OIL PRICE SHOCKS AND MACROECONOMIC PERFORMANCE IN NIGERIA.
1980Q1 – 2013Q4

BY

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BEING A DOCTORAL DISSERTATION SUBMITTED TO THE DEPARTMENT OF ECONOMICS, FACULTY OF SOCIAL SCIENCE, NNAMDI AZIKIWE UNIVERSITY, AWKA, ANAMBRA STATE, NIGERIA, IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF DOCTOR OF PHILOSOPHY IN ECONOMICS

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CERTIFICATION

This is to certify that this dissertation entitled: Oil Price Shocks and Macroeconomic Performance in Nigeria, was carried out by Ijomah, Maxwell Azubuike with registration number 2008117005F, in partial fulfillment of the requirement for the award of Doctor of Philosophy Degree in Economics, Nnamdi Azikiwe University Awka and has not been submitted anywhere for the award of any certificate, diploma or degree.

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DEDICATION

To God Almighty be all the Glory for his infinite mercies and love to achieve this milestone.

To my lovely wife, for her support and my lovely kids Chidera, Chioma, Chukwuebuka and Somtochukwu for their inspiring prayers for God's protection during my Port Harcourt- Awka trips all through the programme.

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ABSTRACT

The Nigerian economy is largely oil-dependent as it accounts for a significant proportion of the Gross Domestic Product. Also the structure of exports in Nigeria shows the acute dominance of this natural resource. This dominance is further revealed especially with regards to revenue generation by the government. Budgetary allocations are many a time made based on projections about the expected path of oil prices thus making the economy susceptible to volatility emanating from the international oil market. This research work examined oil price shocks and macroeconomic performance in Nigeria using quarterly data 1980Q1-2013Q4, the study tested for the time series properties of the variables and adopted the Variance Autoregressive (VAR) technique and the principal component-generalized autoregressive conditional heteroskedasticy (PCA-GARCH) model to estimate the models. Our results showed that oil price shocks do not have substantial effects on government spending, output, interest rate and inflation rate in Nigeria over the period covered by the study. However, the findings demonstrated that fluctuations in oil prices do substantially affect the real exchange rates in Nigeria. The study also revealed that it is not the oil price itself but rather its manifestation in real exchange rates that affects the fluctuations of aggregate economic activity proxy, the GDP. Thus, we conclude that oil price shock is an important determinant of real exchange rates and in the long run real output, while real output and real government expenditure rather than oil price shocks that affects inflation rate in Nigeria. In the light of the above findings, government should eschew unhealthy speculations in the foreign exchange, as well as rent-seeking behaviour, and adopt positive attitudes that are geared towards ensuring stable naira exchange rate.

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CHAPTER ONE

INTRODUCTION

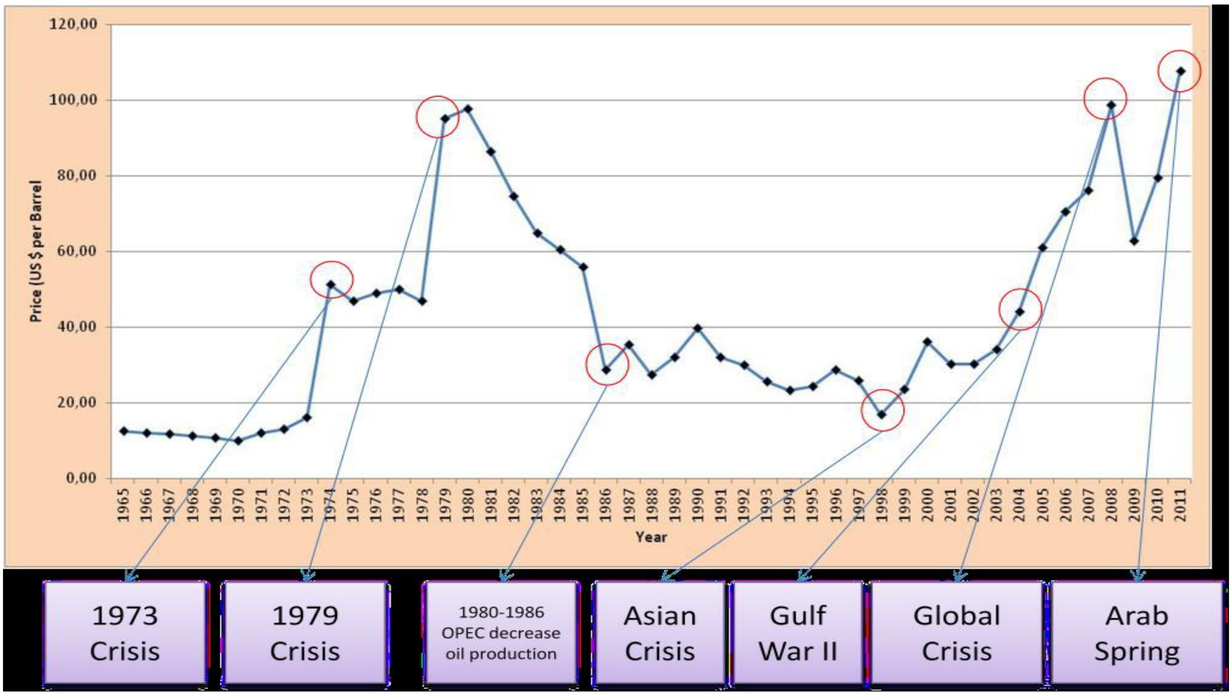
1.1 Background to the Study

Oil is an important commodity in the economy of any country in the world because it is a major source of energy for domestic and industrial uses. Oil therefore serves as an intermediate product and as well as consumers commodity. There are different end products of oil; kerosene, diesel, andgasoline. Any change in the prices of either the crude oil or any of the end products are expected to have impact on theusers and the country at large.

Oil was first discovered in commercial quantities in Nigeria in 1956 at Oloibiri in Niger-Delta, while actual production started in 1958. Since the discovery of oil in commercial quantities in Nigeria, crude oil has been the main stay of the economy and the price of oil plays a vital role in shaping the economic wellbeing of the country. Oil accounts for more than 90% of its export, 25% of its Gross Domestic Product (GDP), and 85% of its government total revenue (Gunu and Kilishi, 2010). Thus, a small oil price change can have a large impact on the economy. For instance a US$1 increase in the oil price in the early 1990s increased Nigerians foreign exchange earnings by about US$650 million (2 percent of GDP) and its government revenue by US$320 million a year (Gunu and Kilishi, 2010). Nigeria is highly vulnerable to fluctuations in the international oil market, given the fragile nature of the economy and the heavy dependence on crude oil proceeds, despite being the sixth largest producer of oil in the world (Akpan, 2009).

When market prices tend to change often over a relatively short time, the market is said to have high volatility. When relative stable prices prevail, the market is said to have low volatility. The price of oil has witnessed significant fluctuations since 1970, it oscillates between $17 per barrel and $26 at different times in 2002 and about $53 per barrel by October 2004 (Philip and Akintaye, 2006). Between 1986 and 2010, oil prices increased more than six folds from $23 per barrel in January 2000 to a peak of $146 per barrel in July 2008 before crashing to $42 per barrel by December 2008. For the year 2009, oil price average $61.73 per barrel (Hassan and Zahid, 2011) and by 2012 it average $72 per barrel.

Figure 1.1: World's oil price shock (1970-2013)



Source: *OPEC Database (http://www.opec.org), accessed 09/05/14, figured by the author*

The price of oil has continued to trend upward since 2003 as a result of the political crisis in the Middle East, particularly, the revolutions in some Arab Countries including Tunisia, Egypt, Libya, Yemen and Syria as well as the Iranian nuclear crisis which led to a ban of the import of Iranian oil by U.S.A and European countries and threats of repercussion from Iran. By February 8, 2013 oil reached $118.90/barrel and on July 18, 2013, oil price hit $109.71 a barrel for Brent crude oil. The catalyst was the removal from office of Egypt's democratically elected President, Mohammed Morsi. Commodities traders worried without reason that the Suez Canal could be closed if unrest spread (EIA report).

The transmission mechanisms through which oil prices have impact on real economic activity include both supply and demand channels. The supply side effects are related to the fact that crude oil is a basic input to production, and consequently an increase in oil price leads to a rise in production costs that induces firms to lower output. Oil prices changes also entail demand-side effects on consumption and investment. Consumption is affected indirectly through its positive relation with disposable income. Oil price rises reduces the consumers spending power. Investment may also be affected if the oil price shock encourages producers to substitute less energy intensive capital for more energy-intensive capital. The magnitude of this effect is in turn stronger the more the shock is perceived to be long-lasting. Furthermore, an oil-price increase leads to a transfer of income from importing to exporting countries through a shift in the terms of trade. The magnitude of the direct effect of a given price increase depends on the share of the cost of oil in the national income, the degree of dependence on imported oil and the ability of end-users to reduce their consumption and switch away from oil. In net oil-importing countries, higher oil prices lead to inflation, increased input costs, reduced non-oil demand and lower investment.

Tax revenues fall and the budget deficit increases, due to rigidities in government expenditure, which drives interest rates up. Given the resistance to real declines in wages, an oil price increase typically leads toupward pressure on nominal wage levels, thereby stimulating wage pressures with far reaching implications which manifests, possibly in all the postulated channels: supply, demand, economic policy reaction, valuation and asymmetric response (Wakeford, 2006).

The Nigeria economy is exposed to oil price shocks since oil contributes over 90% of the total revenue. This shock is so severe that the budget is even tied to a particular price of crude oil and the budget was adjusted in some occasions when there is a sudden change in crude oil price such as the reduction of budget due to a fall in oil prices during the last global financial crisis. This is even worsened due to the fact that despite the four refineries, Nigeria is still exposed to oil price shocks due to massive importation of refined petroleum products. As an oil exporter and importer of refined products, Nigeria is thus vulnerable to oil price volatility.

Foregoing, four oil shocks can be observed in Nigeria. Each of the shocks had connections with some movements in key macroeconomic variables in Nigeria. For instance, the 1973-74, 1979-80, and 2003-2006 periods were associated with price increases while the oil market collapse of 1986 is an episode of price decrease. During the first oil shock in Nigeria (1973-74), the value of Nigeria's export measured in US dollars rose by about 600 per cent with the terms of trade rising from 18.9 in 1973 to 65.3 by 1974. Government revenue which stood at 8 per cent of GDP in 1972 rose to about 20 per cent in 1975. This resulted in increased government expenditure owing largely from the need to monetize the crude oil receipts. Investment was largely in favour of education, public health, transport, and import substituting industries (Nnanna and Masha, 2003).

During the oil price shock of 2003 - 2006, Nigeria recorded increases in the share of oil in GDP from about 80 per cent in 2003 to 82.6 per cent in 2005. The shock was gradual and persisted for a while. This could be regarded as a permanent shock (Akpan, 2009). The result of the shock was a favourable investment climate, increased national income within the period although a slight decline was observed in the growth rate of the GDP.Despite this perceived benefit of oil price change, the macroeconomic environment in Nigeria during the booms was undesirable. For instance inflation was mostly double digit in the 1970s; money supply grew steeply, while huge fiscal deficits were also recorded.

1.2 Statement of the Problem

Issues in oil price volatility and how it impacts on economic growth have continued to generate controversies among economic researchers and policy makers. While some (such as Akpan, 2009; Aliyu, 2009; Olomola, 2006; etc) argue that it can promote growth or has the potential of doing so, others (such as Darby,1982; Cerralo, 2005; etc) are of the view that it can inhibit growth. The former argue that for net-oil exporting countries, a price increase directly increases real national income through higher export earnings, though part of this gain would be later offset by losses from lower demand for exports generally due to the economic recession suffered by trading partners. Whereas, the latter cite the case of net-oil importing countries where oil prices increase lead to inflation, increased input costs, reduced non-oil demand and lower investment. Tax revenues fall and the budget deficit increases, due to rigidities in government expenditure, which drives interest rates up. Because of resistance to real declines in wages, an oil price increase typically leads to upward pressure on nominal wage levels. Wage pressures together with reduced demand tend to lead to higher unemployment, at least in the short term. Thus the impact (positive or negative) which oil price volatility could have on any economy, depends on what part of the divide such economy falls into and of course the nature of such price change (rise or fall). However, the Nigerian economy uniquely qualifies as both an oil exporting and importing economy, by reason of the fact that she exports crude oil, but imports refined petroleum products.

Oil price volatility has been found to have had a more direct effect on the exchange rate of the Naira than probably any other economic variable, this is because crude oil export earnings accounts for a large chunk of Nigeria‘s foreign exchange (about 90%) and thus ultimately determines the amount of foreign reserves of the country which is alarmingly low (about \$30billion from over \$60 billion in 2008) and continuously keeps depleting. Higher crude oil prices also raise inflation, with the magnitude depending in part on the extent of labor market flexibility (wage-cost push inflation) and the ability of producers to pass on cost increases to consumers. Over time, the impact of rising oil prices on activity and inflation depends also on policy responses and supply side effects (IMF, 2005). Thus persistent oil shocks could have severe macroeconomic implications like fluctuation in the GDP which may induce challenges with respect to policy making.

Nigeria's membership of Organization of Petroleum Exporting Countries (OPEC) implies some degree of influence on the international oil market but the level of vulnerability to oil market events is more substantial than the former. In this situation any shock to global oil markets can have a tremendous effect on the structure of the economy. The greatest challenge is when Nigeria generates more revenue from crude oil sales than it budgeted, like presently. Such excesses have always been monetized, creating distortions and inflationary pressure. High oil prices and tight market conditions have also raised fears about oil scarcity and concerns about energy security in many oil-importing countries. Even a small fall in prices may lead to a substantial increase in financing needs, as their exports are not diversified and oil revenue accounts large portion of their total revenue. Consequently, a lack of medium to long-term fiscal framework forces governments to react to oil price volatility by conducting procyclical fiscal policies. A large number of studies show that procyclical fiscal policies have harmful implications in developing countries (Tornell and Lane (1999),Villafuerte and Lopez-Murphy (2010) and Arezki and Ismail (2010)).

Despite the plethora of studies on the oil price macroeconomy relation, the literature is yet to provide conclusive evidence as to how oil price shocks affect the macroeconomy of any country and Nigerian in particular, given the idiosyncrasies inherent in the Nigerian economy.

1.3 Aim and Objectives Of The Study

The broad aim of this study is to estimate the impact of oil price shock on macroeconomic performance in Nigeria and capture its volatility clustering. The specific objectives are:

(1) To investigate the impact of oil price shocks on key macroeconomic variables (i.e. GDP, Inflation rate, Exchange rate, Unemployment rate, government expenditure and Balance of Payment) in Nigeria.

(2) To trace the transmission of symmetric and asymmetric oil price within the economy among the selected macroeconomic variables.

(3) To capture the volatility clustering of oil price vis-à-vis asymmetric oil price and key macroeconomic variables.

(4) To estimate the relationship between current shock of oil price and the conditional volatility of other periods ahead.

1.4 Research Questions

To achieve the objectives of the study, the following research questions will be put forward;

(i) What is the impact of oil price shocks on GDP, Inflation rate, Exchange rate, Unemployment rate, government expenditure and Balance of Payment in Nigeria?

(ii) Do symmetric and asymmetric oil price shock transmit among selected macroeconomic variables?

(iii) How does the volatility clustering of oil price affect key macroeconomic variables and

(iv) What are the relationship between current shock of oil and the conditional volatility of other periods ahead?

These questions are transformed into the following null hypotheses.

1.5 Hypotheses of The Study

The following hypotheses are tested in line with the above stated objectives.

(i) H_0: There is no significant relationship between oil price and key macroeconomic variables during the period under study

H_1: There is a significant relationship between oil price and key macroeconomic variables during the period under study

(ii) H_0: There is no significant transmission of symmetric/asymmetric shocks of oil price among selected macroeconomic variables.

H_1: There is a significant transmission of symmetric/asymmetric shocks of oil price among selected macroeconomic variables.

(iii) $H_{0:}$ There is no volatility clustering of oil price among key macroeconomic variables.

$H_{1:}$ There is a volatility clustering of oil price among key macroeconomic variables.

(iv) H_0 : Current shock of oil price has no relationship with the conditional volatility of other periods ahead?

H_1 : Current shock of oil price has a significant relationship with the conditional volatility of other periods ahead?

1.6. Significance of the Study

The issue of oil price volatility is very important as Nigerian's economy is severely dominated by oil export. Since the world oil market has been highly volatile over the past periods, interpreting macroeconomic fundamentals behind the influence of the price shocks on the economic growth is crucial for economic policy makers. Estimating the consequences of oil price shocks on growth is particularly relevant in the case of Nigeria since, as a small open economy it has no real influence on the world price of oil. This research work therefore reconsiders this asymmetry issue within the context of the broader impacts on prices as well as on key macroeconomic variables in the economy.

This study will help to ginger a policy debate on the causes of oil price fluctuations in economic growth and the consequences of current shock on the volatility, of other periods ahead. This is very vital for policy forecasting and adjustment especially in this era where every country is aiming at targeting rules.

1.7 Organisation of the Study

This research study will be organised into five chapters. Chapter one will focus on the context of the problem, research problem, objectives of the study, significance of the study, scope and limitations of the study. Chapter two will review related literature and theoretical frame work of the study. Chapter three is research methodology. Chapter four will highlight presentation and analysis of data. Finally Chapter five is the summary/conclusion and will proffer recommendations for the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

In this chapter, we present the theoretical foundations for crude oil price shock including oil price transmission mechanism. We also review relevant literature on oil price shocks to enable us understand its impact on key macroeconomic variables. These theoretical foundations provide a framework within which to pursue the study objectives as well as to explain the findings therein.

2.2 Theoretical Foundations For Oil Price Shocks

There has been extensive theoretical work on the macroeconomic consequences of oil price shocks. Most of these studies argued that since the mid-1970s, oil price movements have been a major source of business cycle fluctuations, but rather failed to reach consensus on the validity of a peculiar transmission channel that helps to explain the processes by which fluctuations in oil prices influence the macro economy. The oil response to an oil price shock depends on how that shock impacts on the economy. Several different channels have been proposed to account for the inverse relationship between oil price movements and aggregate economic activity.

According to Hunt *et al.* (2002), an increase in oil prices can influence the economy through many channels. The first mechanism reflects the transfer of income from oil-importing to oil-exporting countries, which leads to a decrease in global demand in the oil-importing nations. The decrease in demand in the oil-importing countries outweighs the increase in the oil-exporting countries because of an assumed low propensity to consume in the latter. Secondly, given the level of capital stock and assuming that wages are relatively inflexible in the short run, an increase in input costs of production will result in non-oil output being affected. Also, since crude oil is a basic input in production, an increase in oil prices leads to an increase in production costs. The third channel is when workers and producers resist a decrease in their real wages and profit margins. This results in upward pressure on labour costs and prices. The fourth channel is through the definition of core inflation. An increase in energy prices raises the consumer price index, leading to calls for action from the central bank.

A tight monetary policy has dire consequences on economic output. Finally, the extent to which monetary authorities' reactions are inconsistent with announced policy objectives could erode their credibility.

2.2.1 Channels of Transmission of an Oil Price Shocks

The transmission mechanisms through which oil prices have impact on real economic activity includes both the supply and demand channels. The most basic is the classic supply-side effect in which rising oil prices are indicative of the reduced availability of a basic input to production. Other explanations include income transfers from the oil-importing nations to the oil-exporting nations, a real balance effect and monetary policy. Of these explanations, the classic supply-side effect best explains why rising oil prices slows GDP growth and stimulates inflation.

Supply Side Channel

Since oil is a factor of production in most sectors and industries, a rise in oil prices increases the enterprises' production costs and thus, stimulates contraction in output (Jimenez-

Rodriguez and Sanchez 2004). Given a firm's resource constraints, the increase in the prices of oil as an input of production reduces the quantity it can produce. Hunt, Isard and Laxton (2001) add that an increase in input costs can drive down non-oil potential output supplied in the short run given existing capital stock and sticky wages. Moreover, workers and producers will counter the declines in their real wages and profit margins, putting upward pressure on unit labour costs and prices of finished goods and services.

According to Verleger (1994), oil price volatility shrinks investment activities in production of oil and gas. In addition a "permanent increase in volatility might lead to a situation where future capacity will always be a little lower than in a world of zero price volatility and prices a little higher". Hamilton (1996) shares the same point and stresses that concerns on oil prices variability and oil supply disruptions could cause postponement of investment decisions in the economy.

There is also a possibility of a "structural shift" and a period of adjustment within an economy when prices of oil increase. As oil becomes relatively expensive vis-à-vis other intermediate goods, energy-intensive industries contract their production whereas less energy-dependent sectors and more efficient users expand. Such period of adjustment is costly and time-consuming with higher unemployment and resource underutilization.

Generally, the studies tend to find that oil price increases have a negative impact on output, while this impact seems to have weakened over time, especially since the late 1990s. One interpretation is that, since the late 1990s, the global economy has experienced two major oil shocks. While being of a sign and magnitude comparable to those of the 1970s, GDP growth and inflation have remained quite stable in the majority of industrialized countries. According to Blanchard and Gali (2007), a plausible explanation is that the effects of an oil price increase are similar across periods, but have coincided in time with large shocks of a very different nature: large increases in other commodity prices in the 1970s, and high growth of productivity and world demand for oil in the 2000s. Turning to CPI, an oil price increase represents an inflationary shock (Fuhrer, 1995; Gordon, 1997; Hooker, 2002) which can be accompanied by second round effects, through the price-wage loop. The reaction of consumer prices and inflation to oil price movements has been investigated by many authors, such as Hooker (2002), Barsky and Kilian (2004) or LeBlanc and Chinn (2004). While Barsky and Kilian (2004) show that oil price increases generate high inflation, LeBlanc and Chinn (2004) argue that oil prices have only a moderate impact on inflation.

Demand Side Channel

As presented earlier, oil price increases translate to higher production costs, leading to commodity price increases at which firms sell their products in the market. Higher commodity prices then translate to lower demand for goods and services, therefore shrinking aggregate output and employment level. Furthermore, higher oil prices affect aggregate demand and consumption in the economy. The transfer of income and resources from an oil-importing to oil-exporting economies is projected to reduce worldwide demand as demand in the former is likely to decline more than it will rise in the latter (Hunt, Isard and Laxton 2001). The resulting lower purchasing power of the oil-importing economy translates to a lower demand. Also, oil price shocks pose economic uncertainty on future performance of the macroeconomy.

People may postpone consumption and investment decisions until they see an improvement in the economic situation. In sum, an increase in oil prices causes a leftward shift in both the demand and supply curve, resulting to higher prices and lower output.

Tang *et al.* (2010) in a study of the short and long-term effects of oil shocks on the Chinese economy identified six transmission channels. Namely: Supply-side shock effect, focusing on the direct impact on output due to the change in marginal producing costs caused by oil-price shock; wealth transfer effect, emphasizing on the different marginal consumption rate of petrodollar and that of ordinary trade surplus; inflation effect, analyzing the relationship between domestic inflation and oil prices; real balance effect, investigating the change in money demand and monetary policy; sector adjustment effect, estimating the adjustment cost of industrial structure, which is mainly used to explain the asymmetry in oil-price shock impact; and unexpected effect, focusing on the uncertainty over oil price and its impact. These channels have been proven to be valid in industrialized countries.

According to the authors, crude oil is one of the most fundamental and crucial raw materials for industrial production and the change in its price can affect the output directly. As Arrow (1) in figure 1.2 indicates, oil-price shocks can increase the marginal cost of production in many industries, and thus reduce the production. This is referred to as the supply-side shock effect. The reduction of output due to the cut in capacity utilization can recover quickly within the range of capacity. However, oil-price shocks also have long-term effect on output which is carried out through price/ monetary transmission mechanism (Arrow (3)).

Cost shocks in the upstream industry can be transmitted from producers and sectors to end-users. A well developed industrial chain can transmit inflationary shock from upstream to down-stream, leaving the producers' profit rate slightly affected. That can raise the overall cost for consumers and producers, thus reducing the consumers' real balance. This transmission ends up with the reduction of consumption and the real output as well. This is the story witnessed in most developed countries. But in China, hackneyed price controls, surplus production due to limited domestic demand and tough price competition in exporting sectors make the output prices very sticky (Arrow (3)) (Tang *et al.*, 2010).

Due to limited space for mark-up, down-stream producers could only reduce their profit to assimilate the cost increase, which would doubtlessly cause the decrease in their investment. Since investment determines the increase of production capacity, i.e. the potential output ability, which cannot recover in a short period of time even when the cost shock disappears, a decrease in investment would abate output in the long run. In the authors' view, this channel is more important and dominant in China. Real balance decrease can enlarge money demand in the market while investment decrease can lessen it, so the net impact of an oil price shock on interest rate is unclear and neither the corresponding monetary policy needed (Tang *et al.*, 2010). Similar theoretical analysis was asserted to be valid by Jin (2008), West African Monetary Agency, WAMA (2008) and Lescaroux and Mignon (2008), who also added that the macroeconomic effects of oil shocks are transmitted via supply and demand side channels and are substantially minimized by economic policy reactions. Altogether, two major channels (demand and supply) have been put forward, in addition to three other recent ones (economic policy reactions, valuation and asymmetric response). Precisely, the supply side channel focuses on oil as an input in the industrial and production processes, with its attendant effects on firm's productivity and supply, non-oil potential supplies, workers' and producers' real wages and profit margins (Jiménez-Rodríguezand Sánchez 2005; Hunt *et al.*, 2002). Other identified manifestations of supply side channel consequences include, the tendency of shrinking current investment in the oil and gas sector as well as aggravating future potentials (Hamilton, 1996), just as possible structural shift occasioned by changes in resource (capital and labour) requirements in both energy-intensive and non-energy-intensive industries due to oil price volatility.The demand side channel consequences of increase in oil prices reflects through lower demands due to high production cost induced higher selling price; transfer of income and resources from oil-importing to oil-exporting economies which affects aggregate demand and consumption globally as demand in the former is likely to decline more than it will risein the latter (Hunt *et al.*, 2002) and heightened economic uncertainty(WAMA, 2008).

Other identified channels such as economic policy reactions, valuation, and asymmetric response are considered as follows: Economic policy reactions occur through monetary authorities' actions toward curtailing adverse effects of increase in oil price such as inflation and lower aggregate demand, through interest rate and money supply. Money supply plays a role in the negative correlation between oil prices and economic activity, as the real money balances channel presupposes that increases in oil prices cause inflation which, in turn, reduces the quantity of real balances in the economy (Ferderer, 1996). Besides, counter-inflationary monetary policy responses to oil price shocks are considered responsible for the real output losses associated with these shocks.

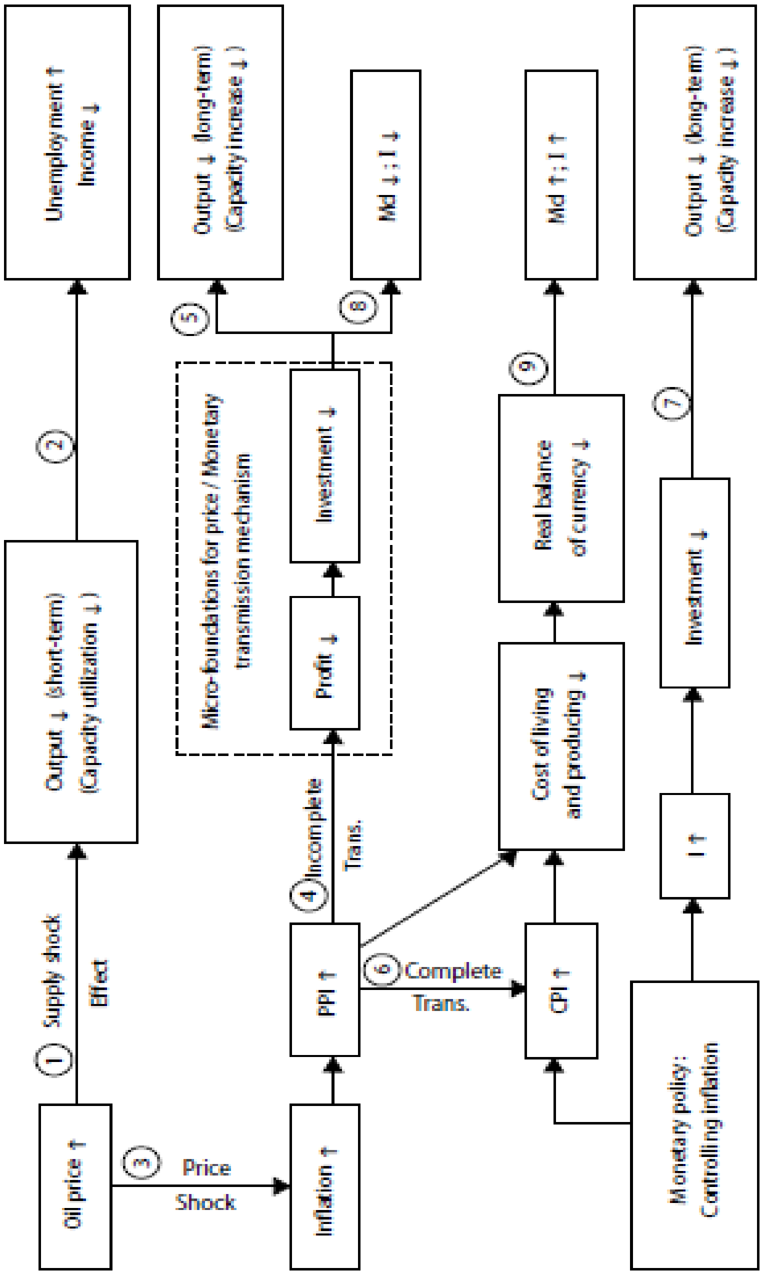
Asymmetric response channel relates to identifying the responses between oil prices and macroeconomic variables, such as GDP responses and employment. One of these include sectoral shifts hypothesis, similar in nature to the demand side effects, as oil price shocks lead to many costs in the form of job losses in one sector or region and net changes in aggregate employment. Second is the demand decomposition mechanism which operates eventually through employment but begins as a disturbance to sector-specific demand. Last is the investment pause effect in which reductions in orders and purchases remain uncertain. To deal with cases where oil price decreases, unlike increases, have positive real income (terms-of-trade) effects that offset identified negative impacts, many time series modellers include nonlinear, asymmetric oil-price specifications (Mork, 1989). Mork hypothesized that oil price decreases had little effects on economic activity compared to oil price increases. His results confirmed this hypothesis by incorporating both an oil price increase variable and anoil price decrease variable in the model.

The valuation channel of adjustment relies on changes in asset prices inresponse to oil demand and oil supply shocks. The magnitude and the nature of these capital gains and losses depend on the size of the initial gross foreign asset holdings and liabilities of oil importers and exporters, as well as their precise composition by financial instrument and currency. Standard diversification arguments suggest that oil-exporters should hold some of their wealth in the form of assets in oil importing economies (and *vice versa*). This diversification of asset holdings plays an important role.

Under the additional assumption that an increase in the price of oil, *ceteris paribus*, will cause profits and asset prices to increase in the oil-exportingeconomy (and to fall in the oil-importing economy), some of the increasedwealth associated with higher oil prices will be transferred from oil exportersto oil importers. Thus, positive oil-specific demand shocks and negativeoil supply shocks should be associated with a temporary capital loss in oilexporting countries (and a corresponding capital gain in the rest of theworld). In the long-run, asset prices return to their steady state level and the valuation channel vanishes. However, it is suggested that the valuation effect should be larger for oil exporters than for oil importers, *ceteris paribus*.

Although this prediction ignores the important role of relative exchange rate adjustments triggered by oil demand and oil supply shock, in general, one would not expect the stylized bilateral and symmetric model to generate accurate predictions for specific oil-importing economies.

Figure 2.1. Oil Price Shocks-macroeconomy Transmission Channel



Source: Adapted by the authors from Tang et al. (2010).

2.2.2 The Effect of Oil Price Shocks on Oil-Importing Economies

The Supply-Side Channel

An exogenous increase in the real price of imported crude oil from the point of view of an oil-importing economy is a terms-of-trade shock. Such terms-of-trade shocks traditionally have been thought to matter for the oil-importing economy through their effects on production decisions (Kim and Loungani 1992; Backus and Crucini 2000). In this view, oil is treated as an intermediate input in domestic production. How imported oil enters the production function for domestic value added is one of the most studied and least resolved issues in empirical macroeconomics. There are well-known problems in explaining a decline in real GDP based on this intermediate input cost or supply channel.

The first problem is that the interpretation of crude oil as an intermediate input in the value added production function is questionable if we think of oil as an imported commodity. Under standard assumptions, imported oil enters the production function of domestic gross output, but it does not enter the production function of domestic value added (Rotemberg and Woodford 1996). Since gross output is separable in value added and imported energy, holding capital and labor fixed, oil price shocks do not move value added. Hence, oil price shocks by definition cannot be interpreted as productivity shocks for real GDP (Barsky and Kilian 2004). Rather they affect the domestic economy by changing domestic capital and labor inputs.

The second problem is that, to the extent that oil prices affect domestic output, under standard assumptions their impact should be bounded by the cost share of oil in domestic production, which is known to be very small. For example, for the United States, the ratio of imported and domestically produced crude oil in GDP has been fluctuating between 1 and 5 percent (see Edelstein and Kilian 2007). Thus, if oil price shocks are viewed as cost shocks for the oil-importing economy, their effect by construction cannot be very large. Indeed, Backus and

Crucini (2000) have demonstrated that standard production-based general equilibrium models of the transmission of oil price shocks are not capable of explaining large fluctuations in real GDP.

This type of result came as a surprise to many researchers who expected oil price shocks to be a major determinant of the business cycle. This spurred interest in the development of less conventional macroeconomic models that would be able to explain large effects of oil price shocks on real GDP. There are three such proposals in the literature. The first proposal by Rotemberg and Woodford's (1996) relies on large and time-varying markups to generate large effects of oil price shocks on real GDP. The second proposal is Atkeson and Kehoe's (1999) putty-clay model which appeals to capital energy complementarities in production. The third proposal is due to Finn (2000). Finn establishes that in a perfectly competitive model, in which energy is essential to obtaining a service flow from capital, there is a large effect of oil price shocks on real GDP. In all three models, the supply channel of the transmission of oil price shocks may be quantitatively important, yet there is no consensus which, if any, of these models has empirical support. For example, it remains to be shown that mark-ups in the U.S. economy are as large and as time-varying as required for the Rotemberg and Woodford model. Likewise, it has yet to be shown that changes in capacity utilization in response to oil price shocks are indeed as important and pervasive in the real world as they are in Finn's model. Similarly, the microeconomic evidence on the existence and quantitative importance of capital-energy complementarities is mixed at best. A second unresolved issue is whether these models can account for a large share of business cycle fluctuations in real GDP. A third issue is that all three models postulate that oil prices follow an exogenous stochastic process, an assumption that is at odds with both the data and standard economic models of the oil market. It is fair to say that these alternative explanations are fragile in that they depend on very specific modeling assumptions, that they have never become universally accepted, and that their quantitative importance is open to debate. For example, Wei (2003) concluded that an extended version of Atkeson and Kehoe's model is unable to explain stock market fluctuations following the 1973/74 oil price shock episode.

The Demand-Side Channel

In the absence of an empirically supported model of the supply channel, there is no reason to expect global oil price shocks to exert major effects on oil-importing economies. In part in response to these challenges, another branch of the literature has developed that focuses on the reduction in the demand for goods and services triggered by energy price shocks rather than treating energy price shocks as aggregate supply shocks for the oil-importing economy (or as cost shocks for domestic production). In this alternative view, the primary channel of transmission is on the demand side of the economy. For example, in a recent survey on the effects of energy price shocks, Hamilton (2008) stresses that a key mechanism whereby energy price shocks affect the economy is through a disruption in consumers' and firms' spending on goods and services other than energy. This view is consistent with evidence from industry sources of how oil price shocks affect U.S. industries. Most U.S. firms perceive energy price shocks as shocks to the demand for their products rather than shocks to the cost of producing these products (Lee and Ni 2002). Related results based on sectoral stock return responses are in Kilian and Park (2009).

This alternative view is also shared by many policymakers. There is a widespread perception that an increase in energy prices slows economic growth primarily through its effects on consumer spending (Bernanke 2006). The remainder of this subsection outlines the economic rationale for this demand channel of transmission and assesses its empirical support. The demand channel by construction relates to retail energy price shocks rather than crude oil price shocks. In practice, that distinction is often ignored on the grounds that in the long-run there is strong co-movement between the prices of crude oil and retail energy.

There are four complementary mechanisms by which energy price changes may directly affect consumer expenditures (Edelstein and Kilian 2009). First, higher energy prices reduce discretionary income, as consumers have less money to spend after paying their energy bills. All else equal, this discretionary income effect will be the larger, the less elastic the demand for energy, but even with perfectly inelastic energy demand the magnitude of the effect of a unit change in energy prices is bounded by the energy share in consumption. For the United States, for example, the share of energy in consumer expenditures fluctuates between 4% and 10% (Edelstein and Kilian 2009). Although this expenditure share is higher than the corresponding share on the production side, it is still too low to explain very large effects on real GDP by itself.

Second, changing energy prices may create uncertainty about the future path of the price of energy, causing consumers to postpone irreversible purchases of consumer durables (Bernanke 1983, Pindyck 1991). Unlike the first effect, which applies to all forms of consumption, this uncertainty effectis limited to irreversible purchases. It is usually thought to apply to consumer durables, especially energy-using consumer durables.

Third, even when purchase decisions are reversible, consumption may fall in response to energy price shocks, as consumers increase their precautionary savings. This response may arise if consumers smooth their consumption because they perceive a greater likelihood of future unemployment and hence future income losses. By construction, this effect will embody general equilibrium effects on employment and real income. In addition, the precautionary savings effect may also reflect greater uncertainty about the prospects of remaining gainfully employed, in which case any unexpected change in the price of energy would lower consumption.

Finally, consumption of durables that are complementary in use with energy (in that their operation requires energy) will tend to decline even more, as households delay or forego purchases of energy-using durables. This operating cost effect is more limited in scope than the uncertainty effect in that it only affects specific consumer durables. It should be most pronounced for motor vehicles (Hamilton 1988).

Although these four effects are usually discussed in the context of consumer expenditures, similar arguments apply to investment expenditures by firms. For example, Bernanke's (1983) and Pindyck's (1991) analysis of the uncertainty effect was originally intended to explain firm's investment decisions. Similarly, the operating cost effect applies to firm's purchases of vehicles.

The four direct effects on consumption and investment expenditures have in common that they imply a reduction in aggregate demand in response to unanticipated energy price increases. In addition, there may be indirect effects related to the changing patterns of consumption and investment expenditures. A large literature has stressed that shifts in expenditure patterns driven by the uncertainty effect and operating cost effect amount to allocative disturbances that are likely to cause sectoral shifts throughout the economy (Davis (1987) and Hamilton (2008) for a review). For example, it has been argued that reduced expenditures on energy-intensive durables such as automobiles may cause the reallocation of capital and labor away from the automobile sector. As the dollar value of such purchases may be large relative to the value of the energy they use, even relatively small changes in energy prices (and hence in the purchasing power of consumers) can have large effects on output and employment (Hamilton 1988). A similar reallocation may occur within the same sector, as consumers switch toward more energy efficient durables (Hamilton 1988; Bresnahan and Ramey 1993).

In a standard neoclassical model, reallocations driven by relative price changes will be smooth and instantaneous. In the presence of frictions in capital and labor markets, however, these intersectoral and intrasectoral reallocations will cause resources to be unemployed, thus causing further cutbacks in consumption and amplifying the effect of higher energy prices on the real economy. For example, it does not seem feasible to ship machinery or relocate workers from automobile manufacturers in Detroit to software producers in Silicon Valley when the real price of oil increases, short of substantial retraining and retooling. Thus, these resources will remain idle for extended periods in response to major oil price increases, causing private consumption to fall and tax revenues to erode, followed by cutbacks in public consumption. This indirect effect could be much larger than the direct effects listed earlier, and is considered by many economists to be the primary channel through which energy price shocks affect the economy Davis and Haltiwanger (2001) and Lee and Ni (2002) and the references therein). Concerns over reallocation effects also help explain the preoccupation of policy makers with the effects of energy price shocks on the automobile sector (Bernanke 2006).

The Monetary Policy Channel

Another channel that may help amplify the effects of oil price shocks on real output is the endogenous policy response of the central bank to oil price shocks. Bernanke, Gertler and Watson (1997), henceforth referred to as BGW, stipulated that the Federal Reserve, when faced with potential or actual inflationary pressures triggered by a positive oil price shock, responds by raising the interest rate, amplifying the decline in real output associated with oil price shocks. In assessing the effect of this policy response from vector autoregressive (VAR) models, BGW postulated a counterfactual in which the Federal Reserve holds the interest rate constant. In other words, the Fed is not responding to any of the effects of the oil price shock on the economy. BGW concluded that the Fed's systematic and anticipated response to oil price shocks is the main cause of the recessions that tend to follow oil price shocks and that these recessions could have been avoided (at the cost of higher inflation) by holding the interest rate constant.

BGW's results have not remained unchallenged. For example, Hamilton and Herrera (2004) showed that the estimates in BGW are sensitive to the choice of the VAR lag order. Allowing for additional lags undermines the importance of the policy response. They also demonstrated that implementing a constant interest rate policy would have required policy changes so large to be unprecedented historically and hence not credible in light of the Lucas critique, a point acknowledged by Bernanke, Gertler and Watson (2004). This evidence has done little to diminish the appeal of BGW's results among economists, however.

BGW's empirical results also have motivated a theoretical literature that examines the potential macroeconomic impact of monetary policy responses to oil price shocks using dynamic stochastic general equilibrium (DSGE) models. The conclusions reached in this literature very much depend on the specification of the DSGE model. Whereas Leduc and Sill (2004), for example, concluded that in their DSGE model monetary policy contributes about 40 percent to the drop in real output following a rise in the price of oil, Carlstrom and Fuerst (2006), found that under alternative assumptions the entire decline in U.S. real output following an oil price shock may be due to oil and none attributable to monetary policy. Thus, the key question remains of how plausible the original empirical estimates in BGW are. The empirical analysis in BGW, however, is based on the class of asymmetric empirical models that Kilian and Vigfusson (2009) showed to be inconsistent. Moreover, as discussed earlier, the data appear to be fully consistent with symmetric responses to oil price shocks.

Kilian and Lewis (2009) therefore recently have reestimated the BGW model under the assumption of symmetry. They show that there is no evidence that monetary policy responses to oil price shocks are to blame for the recessions of the 1970s and early 1980s, contrary to the conclusion of BGW. This result should not be surprising. Although few researchers have questioned the narrative in BGW, the rationale for the policy response they stipulated is not self- evident. As discussed in Kilian and Lewis (2009), there are three problems.

First, it is widely accepted that the Federal Reserve in the 1970s was as much concerned with maintaining output and employment as it was concerned with containing inflation. In fact, it has been argued that the Federal Reserve was overly concerned with the output objective during this period (see, e.g., Barsky and Kilian 2002). To the extent that oil price shocks are recessionary, in the absence of a policy response one would have expected the Fed to ease rather than tighten monetary policy in response; and even if one were to grant that oil price shocks also have inflationary effects, it would not be obvious that the appropriate policy response on balance would be to raise the interest rate. In fact, BGW's notion of a policymaker responding aggressively to inflationary pressures seems more consistent with the Volcker era than with U.S. monetary policy in the 1970s.

Second, while a robust theoretical finding is that oil price shocks are at least mildly recessionary in the absence of a monetary policy response, it is not clear that oil price shocks are necessarily inflationary. For simplicity suppose that a one-time oil price shock occurs, while everything else is held constant. As discussed earlier, there are two main channels of transmission. One is the increased cost of producing domestic output (which is akin to an adverse aggregate supply shock); the other is the reduced purchasing power of domestic households (which is akin to an adverse aggregate demand shock). The latter channel of transmission may be amplified by increased precautionary savings and by the increased operating cost of energy-using durables, as discussed earlier. Empirical evidence suggests that the supply channel of transmission is weak and that the demand channel of transmission dominates in practice (Kilian 2008b). On that basis, one would expect an exogenous oil price shock, if it occurs in isolation, to be recessionary and deflationary, suggesting that there is no reason for monetary policy makers to the raise interest rate at all. In fact, one could make the case that policy makers should lower interest rates to cushion the recessionary impact. Moreover, if both the aggregate demand and the aggregate supply curves shift to the left, as seems plausible, the net effect on the domestic price level is likely to be small, so there is little need for central bankers to intervene under the price stability mandate. Thus, unless a good case can be made for the risk of a wage-price spiral, oil price shocks would not be expected to cause sustained inflation. This analysis shows that BGW implicitly take the rather extreme view that oil price shocks necessarily represent adverse aggregate supply shocks that are both recessionary – if only mildly so because otherwise there would be no need for an amplifier – and inflationary.

The third problem is BGW's premise that innovations to the price of oil are exogenous with respect to the U.S. economy. The recent literature has established that oil price shocks do not take place in isolation, violating the premise of the analysis in BGW. This point matters. Kilian and Lewis (2009) showed that the Federal Reserve on average has been responding differently to oil price shocks driven by global demand pressures than to oil price shocks driven by oil supply disruptions, for example. In response to positive oil demand shocks, it tended to raise the interest rate in response, whereas in response to negative oil supply shocks it tended to lower the interest rate. Thus, the Federal Reserve's policy response appears to have been much more sophisticated than BGW's model gives it credit for. These findings suggest that DSGE models of monetary policy responses in particular must account for a variety of structural shocks in the crude oil market, each of which may necessitate a different policy response. For example, the policy response required for dealing with oil price shocks reflecting shifts in the global demand for oil driven by unexpected growth in emerging Asia should look different from the response required in dealing with oil price shocks triggered by oil supply disruptions in the Middle East. In short, it does not make sense for a central banker to respond to all oil price shocks the same way without regard to the causes of the oil price shock. This point has been established rigorously in Nakov and Pescatori (2009). Within the context of a stylized DSGE model they show that it is suboptimal from a welfare point of view for a central bank to respond to oil price shocks rather than to the underlying causes of these oil price shocks.

2.2.3 The Effect of Oil Price Volatility on Oil-Exporting Economies

Most oil exporters rely on oil revenues as their main source of revenue. While falling oil prices can put serious strains on oil producers' fiscal balances and on their ability to borrow from abroad, rising oil prices can typically be accommodated easily by oil producers. Some of the additional revenues due to rising oil prices tend to be used to finance imports from the rest of the world, helping to stabilize oil-importing economies. In addition, there are good reasons for oil exporters to recycle some of these oil revenues into the global financial system. First, there is an incentive for oil producers to smooth expenditures in anticipation of future declines in the real price of oil. Second, if the oil producer decides to use the extra revenue to diversify the domestic economy, the ability of the domestic economy of oil exporters to absorb infusions of capital is limited. Thus, inevitably, oil exporters must save the revenue that cannot be invested domestically. Given the absence of savings and investment opportunities in the region, these petro dollars must be invested in oil-importing economies. A good example is the sovereign wealth funds maintained by many oil-producing countries.

One obvious concern for some oil producers is that they face a risk of their assets being frozen or expropriated, if they pursue foreign policies at odds with the interests of the countries in which they invest. For most oil producers that risk is negligible. More importantly, oil producers' investments abroad are subject to foreign exchange risk and inflation risk, as the experience of the 1970s demonstrated. To the extent that oil producers import goods from countries other than the United States, a fall in the value of the dollar and unexpected U.S. inflation will erode the oil revenues invested in the United States, creating an incentive for oil producers to diversify their foreign asset holdings. Opportunities for purchasing liquid financial assets other than U.S. Treasury bills are limited, however, which has led many OPEC oil producers to invest in stocks of major European manufacturing companies.

In practice, suitable opportunities for investments abroad often are limited, causing oil revenue funds to be parked in international banks. This influx of deposits tends to create conditions of easy global credit. In the 1970s, this problem was resolved by banks lending the capital they received from OPEC countries to borrowers in oil-importing developing countries without much regard to creditworthiness. While this petro-dollar recycling successfully helped many oil-importing countries cope with external deficits in the short-run, the reliance on short-term financing of longer-term deficits ultimately caused the global debt crisis of the 1980s, when credit dried up as global interest rates increased.

In addition, banks discovered oil producers as likely prospects for making loans, as high oil prices seemed to guarantee the creditworthiness of this new clientele. Given the lack of productive investment opportunities in oil producing countries, these loans tended to finance higher imports and higher domestic consumption levels. This proved a miscalculation because oil prices did not remain high forever, causing even oil-rich countries such as Mexico to go into default and threatening the stability of the international financial system. This problem of over borrowing by oil producers during oil price booms has by no means been resolved, as the recent experience of Dubai shows. The next section explores in more detail the transmission of oil demand and oil supply shocks and the interdependencies between oil exporters and oil importers created by the international financial system.

Oil Price Shocks in Nigeria

Oil price shocks are predominantly defined with respect to price fluctuations resulting from changes in either the demand or supply side of the international oil market (Hamilton, 1983; Wakeford, 2006). These changes have been traditionally traced to supply side disruptions such as OPEC supply quotas, political upheavals in the oil-rich Middle East and activities of militant groups in the Niger Delta region of Nigeria. The shocks could be positive (a rise) or negative (a fall). Two issues are identified regarding the shocks; first is the magnitude of the price increase which can be quantified in absolute terms or as percentage changes, second is the timing of the shock, that is, the speed and persistence of the price increase. Going by the foregoing, four oil shocks can be observed in Nigeria. Each of the shocks had connections with some movements in key macroeconomic variables in Nigeria. For instance, the 1973-74, 1979-80, and 2003-2006 periods were associated with price increases while the oil market collapse of 1986 is an episode of price decrease. During the first oil shock in Nigeria (1973-74), the value of Nigeria's export measured in US dollars rose by about 600 per cent with the terms of trade rising from 18.9 in 1982 to 65.3 by 1974. Government revenue which stood at 8 per cent of GDP in 1972 rose to about 20 per cent in 1975. This resulted in increased government expenditure owing largely from the need to monetize the crude oil receipts. Investment was largely in favour of education, public health, transport, and import substituting industries (Nnanna and Masha, 2003).

During the oil price shock of 2003-2006, Nigeria recorded increases in the share of oil in GDP from about 80 per cent in 2003 to 82.6 per cent in 2005. The shock was gradual and persisted for a while. This could be regarded as a permanent shock. The result of the shock was a favourable investment climate, increased national income within the period although a slight decline was observed in the growth rate of the GDP. Despite this perceived benefit of oil price change, the macroeconomic environment in Nigeria during the booms was undesirable.

2.2.4 The Role of Asymmetry in the Responses to Oil Price Shocks

In standard models of the transmission of energy price shocks, the response of real output to a negative energy price shock will be the exact mirror image of the response to a positive energy price of the same magnitude. Unlike the discretionary income effect, the uncertainty effect and the reallocation effect necessarily generate asymmetric responses of macroeconomic aggregates to unanticipated energy price increases and decreases, as does the component of the precautionary savings effect driven by uncertainty. The asymmetry arises because these effects amplify the response of macroeconomic aggregates to energy price increases, but reduce the corresponding response to falling energy prices. Such mechanisms allow us to explain much larger recessions in response to positive oil price shocks than conventional models, while being consistent with the perception that negative oil price shocks of the same magnitude do not generate expansions of comparable magnitude. The fact that theoretical models embodying asymmetries are capable of explaining much larger recessions in response to positive oil price shocks than conventional models has attracted much attention.

In fact, models of the transmission of oil price shocks involving asymmetries have been popular in empirical research since the 1990s (Mork 1989; Lee, Ni and Ratti 1995; Hamilton 1996, 2003; Davis and Haltiwanger 2001; Lee and Ni 2002). Initially, researchers experimented with models in which only oil price increases matter. Subsequent research has refined this idea and introduced measures of net oil price increases. The net increase measure of oil price shocks was based on the (untested) premise that consumers and firms only respond to oil prices if the current oil price is larger than its maximum in recent history. An obvious advantage of this class of empirical models is that they do not require the researcher to take a stand on the mechanism generating the asymmetry of the response to oil price shocks. Finally, these models were considered more credible than conventional models because they generated much larger responses to positive oil price shocks, in line with subjective beliefs about the importance of oil price shocks for the economy (Bernanke, Gertler and Watson 1997). Recent research, however, has shown that the response estimates reported in this literature are spurious because this type of asymmetric models of the transmission of energy price shocks is fundamentally misspecified (Kilian and Vigfusson 2009). By construction these models yield inconsistent parameter estimates. In addition, the responses of output and employment to energy price shocks in these models were routinely computed incorrectly, causing the estimated responses to positive oil price shocks to look larger than they really are. Finally, the statistical tests used in support of allowing for asymmetric responses to energy price shocks were inappropriate for this task. More appropriate tests proposed in Kilian and Vigfusson (2009) reveal no statistically significant evidence of asymmetric responses to energy price shocks for the United States.

If the linear symmetric model provides a good approximation, as the results in Kilian and Vigfusson (2009) show, then what caused sharply higher energy prices in 1979 to be followed by a major recession, whereas sharply lower energy prices in 1986 were not followed by a major economic expansion? Edelstein and Kilian (2007, 2009) demonstrate that much can be learned from decomposing real GDP growth in 1986. They show that the lackluster performance of real GDP in 1986 despite falling oil prices can be traced to nonresidential investment expenditures. There actually is no evidence of asymmetries in consumption growth or in residential investment growth. The reason nonresidential investment expenditures did not increase more in 1986 appears to be due in part to an exogenous decline in business investment in 1986, related not to the fall in energy prices but arguably to the 1986 Tax Reform Act. This effect was exacerbated by the response of investment in the petroleum and natural gas industry to the collapse of OPEC in late 1985, which far exceeded the response one would have expected to a decline in energy prices alone. Moreover, composition effects from aggregating investment expenditures related to petroleum, coal and natural gas mining and all other investment expenditures helped generate an apparent asymmetry in the growth of aggregate investment. Hence, the asymmetry in the real GDP growth data seems to be largely a statistical artifact.

The growing body of evidence against asymmetric effects of energy price shocks is important in that it allows us to remove from consideration all theoretical models of the transmission of oil price shocks that imply asymmetries. Because it is precisely these models that are required to rationalize a strong recessionary effect of oil price shocks, we conclude that the effect of oil price shocks on the economy historically has tended to be only fairly moderate. Oil price shocks have not been one of the key driving forces of postwar recessions. This does not mean that oil price shocks do not matter as a contributing factor. Edelstein and Kilian (2007, 2009) based on a detailed analysis of U.S. consumer and business investment expenditures documented that the demand channel of the transmission of oil prices is actually more important than the small share of energy in expenditures would suggest. A one percent increase in energy prices is associated with a reduction of real consumption and real nonresidential investment of -0.15 and -0.16 percent, respectively, after one year. This is about four times as high as the energy share argument would suggest. Nevertheless, the overall responses are still fairly small and of limited importance in explaining U.S. business cycle fluctuations. For nonresidential investment in equipment and structures, the corresponding estimate is -0.16 percent.

Suppose, for example, that gasoline prices unexpectedly and permanently increased by 25 cents per gallon (which translates into a 6.85% increase in the overall price of energy, assuming all other energy prices remain unchanged). If a typical household spends $200 a month on gasoline at the January 2007 price of $2.29 per gallon, this would raise the household's gasoline bill by almost $22 a month. Assuming an average household expenditure of $4000 per month and given the share of consumption in GDP of about 72%, the estimates in Edelstein and Kilian (2009) imply that, all else equal, real GDP will fall by 0.63% on average one year after the shock. This example illustrates that it takes repeated surprise increases in gasoline prices to generate large effects on household consumption, but over time the effects will add up.

Evidence of larger responses can be found only for specific expenditure items. Residential housing purchases and automobile purchases are particularly sensitive to unexpected fluctuations in oil prices. Edelstein and Kilian's analysis has been extended to 2008 by Hamilton (2009). Hamilton concludes that reduced demand in these sectors was an important contributing factor to the recession of 2008, quite independently of the financial crisis.

2.3 Empirical Studies On The Impact Of Oil Prices

Over the past twenty years, dozens of scholars have explored the relationships between oil price shocks and the macroeconomic performance of national economies. Different methods of analysis have yielded different results, sometimes sharply different, sometimes modestly. The empirical literature on the macroeconomic impacts of oil supply shocks evolved as the new state of the oil market revealed itself gradually after 1973.

The first generation studies of the economic growth effect of oil price volatility dealt with the experience of the developed countries. However, since the 1980's, a number of studies for some developing economies like Nigeria have produced insightful results.

Ayadi (2005) states that the single most important issue confronting a growing number of world economies today is the price of oil and its attendant consequences on economic output. He notes that several studies have taken the approach of Hamilton (1983) in investigating the effect of oil price shocks on levels of gross domestic product. The focus of his paper is primarily on the relationship between oil price changes and economic development via industrial production. A vector auto regression model is employed on some macroeconomic variables from 1980 through 2004. The results indicate that oil price changes affect real exchange rates, which, in turn, affect industrial production. However, this indirect effect of oil prices on industrial production is not statistically significant. Therefore, the implication of the results presented in this paper is that an increase in oil prices does not lead to an increase in industrial production in Nigeria.

Olomola and Adejumo (2006) examine the effect of oil price shock on output, inflation, the real exchange rate and the money supply in Nigeria using quarterly data from 1970 to 2003. The VAR method was employed to analyze the data. Their findings were contrary to previous empirical findings in other countries; oil price shock does not affect output and inflation in Nigeria. However, oil price shocks did significantly influence the real exchange rates. The implication was that a high real oil price gave rise to wealth effect that appreciated the real exchange rate. This squeezed the tradable sector, giving rise to the “Dutch Disease”.

Olusegun (2008) investigated the impacts of oil price shocks on the macroeconomic performance in Nigeria using Vector Autoregression (VAR) approach. Forecast error variance decomposition is estimated using 7 key Nigerian macroeconomic variables, which are; real gross domestic product, consumer price index, real oil revenue, real money supply, real government recurrent expenditure, real government capital expenditure and real oil price. An annual data between the periods 1970-2005 were employed. The Johansen cointegration test identified at least four cointegrating vectors among the variables. The forecast error variance decomposition estimated from the VAR model shows that oil price shocks significantly contribute to the variability of oil revenue and output. On the other hand, the result reveals that oil price shock does not have substantial effects on money supply, price level and government expenditure in Nigeria over the period covered by the study. This is evident, as its contributions to the variability of these variables are very minimal. The study again reveals that the variability in the price level, apart from its own shock, is explained substantially by output and money supply shocks. Also, apart from its own shock, the variability in money supply is also explained by price level and output. This finding confirms, therefore, that oil price shock may not be necessarily inflationary especially, in the case of an open developing economy like Nigeria. The policy implication of this is that fiscal policy can be used more effectively to stabilise the domestic economy after an oil shock.

Akpan (2009) study the asymmetric effects of oil price shocks on the Nigerian economy. The findings from her study show a strong positive relationship between positive oil price changes and real government expenditure. Also, the impact of oil price shocks on industrial output growth was found to be marginal with observed significant appreciation of the real exchange rate. A finding which reinforces that of Olomola and Adejumo (2006) and Ayadi (2005) that oil price shocks tend to create the tendency for the Dutch disease syndrome in Nigeria.

Aliyu (2009a) used a non-linear approach to investigate the OPM relation in Nigeria and find evidence of both linear and non-linear impacts of oil price shocks on real GDP. The results of the asymmetric oil price increases in the non-linear models are found to have positive impacts on real GDP growth of a larger magnitude than for other specifications; a result that is an aberration from the previous empirical works earlier reviewed.

Our analysis is an improvements on previous works on the OPM relation in Nigeria because we do not only examine the linear and symmetric impacts of oil price shocks, we also focus on the asymmetric and non-linear relationship over a longer period of time (1980-2013) and with higher frequency of data (quarterly).

Aliyu (2009b) assessed the impact of oil price shock and real exchange rate volatility on real economic growth in Nigeria on the basis of quarterly data from 1986Q1 to 2007Q4. The empirical analysis started by analyzing the time series properties of the data which is followed by examining the nature of causality among the variables. Furthermore, the Johansen VAR-based cointegration technique was applied to examine the sensitivity of real economic growth to changes in oil prices and real exchange rate volatility in the long-run while the short run dynamics was checked using a vector error correction model. Results from ADF and PP tests show evidence of unit root in the data and Granger pairwise causality test revealed unidirectional causality from oil prices to real GDP and bidirectional causality from real exchange rate to real GDP and vice versa. His findings showed that oil price shock and appreciation in the level of exchange rate made positive impact on real economic growth in Nigeria. He recommended greater diversification of the economy through investment in key productive sectors of the economy to guard against the vicissitude of oil price shock and exchange rate volatility.

Recently, Oriakhi and Iyola (2013) in their study on the consequences of oil price volatility on the growth of the Nigerian economy within the period 1970 to 2010. Using quaterly data and employing the VAR methodology, the study finds that of the six variables employed, oil price volatility impacted directly on real government expenditure, real exchange rate and real import, while impacting on real GDP, real money supply and inflation through other variables, notably real government expenditure.

Ebele and loremba (2015), investigated Nigeria's output response to shocks in oil prices using the Benchmark Model proposed by Hamilton (2003). Following, Lee, Shawn and Ratti (1995), and Mork (1989), the study derived measures of oil shocks and estimated the effect of the shocks on both oil and non oil components of the Nigerian economy. The results of the study suggest that oil shocks have positive and significant effects on output growth in Nigeria for both oil and non oil GDP.

Other countries

One of the initial beliefs following the 1973-74 price shock was that the new, higher price of oil might be a permanent feature of a changed natural resource regime. Accordingly, one recurrent theme was the aggregate economy's response to a sudden, permanent price shock. How would an economy adjust to the new circumstances? This assumption underlies Rasche and Tatom's (1977, 1981) application of the potential GNP concept to the oil price shock problem and continues as late as the work of Bruno and Sachs (1982, 1985) on adjustment to supply shocks. Even Eastwood's (1992) investigation of the implicit substructure of some oil-macro simulation models assumes a single, permanent price shock.

Another theme in the empirical macroeconomic studies of the oil price shocks has been what could be called the attribution issue: to what extent was recession caused by the oil price shocks, government policies, or other events? Rasche and Tatom's estimate of a 7% long-run reduction in real GNP due to the 1973-74 oil price increase appeared suspiciously high to a number of macro economists who focused on the share of oil in GNP.

Darby (1982) estimated the impact of the 1973-74 oil price shock on real income in eight OECD countries. He was unsatisfied with the ability of the available data to distinguish among three factors that may have contributed to the recession: the oil price shocks; a largely independent course of monetary policy fighting inflation in the wake of the 1973 collapse of the Bretton Woods system; and a partly statistical partly real effect of the imposition and subsequent elimination of price controls over the period 1971-75. Darby looked forward to the availability of internationally comparable data which would permit similar investigation of the 1979-80 oil price shock, but this line of research has not been pursued consistently since the early 1980s. James Hamilton's (1983) study of the role of oil price shocks in United States business cycles has had considerable influence on research on the macroeconomics of oil price shocks.

Burbidge and Harrison (1984) also run a seven-variable VAR with the monthly data of May 1962 - June 1982 for the US, Japan, Germany, Canada and the UK. According to the impulse response analysis, the impact of oil price shocks on industrial production in the US and UK is sizable while in Japan, Germany and Canada it is relatively small. Price level impacts on the US and Canadian economies are substantial, while they are smaller but still significant in Japan, Germany and the UK.

Gisser and Goodwin (1986) study the impact of oil price shocks on the US economy with data from 1961Q1 - 1982Q4 by testing for a regime shift in 1973. They find that the overall relationship between crude oil price and the US macroeconomy has been stable over the sample period. Furthermore, they find that oil price shocks shift aggregate supply curve causing large real effects but weak direct price effects, while monetary policy primarily shifts the aggregate demand curve causing strong price effects but long-run neutrality with respect to real GDP.

Hamilton (1988) investigates a general equilibrium model of unemployment and business cycle model where it is costly to shift labor and capital inputs between sectors. In such a model he shows that energy price shocks can reduce aggregate employment by inducing workers in adversely affected sectors to remain unemployed while they wait for labor conditions to improve in their sector, rather than move to a sector not adversely affected.

Rotemberg and Woodford (1996) study the impact of oil price shocks on output and real wages with a simple aggregative model by assuming imperfect competition in the product market. Allowing for a modest degree of imperfect competition (such as an implicit collusion between oligopolists) can account for declines in output and real wages after oil price shocks. According to them, an imperfect competition model can explain the effects of oil price shocks on the US economy greater extent than a stochastic growth model (which assumes a perfectly competitive product market).

Hooker (1996) finds somewhat different results that in data up to 1973, Granger causality from oil price shocks to US macroeconomic variable exists, but if the data is extended to the mid 1990's the relationship is not robust. He investigates a few potential explanations about this phenomenon such as sample period issues, misspecification of linear VAR equations for the oil price and macroeconomic variables, but none are supported by the data. His analysis concludes that the oil price-macroeconomy relationship has changed in a way which can't be well represented by simple oil price increases and decreases.

Keane and Prasad (1996) use micro panel data to examine the effect of oil price changes on employment and real wages at the aggregate and industry levels. The data set is from the National Longitudinal Survey of Young Men (NLS). It consists of a nationally representative sample of 5,225 males between 14 and 24 years of age in 1996 and interviewed in 12 times during 16 years from 1966 to 1981. The data contains employment status, wage rates and socio-demographic characteristics. Workers are classified into 11 broadly defined industries on the basis of the 3-digit census industrial classification (CIC) codes. They differentiate skilled and unskilled workers and analyze how various human capital variables interact with real shocks to affect wages and employment variability. Oil price increases cause real wages to decline at the aggregate level and all sectors as well as all skilled workers. But, the relative wage of skilled workers increases. This is the difference between panel data econometric techniques, which control for unobserved heterogeneity, and OLS estimation methods. In the case of employment, oil price increase do not reduce aggregate employment in the long run since oil and labor are net substitutes instead of gross substitutes in production. When the oil price increases, labor supply can increase due to the income effect. Employment probabilities for skilled labor rise even more strongly following an oil price increase because skilled labor may be a good substitute for energy in the production function for most industries.

Lee et al. (1995) and Hamilton (1996) propose non-linear transformations of oil prices to reestablish the negative relationship between increases in oil prices and economic downturns. The transformations are scaled specification (Lee et al., 1995) and net specification (Hamilton, 1996). The objective of scaled specification (*SOP*) is to account for volatility of oil prices by using GARCH, while the objective of net specification (*NOPI*) comes from consumption decisions. Specifically, it is more responsible to measure an oil price increase by comparing the current price of oil with where it has been over previous periods rather than compare the oil price to a previous period alone. So oil price increase is recognized only when current oil price is greater than its maximum value over the previous periods. According to Lee et al.(1995), oil price changes are likely to have a greater impact on GDP in an environment where the oil price has been stable than where the oil price changes frequently. Hamilton (1996, 2003) finds that by using the net oil price increase (*NOPI*), the historical correlation between oil prices and GDP still exist in early 1990's and a nonlinear function of oil price changes is better to forecast GDP.

Finn (2000) shows that perfectly competitive model can also explain the effect of oil price shocks. He uses the concept of utilization rates for productive capital. The main idea of his model comes from the relationship between energy usage and capital services. Specifically, energy is essential to obtain the service flow from capital. Capital utilization rates are determined by energy use. Due to the oil price shocks, the decline of energy use reduces output and labor's marginal product, leading to a decline in wages and labor supplied. According to him, an oil price shock is like an adverse technology shock in Inducing a contraction in economic activity.

Eltony and Al-Awadi (2001) in a study on Kuwait find that linear oil price shocks are significant in explaining fluctuations in macro economic variables in Kuwait. The results reveal the importance of oil price shocks in government expenditures which are the major determinants of the level of economic activity in Kuwait.

Miguel et al (2003) investigated the macroeconomic impact of oil price shocks with a dynamic general equilibrium model of a small open economy for Spain. In their model, oil is included as an imported productive input and oil prices as well as interest rates are assumed to be set by the international market. With respect to the exogenous oil price shocks, their model reproduces Spanish GDP closely from 1970 to the mid 1980's, while it replicates less for the period 1985 - 1998. In addition, they show that oil price increases have a negative and significant effect on welfare.

Raguindin and Reyes (2005) examined the effects of oil price shocks on the Philippine economy over the period 1981 to 2003. Their impulse response functions for the symmetric transformation of oil prices showed that an oil price shock leads to a prolonged reduction in the real GDP of the Philippines. Conversely, in their asymmetric VAR model, oil price decreases play a greater role in each variable's fluctuations than oil price increases. In a related study, Anshasy *et al.* (2005) assessed the effects of oil price shocks on Venezuela's economic performance over a longer period (1950 to 2001). The study adopted a general to specific modeling VAR and VECM technique to investigate the relationship between oil prices, governmental revenues, government consumption spending, GDP and investment. The results found two long-run relationships consistent with economic growth and fiscal balance. Furthermore, they found that this relationship is important not only for the long-run performance but also for short-term fluctuations.

Cavallo and Wu (2006) used a VAR model of three variables namely output, inflation and oil prices to estimate the effects of oil-price shocks on output and prices for the U.S. economy. The study found that following an oil-price shock, output declined and prices increased.

Lardic and Mignon (2006) investigate the existence of a long run relationship between oil prices and GDP in 12 European countries using quarterly data from 1970:1 to 2003:4. To account for possible asymmetry in the linkage between oil price shocks and economic activity, they employ both the standard cointegration and a variant- asymmetric cointegration. From the results, only asymmetric cointegration exists between oil prices and GDP in most of the countries considered. This suggests that rising oil prices appear to retard economic growth more than declining prices stimulate it.

Wakeford (2006) assessed the impact of oil price shocks on the South African macro economy. The study traced the history of oil shocks and their impact on South Africa. The findings reveal that while commodity exports-especially gold-provided an initial buffer, the economy was not immune to sustained price shocks. The paper considered the outlook for future oil shocks and their possible impact, given South Africa's strengths and vulnerabilities. The study concludes that while there are several short-run supply risks, the major threat is the inevitable peaking of oil production which may occur within 5 to 10 years. This, the study argues will result in recurrent oil shocks and greater volatility and recommended governments' accelerated action on the shared growth initiative to cushion the effect of the shocks.

Similarly, Bartleet and Gounder (2007) examined oil price shocks and economic growth in Venezuela using the Vector Autoregressive (VAR) methodology based on quarterly data.

Three oil price measures were considered, following the various theoretical implications that oil price shocks have on economic growth. The authors analysed the short-run impact of oil price shocks in a multivariate framework which traced the direct economic impact of oil price shocks on economic growth as well as indirect linkages. Furthermore, the models employed the linear oil price and two leading nonlinear oil price transformations to examine various short-run impacts. A Wald and Likelihood Ratio tests of Granger Causality, was utilized and the results indicated that linear price change, the asymmetric price increase and the net oil price variables were significant for the system as a whole, whereas the asymmetric price variables was not. Following the causality analysis of oil price nexus, the generalized impulse responses and error variance decompositions the authors reaffirmed the direct link between the net oil price shock and growth, as well as the indirect linkages. They concluded that since oil consumption continued to increase in New Zealand, there is a need for policy-makers to consider oil price shocks as a major source of volatility for many variables in the economy. The literature on the impact of oil price shocks on developing oil producing/supplying countries is scant. The main focus of research has been on net oil importers and developed countries. Some limited studies have been conducted on the effects of oil price changes on the macro economy of developing countries. In these studies, net oil exporters are the centre of focus.

Parvar *et al* (2008) tested testing the Dutch disease hypothesis by examining the relationship between oil prices and real exchange rate in a sample of 14 oil-exporting economies using monthly data and autoregressive distributed lag approach. They concluded that there was a long run stable relationship between the two variables in all countries studied. In their analysis of the short-run dynamics, they also showed the existence of unidirectional causality from oil prices to exchange rates in four countries (Angola, Colombia, Norway, and Venezuela) from exchange rates to oil prices in two countries (Bolivia and Russia), bidirectional causality in four other countries (Gabon, Indonesia, Nigeria and Saudi Arabia), and no causality in the remaining four countries (Algeria, Bahrain, Kuwait and Mexico.).

In a comparative study by Jin (2008) on the impact of oil price shocks and exchange rate volatility on economic growth, he shows that the oil price increases exerts a negative effect on economic growth of Japan and China – although the latter is an oil producing country, and a positive effect on economic growth of Russia. Specifically, a 10% permanent increase in international oil prices is associated with a 5.16% growth in Russian GDP and a 1.07% decrease in Japanese GDP. On the one hand, an appreciation of the real exchange rate leads to a positive GDP growth in Russia and a negative GDP growth in Japan and China.

Etoranam (2015) in a study on the Impact of Oil Price Shocks on the Macroeconomy of Ghana, employed a restricted VAR model and Johansen Cointegration test observed that oil price shocks have significant negative impact on output and economic activities in Ghana and that negative oil price shocks adversely affect economic growth whiles positive oil price shocks stimulate growth and increase.

Taghizadeh-Hesary and Yoshino. (2015) in a study to examine the impact of crude oil price movements on two macro variables, the gross domestic product (GDP) growth rate and the consumer price index (CPI) inflation rate, in three countries, the People's Republic of China (an emerging economy), Japan, and the United States (developed economies), in a model incorporating monetary variables (money supply and exchange rate) using an N-variable structural vector autoregression (SVAR) model. The results suggest that the impact of oil price fluctuations on developed oil importers' GDP growth is much milder than on the GDP growth of an emerging economy. On the other hand, however, the impact of oil price fluctuations on the People's Republic of China's inflation rate was found to be milder than in the two developed countries that were examined.

2.4: Summary of related empirical work

Author(s)/Year	Topic	Varibles of the model	Methodology	Major findings/Conclusions
Papapetrou(2009)	Oil Price Asymmetric Shocks and Economic Activity: The case of Greece	Output proxied by industrial production and oil price	A regime-switching model (RSR) and a threshold regression modeling (TA-R)	The empirical evidence suggests that the degree of negative correlation between oil prices and economic activity strengths during periods of rapid oil price changes and high oil price change volatility.
Gronwald et al (2009)	Estimating the effects of oil price shocks on the Kazakh economy	real GDP, inflation and real exchange rates	VAR model	The price of oil is influenced by a large number of factors, which results in a considerable degree of volatility. Also, all variables considered in the VAR model exhibit a strong negative significant reaction on oil price declines.
Singer (2007)	Oil Price Volatility and the US Macroeconomy	Industrial production index, Federal fund rate, Total capacity utilization and Oil price	VAR model and a generalized autoregressive conditional heteroskedasticity (GARCH) model	Oil price volatility has a negative impact on output. Volatility has less of an effect on inflation.
Mohammad (2010)	The Impact of Oil Prices Volatility on Export Earning in Pakistan	GDP growth,standard of living, balance of trade, oil price variability and Broad money M2.	The Johansen co integration approach and Vector error correction model (VECM)	Oil price has a negative correlation to export earning and it may affects adversely on export earning.
Babyer (2010)	The impact of Oil Price Shocks on the Economy: Emperical Evidence from Azerbaijan	Output, Inflation rate, Real export, Oil Price	VAR model	Linear oil price shocks affect inflation and real export significantly. But oil price fluctuations do not affect in industrial output.
Yong and Aie-Rie (2002)	The Impact of Oil Prices on Income and Energy	Real income growth, real oil prices, money supply,exchange rates, energy consumption, and government spending.	Vector error correction model (VECM)	Bidirectional causation between energy consumption and real income.
Farzanegan and Markward (2007)	The Effects of Oil Price Shocks on the Iranian Economy	real industrial GDP per capita, real public consumption expenditures , real imports , real effective exchange rate and inflation and data on	VAR model	Oil price increases (decreases) have a significant positive impact on industrial output. There was an significant impact of oil price fluctuation on real government expenditures. The response of real imports and the real effective exchange rate to asymmetric oil

		real oil prices		price shocks are significant. Furthermore, the response of inflation to any kind of oil price shocks issignificant and positive.
Cobo-Reyes and Quirós (2005)	The effect of oil price on industrialproduction and on stock returns	Oil price, the stock market and industrial production.	ARCH specification	The results show that raises in oil price affects in a negative and statistically significant way to stock returns and to industrial production, but the effect on stock returns is stronger than on industrial production.
Clements and Krolzig (2000)	Can oil shocks explain asymmetries in the US Business Cycle?	Oil price , Output and Employment	Markov switching autoregressive model	Oil prices do not appear to be the sole explanation of regime-switching behavior. Furthermore, the asymmetries detected in the business cycle do not appear to be explicable by oil prices.
Miller and Ratti (2009)	Crude Oil and Stock Markets: Stability, Instability, and Bubbles	Stock Market Prices and Oil price	Vector error correction model (VECM)	long-run relationship between real stock prices for six OECD countries and world real oil price.
Arouri et al (2010)	Oil Price Shocks and Stock Market Returns in Oil-Exporting Countries: The Case of GCC Countries	oil prices and stock market returns	OLS method	Stock market returns significantly react to oil price changes in Qatar, Oman, SaudiArabia and UAE
Lippi and Nobili (2011)	Oil and the macroeconomy: A quantitative structural analysis	Oil price, Oil production and Oil price	Vector Autoregression (VAR) method	The real oil price does respond to shocks originated in the US economy. Also, impact of a negative oil-supply shock on US production is negative, large and highly persistent.
Cologni and Manera (2006)	TheAsymmetric Effects of OilShocks on Output Growth: A Markov-Switching Analysis for the G-7 Countries	Output, crude oil price, consumer price index and exchange rate	Markov- Switching (MS) regime autoregressive models	Oil shocks effects tend to be asymmetric and depend on whether or not the price increases are simple corrections of past decreases. Results from an analysis of the stability of the coefficients suggest that the role of oil shocks in explaining recessionary episodes has decreased over time.
Rahman and Mustafa (2008)	Influence of Money Supply and Oil Price in U.S Stock market	Broad Money Supply , Oil price and U.S Stock Market	The vector error-correction models	Broad money supply (M2) and oil price unleash no long-run converging causal effects on U.S. stock market.
Rattia and Vespignanib(2014)	Oil prices and the economy: A global	oil price, interest rate, money, real output	Granger causality test	Positive innovation in global oil price is connected with global interest rate tightening. Positive

	perspective	and inflation		innovation in global money, CPI and outputs is connected with increase in oil prices while positive innovations in global interest rate are associated with decline in oil prices.
LescarouxandMignon (2008)	On the Influence of Oil Prices on Economic ActivityandOther Macroeconomic and Financial Variables	Oil price, Gross Domestic Product (GDP), Consumer Price Index (CPI), household consumption, unemployment rate and share prices	Vector Autoregression (VAR) method	Oil prices are found to lead countercyclically share prices for almost every country. GDP and oil prices evolve together in the long run for twelve countries. The relationships between oil prices and unemployment rates or share prices only concern non-OPEC members.
Syed (2010)	Measuring the Impact of Changing Oil Prices and otherMacro Economic Variables on GDP in theContext of Pakistan's Economy	Real Gross Domestic Product, Real consumption Expenditures, Real Crude Oil prices, Real Government Expenditures, Exchange Rates,Investment, Inflation, Foreign Direct Investment	The Ordinary Least Square method	Changing oil prices have negative relationship with GDP which is expected. Changing government expenditures, consumption, average exchange rates, investment and foreign direct investment have positive and direct impact on GDP.
Jalil et al (2009)	Oil Prices and The Malaysia Economy	oil price, GDP, investment and money supply	Vector Autoregression (VAR) method	Oil price appears to have the most pronounced effect to the GDP. It is because, significant results of domestic oil price analysis are documented both in short-run and long-run tests. In the asymmetric test, significant result is documented in domestic oil price analysis only. The finding signifies the presence of asymmetric relationship between oil price changes and the economy.
Montoro (2010)	Oil shocks and optimal monetary policy	Inflation , Output, Price level, Interest rate	Utility-based loss function approach	Target level differs from the natural level of output when the elasticityof substitution between labour and oil is different from one. This generates a trade-off between stabilising inflation and output in the presence of oil shocks.
Clausen and Wohltmann (2011)	Oil Price Shocks and Cyclical Dynamics in an Asymmetric	consumer price index, oil price private consumption Interest rate	The cyclical dynamics approach	Oil price increases the relative cyclical position is reversed in the course of the adjustment process.

	Monetary Union			
Cologni and Manera (2005)	Oil Prices, Inflation and Interest Rates in a Structural Cointegrated VAR Model for the G-7 Countries	interest rates (treasurybill or lending rate), monetary aggregate, the consumer price index, the real gross domestic product, the oil price and the exchange rate expressed	Structural cointegrated VAR model	For most of the countries considered, there seems to be an impact of unexpected oil price shocks on interest rates, suggesting a contractionarymonetary policy response directed to fight inflation.
Paiva (2010)	Oil Prices and Inflation Dynamics under Alternative Monetary Regimes: Evidence from Brazil	Oil price, unemployment, the exchange rate, interest rate and inflation	Vector Autoregression (VAR) models	The results show that theimpact of oil prices on inflation seems to have declined after the introduction of inflation targeting, being now broadly similar to that experienced in some industrialized countries.
Bachal et al (2011)	Oil Price Shocks: A Comparative Study on the Impacts in Purchasing Power in Pakistan	real gross domestic product real effective exchange rate, money, interest rate and the oil price	A multivariate VAR analysis	oil price movements cause significant reduction in aggregate output and increase real exchange rate. The variance decomposition shows that crude oil prices significantly contribute to the variability of real exchange rate long term interest rate in the Pakistan economy while oil price shocks are found to have significant effects on money supply and short term interest rate in the economy.
Summary of related work in Nigeria				
Akpan (2009)	Oil Price Shocks and Nigeria's Macroeconomy	Real industrial production, Real effective exchange rate, Real Public Expenditure, Real oil price and Inflation.	Augmented vector autoregressive (VAR) model	oil price shocks significantly increase inflation and also directly increases real national income through higher export earnings
Ayadi et al (2000)	Effects of oil production shocks on a net oil exporting country, Nigeria	oil production, output, the real exchange rate and inflation	A Standard SVAR	Positive oil production shock was followed by rise in output, reduction in inflation and a depreciation of the domestic currency.
Olomola (2006)	Oil Price Shock and Aggregate Economic Activity in Nigeria	Output, Exchange rate, real Money supply inflation rate, oil price shock and consumer price index	VAR model	Oil price does not affect output and inflation rate in Nigeria but do significantly affect exchange rate.
Olomola and Adejumo	Effect of oil price shock on output,	The real GDP, the	VAR framework	Inflation rate depend on shocks to output and the real exchange rates.

(2006)	inflation, real exchange rate and money supply in Nigeria	domestic price level, Oil price the real exchange rate and the domestic Wholesale Price Indexes		Also, it is not the oil price itself but rather its manifestation in real exchange rates and money supply that affects the fluctuations of aggregate economic activity.
Apere and Ijomah (2013)	The Effects of Oil Price Shock on Monetary Policy in Nigeria	real oil price, money supply, inflation rate, treasury bill, interest rate and real exchange rate.	Vector Autoregresssive model (VAR)	There is a long run relationship involving oil prices, inflation rate, treasury bill rate, exchange rate, interest rate and money supply in Nigeria. Oil price shock is followed by an increase in inflation rate and a decline in exchange rate and interest rate in Nigeria
Apere and Ijomah (2012)	Macroeconomic Impact of Oil Price Levels and Volatility in Nigeria	Real oil price, real GDP, exchange rate, inflation rate, interest rate and government expenditure.	Exponential Generalized Autoregressive Conditional Heteroskedasticity (EGARCH),	There is a unidirectional relationship exists between the interest rate, exchange rate and oil prices, with the direction from oil prices to both exchange rate and the interest rate..
Olusegun (2008)	Oil Price Shocks and the Nigerian Economy: A Forecast Error Variance Decomposition Analysis	Real gross domestic product, consumer price index, real oil revenue, real money supply, real government recurrent and capital expenditure and real oil price.	Vector Autoregression (VAR) approach	Oil price shocks significantly contribute to the variability of oil revenue and output. On the other hand, the result reveals that oil price shock does not have substantial effects on money supply, price level and government expenditure in Nigeria over the period covered by the study
Ojapinwa and Ejumedia (2010)	The Idustrial Impact of Oil price shocks in Nigeria	Exchange rate, Inflation, unemployment, Money Supply and oil price	VAR impulse response	Oil price, inflation and exchange rate has the potentials of causing significant changes in industrial output in Nigeria, while it was also revealed that industrial output was not significantly determined by money supply
Omojolaibi (2013)	Does Volatility in Crude Oil Price Precipitate Macroeconomic Performance in Nigeria?	Domestic price level, economic output, money supply and oil price	Structural Vector Autoregressive (SVAR) technique	Domestic policies, instead of oil-boom should be blamed for inflation. Also, oil price variations are driven mostly by oil shocks, however, domestic shocks are responsible for a reasonable portion of oil price variations.
Umar (2010)	Oil Price Shocks and the Nigeria Economy.	Real Gross Domestic Product, unemployment,Consumer Price Index,	Vector Autoregressive VAR approach	Oil prices have significant impact on real GDP, money supply and unemployment. It impact on the fourth variable, consumer price

		money supply and crude oil prices		index is not significant
Ushie et al (2012)	Oil Revenues, Institutions and Macroeconomic Performance in Nigeria	Pubic consumption, fiscal deficit, oil revenue	Vector Autoregressive (VAR) framework	Fluctuations in oil revenues resulted in inflation, lower output growth and real exchange rate appreciation in Nigeria. Importantly, the institutional variable was found to be significant.
Adeniyi (2010)	Oil PriceShocks and Economic Growth in Nigeria: Are Thresholds Important?	oil price and output growth	Multivariate Threshold Autoregressive model, and VAR	0il price shocks do not account for a significant proportion of observed movements in macroeconomic aggregates. This pattern persists despite the introduction of threshold effects.
Aliyu (2009)	Oil Price Shocks and the Macroeconomy of Nigeria: A Non-linear Approach	Real GDP, oil price, money supply and consumer price index	Granger causality tests and multivariate VAR analysis	Asymmetric oil price increases in the non-linear models are found to have positive impact on real GDP growth of a larger magnitude than asymmetric oil price decreases adversely affects real GDP.
Mordi and Adebiyi, (2010)	The Asymmetric Effects of Oil Price Shocks on Output and Prices in Nigeria	Oil price, output, inflation rate	Structural VAR model	Impact of oil price shocks on output and prices is asymmetric in nature; with the impact of oil price decrease significantly greater than oil price increase.
Oyeyemi (2013)	The Growth Implications of Oil Price Shock in Nigeria	Inflation, money supply, capacity utilization,economic growth and oil price	Ordinary Least Square technique	A little shock in the price of crude oil in the global oil market in the current period will produce a long–termeffect on economic growth in Nigeria.
Omojolaibi (2013)	Does Volatility in Crude Oil Price Precipitate Macroeconomic Performance in Nigeria?	Domestic price level, money supply, output and oil price	Structural Vector Autoregressive (SVAR) technique	Domestic policies, instead of oil-boom should be blamed for inflation. Also, oil price variations are driven mostly by oil shocks, however, domestic shocks are responsible for a reasonable portion of oil price variations
Iwayemi and Fowowe (2011)	Effects of Oil Price Shocks on Developing Oil-Exporter -Nigeria	Output, government expenditure, inflation, exchange rate and oil price	Granger Causality Test and Impulse Response	Oil price shocks do not have a major impact on most macroeconomic variables in Nigeria.
Akinley and Ekpo (2013)	Oil price shocks and macroeconomic performance in Nigeria.	Real oil price, real government expenditure, real gdp, inflation rate, interest rate, real volume of	Vector Autoregressive (VAR) model	Both positive and negative oil price shocks influence real government expenditure only in the long run rather than in the short run, while examining

		import , external reserves and real effective exchange rate		positive and negative shocks to external reserves revealed stronger implications for expenditure in the long run, with positive rather than negative oil price shocks having stronger short and long run effects on real GDP, and therefore triggering inflationary pressure and domestic currency depreciation as importation rises.
Chuku et al (2010)	Oil pricedistortions and their short- and long-run impacts on the Nigerian economy	Real Oil Price, Real gross domestic product, Inflation, Money Supply and Interest rate	Cointegration and vector error correction (VECM) techniques	The results from the linear model show that oil price shocks are not a major determinant of macroeconomic activity in Nigeria, and macroeconomic activities in Nigeria do not Granger cause world oil prices. Further, the results from our non-linear specification reveals that the impact of world oil price shocks on the Nigerian economy are asymmetric.
Aliyu (2009)	Impact of Oil Price Shock and Exchange Rate Volatility on Economic Growth in Nigeria: An Empirical Investigation	Real GDP, international oil price and exchange rate	VAR-based cointegration technique	Granger pairwise causality test revealed unidirectional causality from oil prices to real GDP and bidirectional causality from real exchange rate to real GDP and vice versa. Findings further show that oil price shock and appreciation in the level of exchange rate exert positive impact on real economic growth in Nigeria.
Odularu (2008)	Crude Oil and the Nigerian Economic Performance	Labour, the capital, domestic consumption of crude oil, *and* crude oil export.	OrdinaryLeast Square regression method,	Crude oil consumption and export have contributed to the improvement of the Nigerian economy.
Adebiyi et al (2010)	Oil Price Shocks, Exchange Rate and Stock Market Behaviour: Empirical Evidence from Nigeria	real stock returns, exchange rate, interest rate, index of industrial production to oil price	Multivariate VAR analysis	Empirical results show an immediate and significant negative real stock returns to oil price shock in Nigeria. The Granger causality test indicates that causation run from oil price shocks to stock returns, implying that variation in stock market is explained by oil price volatility.

Source: Author's Compilation

2.5 Justification Of Study

The concept of volatility is often confused simply with rising prices and this limits the use of VAR and SVAR; however, volatility can equally result in prices that are significantly lower than historical average levels. The empirical observation that volatility is not constant over time and that it has memory has led to more sophisticated time series models, known as generalised autoregressive conditional heteroskedasticy (GARCH) models. These models capture the persistence of volatility, time-varying mean as well as the non-constant nature of volatility. Since the conditional variance at time t is known at time t-1 by construction, it provides a one-step ahead conditional variance forecast.

This study therefore fills the existing gap between VAR and GARCH by utilising VAR technique to measure the relationship between oil price and selected macroeconomic variables while the GARCH method will captures the volatility clustering of oil price on the macroeconomic variables. Secondly, the work will be extended to 2013 to capture the present realities on ground.

Available works received could not trace the transmission of structural shocks of oil price among key macroeconomic variables and the relationship between current shock on economic growth and conditional volatility of other periods ahead was not emphasized. The issue of volatility clustering of oil price and macroeconomic fundamentals is beyond the scope of VAR, SVAR model which most of the studies used.

To date no study, to our knowledge, has been undertaken to capture volatility clustering of crude oil price and key macroeconomic variables on the Nigerian economy. This research attempts to empirically examine the impact of oil price shocks on macroeconomic variables utilizing the linear and non-linear approaches. Estimating the consequences of oil price shocks on such key variables is particularly relevant in the case of Nigeria since, as a small open economy, it has no real influence on the world price of oil.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the methodology and the theoretical framework for the study. Specifically, we review the theoretical framework for oil price volatility, vector auto-regression model for analyzing transmission mechanism of oil price, co-integration and exponential garch (EGARCH) technique for oil price-macroeconomic nexus.

3.2 Theoretical Framework

The early empirical studies were widely employed the classical Ordinary Least Square (OLS) method to explain relationship between economic variables. This methodology seems to work well when variable is stationary. It can achieve Best Linear Unbiased Estimator (BLUE) principle. In statistics, given a sample of data, the estimator is a linear combination of this data which measures the right quantity with no systematic errors (unbiased) and is the most efficient (best) because its variance is minimal. However, it is widely known that financial data have a number stylized features for example, high frequency, non-stationary, non-normality, linear independent, volatility pooling and asymmetries in volatility.

Therefore, traditional econometric models are unable to explain some typical features for financial data sets. At least three of them are investigated by some economists. First, Stenius (1991) indicated the empirical studies from stock markets that stock returns have leptokurtic distributions rather than normal distribution. According to Watsham and Parramore (1997), one reason for this kind of distribution is discontinuous trading that produces periodic jumps in asset prices. Due to the markets are not continuously open and information may arrive during this period of time, so it results a jump in asset prices. The result is a leptokurtic distribution with fat tails and excess peakedness. Second, the patterns of them are volatility cluster. It means that large returns of either sign are expected to follow by large returns and vice versa. Third, features of financial data are leverage effects. As Watsham and Parramore (1997) mentions, there is evidence that volatility raises more following a large price fall than after a price rise of same magnitude. It means that financial data always response to bad news more than good news. Consequently, it is generally known that the volatility of many financial return series is not constant over time and that these series exhibit prolonged periods of high and low volatility, often referred to as volatility clustering. Over the past two decades, the prominent model has been developed in order to capture this time-varying autocorrelated volatility process: the Generalized Autoregressive Conditional Heteroscedasticity (GARCH) model. This model defines the time-varying variance as a deterministic function of past squared innovations and lagged conditional variances.

For this study, I would like to investigate time varying risk premium, oil price volatility and volatility transmission channel of oil price within the economy among selected macroeconomic variables. The suitable and chosen models for this study are Generalized Autoregressive Conditional Heteroscedasticity (GARCH) and Vector Auto Regressive (VAR) model.

3.2.1 GARCH Models

Generalized Autoregressive Conditional Heteroskedasticity (GARCH) is a model that is mainly used to model volatility. GARCH, introduced by Bollerslev (1986), is a development from ARCH model which has some limitations to capture the dynamic patterns in conditional volatility. Even though ARCH is an applicable model because of its ability to capture time-varying variance (i.e. variance that changes over time), it cannot be used when the parameter is too high due to a possibility of loss in precision. Moreover, due to the difficulty of estimating the parameter, because it is imposed by some restrictions to make sure that the parameter is stationary and positive, a lagged conditional variance is added to the ARCH model to minor the calculation problem. Conditional variance is a one-period future estimation for the variance which is dependent upon its previous lags. The most common model used in GARCH is the GARCH(1,1):

$$\sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \alpha_2 \sigma^2{}_{t-1} \tag{3.1}$$

The equation above explains that it is possible to interpret the current fitted variance, σ_t^2, as a weighted function of a long term average value, which is dependent on α_0, the volatility information during the previous period $(\alpha_1 \cdot \varepsilon_{t-1}^2)$, and the fitted variance from the model during the first lag$(\alpha_2 \cdot \sigma_{t-1}^2)$. Furthermore, the parameters in this model should satisfy $\alpha_0 > 0$, $\alpha_1 > 1$, and $\alpha_2 \geq 0$ in order for σ_t^2 to be ≥ 0.

Additionally, by adding the lagged ε_t^2 terms to both sides of the above equation and moving σ_t^2 to the right-hand side, the GARCH(1,1) model can be rewritten as an ARMA(1,1) process for the squared errors:

$$\varepsilon_t^2 = \alpha_0 + (\alpha_1 + \beta_1) \cdot \varepsilon_{t-1}^2 + v_t - \beta_1 \cdot v_{t-1} \tag{3.2}$$

where $v_t = \varepsilon_t^2 - \sigma_t^2$.

Supported by ARMA models, GARCH(1,1) is termed stationary in variance as long as $\alpha_1 + \beta_1 < 1$. This is the case where the unconditional variance of ε_t is constant and given by

$$var(\varepsilon_t) = \frac{\alpha_0}{1 - (\alpha_1 + \beta_1)} \tag{3.3}$$

The non-stationarity in variance is the case where $\alpha_1 + \beta_1 \geq 1$ and the unconditional variance of ε_t is not defined. Moreover, $\alpha_1 + \beta_1 = 1$ is known as a unit root in variance, termed as 'intergrated GARCH' or IGARCH.

3.2.2 Vector Auto Regressive (VAR) Model

The use of VAR in macroeconomics has generated much empirical evidence, giving fundamental support to many economic theories (see Blanchard and Watson (1986) and Bernanke (1983) among others). Vector autoregression (VAR) models were introduced by Sims (1980) to model the joint dynamics and causal relations among a set of macroeconomic variables.The VAR model is a multi-equation system where all the variables are treated as endogenous. There is thus one equation for each variable as dependent variable. Each equation has lagged values of all the included variables as dependent variables, including the dependent variable itself. Since there are no contemporaneous variables included as explanatory, right-hand side variables, the model is a reduced form. Thus all the equations have the same form since they share the same right-hand side variables.

Multivariate simultaneous equations models were used extensively for macroeconometric analysis when Sims (1980) advocated vector autoregressive (VAR) models as alternatives. At that time longer and more frequently observed macroeconomic time series called for models which described the dynamic structure of the variables. VAR models lend themselves for this purpose. They typically treat all variables as a priori endogenous. Thereby they account for Sims' critique that the exogeneity assumptions for some of the variables in simultaneous equations models are ad hoc and often not backed by fully developed theories. Restrictions, including exogeneity of some of the variables, may be imposed on VAR models based on statistical procedures. VAR models are natural tools for forecasting. Their setup is such that current values of a set of variables are partly explained by past values of the variables involved. They can also be used for economic analysis, however, because they describe the joint generation mechanism of the variables involved. Traditionally VAR models are designed for stationary variables without time trends. Trending behavior can be captured by including deterministic polynomial terms. In the 1980s the discovery of the importance of stochastic trends in economic variables and the development of the concept of cointegration by Granger (1981), Engle and Granger (1987), Johansen (1995) and others have shown that stochastic trends can also be captured by VAR models. If there are trends in some of the variables it may be desirable to separate the long-run relations from the short-run dynamics of the generation process of a set of variables. Vector error correction models offer a convenient framework for separating longrun and short-run components of the data generation process (DGP). The advantage of levels VAR models over vector error correction models is that they can also be used when the cointegration structure is unknown.

VAR models are the best method for investigating shock transmission among variables because they provide information on impulse responses (Adrangi and Allender (1998). Zellner and Palm (1974), Zellner (1979), and Palm (1983) show that any linear structural model can be written as a VAR model. Therefore, a VAR model serves as a flexible approximation to the reduced form of any wide variety of simultaneous structural models.

Vector Auto Regressive (VAR) models have been much used in empirical studies of macroeconomic issues since they were launched for such purposes by Sims (1980). This first study related to the estimation of a six-variable dynamic system namely GNP, money supply, unemployment rate, wages, price level and import price based on an alternative style of macro-econometrics without using theoretical perspectives. He suggests that it should be feasible to estimate large scale macro-models as unrestricted reduced forms, treating all variable as endogenous (Sims, 1980). Sims also criticized the way that the classical simultaneous equations models are identified as well as questioned about the exogenous assumptions for some variables not necessary backing by theoretical framework. In contrast, VAR model overcomes this problem by treating all variables as endogenous variables.

Basically, the form of a VAR model treats all variables symmetrically without making reference to the issue of dependence versus independence or of them as endogenous variables and estimating dynamic systems without using theoretical perspectives. This methodology is one of the most successful, flexible and easy to analyze the multivariate time series (Sims, 1980). It is the extension of the univariate autoregressive model to dynamic multivariate time series and proven to be useful for explain the dynamic behavior of economic and financial time series. They are now widely used in all kinds of empirical macroeconomic studies, from relatively theoretical exercises such as data description and forecasting, to tests of fully specified economic models. In brief, VAR is an econometrics tool that shows the dynamic interrelationship between stationary variables. Thus, VAR is used when the variables are either stationary, or non-stationary and not cointegrated. When the variables are non-stationary and not cointegrated, a VAR in first differences are used in order to determine the interrelation between them. However, if the variables are non-stationary and cointegrated, VEC model is estimated. VAR is a model which consists only of endogenous variables and allows for the variables to depend not only on its own lags. Consider a case of bivariate VAR which consists of two variables, y_{1t} and y_{2t}, which each dependent variable depends on the combination of their lags, k, and error terms:

$$y_{1t} = \beta_{10} + \beta_{11} y_{1t-1} + \cdots + \beta_{1k} y_{1t-k} + \alpha_{11} y_{2t-1} + \cdots + \alpha_{1k} y_{2t-k} + \varepsilon_{1t}$$

$$y_{2t} = \beta_{20} + \beta_{21} y_{2t-1} + \cdots + \beta_{2k} y_{2t-k} + \alpha_{21} y_{1t-1} + \cdots + \alpha_{2k} y_{1t-k} + \varepsilon_{2t} \qquad (3.4)$$

where ϵ_{it} is a white noise disturbance with $E(\varepsilon_{it}) = 0, (i = 1,2),\ E(\varepsilon_{1t}\varepsilon_{2t}) = 0.$

Moreover, there are two techniques from VAR employed in order to show the statistically significant impacts of each variables on the future values, for example whether the changes of a variable have a positive or negative effect on other variables in the system, namely the VAR's impulse responses and variance decompositions. In determining both techniques, ordering of the variables plays a very important role.

Impulse responses show how the shocks to any single variable affect the dependent variable in the VAR. More specifically, impulse responses record the size of the impact inflicted by single shocks to the errors to the VAR system. Moreover, n^2 impulse responses will be generated afterwards for the total of n variables in the system. Impulse responses are achieved by writing VAR as Vector Moving Average (VMA).

Another way to explain the effects of the shocks is to analyze the variance decompositions. Variance decompositions analysis is slightly different with impulse responses in term of how the shocks are applied. It records the effect on dependent variable due to its own shocks against shocks to other variables in the system. Moreover, variance decompositions analysis focuses not only on the movement of the dependent variable, but also on the forecast error variance produced by the shocks which helps to show the sources of the volatility.

3.3 Model Specification

We will adopt two models for the study in order to capture different hypothesis specified. These models are the Exponential GARCH (EGARCH) model and the vector Autoregressive **(**VAR**)** which may be transformed to vector Error correction.

3.3.1 Exponential GARCH (EGARCH) Model:

The Exponential GARCH (EGARCH) model was introduced byNelson (1991) to overcome some weakness of the GARCH model. In particular, it allows for asymmetric effects between positive and negative asset returns. Conditional variance in this case is specified as:

$$In(h_t) = w + \alpha_1 z_{t-1} + \gamma_1 (|z_{t-i}| - E(|z_{t-i}|)) + \beta \ln(h_{t-i}) \qquad (3.5)$$

where $\ln(h_t)$ = the logarithm of conditional variance

z_{t-i} = past shocks

α_1, β_1 and γ_1 are parameters which have no restriction in order to ensure that h_t is non-negative

EGARCH model shows the relationship between past shocks and the logarithm of the conditional variance. When we adopt the properties of shocks, z_t then:

$g(z_t) = \alpha_1 z_{t-1} + \gamma_1 (|z_t| - E(|z_t|))$ with zero mean and uncorrelated. The above function is pairwise linear in z_t because it can be specified as :

$$g(z_t) = (\alpha_1 + \gamma_1) z_t I(z_t > 0) + (\alpha_1 - \gamma_1) z_t I(z_t < 0) - \gamma_1 E((|z_{t-i}|) \qquad (3.6)$$

where

$\alpha_1 + \gamma_1$ = the impact of positive shocks on log of conditional variance .

$\alpha_1 - \gamma_1$ = the impact of negative shocks on log of conditional variance .

We will use News lmpact Curve (NIC) to show hownew information is incorporated into volatility. NIC shows the relationship between the current shock, e_t, and the conditional volatility of other periods ahead, h_{t-i} holding constant all other past and current informations. In this model, NIC is specified as

$$A\exp(\alpha_1 + \gamma_1)/\delta * e_t \text{ for } e_t > 0$$

$$NIC(e/h_t = \delta^2) = A\exp(\alpha_1 - \gamma_1)/\delta * e_t \; e_t < 0$$

where $A = \delta^{2\beta t}\exp(w - \gamma_1(2/\pi)^{1/2}$

In this case, negative shocks have a larger effect on the conditional variance then positive shocks of the same size.

3.3.2 Vector Autoregressive (VAR) Model:

Vector Autoregressive (VAR) model specifies every endogeneous variable as a function of the lagged values of endogeneous variables in the system. The VAR technique is very appropriate because of its ability to characterize the dynamic structure of the model as well as its ability to avoid imposing excessive identifyingrestrictions associated with different economic theories. That is to say that VAR does not require any explicit economic theory to estimate the model. The use of VAR in macroeconomics has generated much empirical evidence, giving fundamental support to many economic theories (see Blanchard and Watson (1986) and Bernanke (1983) among others). Our unrestricted autoregressive VAR model in reduced form of order p is presented in the following equation,

$$Y_t = c + \sum A_i y_{t-i} + \varepsilon_t \qquad (3.7)$$

where $c = (c_1, ..., c_{11})$ is the (11*X*1) intercept vector of the VAR, *Ai* is the *ith* (11*X*11) matrix of autoregressive coefficients for $i = 1,2,............, p$ and is the (11*X* 1) generalization of a white noise process.

As described in the data section, we use seven endogenous macroeconomic variables in our system: *rop*, *bop*, *inf*, *gdp*, gex, *exch*, *une*and *intr*. The form of unrestricted VAR system in this study is thus given by:

$$\begin{bmatrix} roilp \\ bop \\ Inf \\ gdp \\ exch \\ gex \\ une \\ \text{int}\, r \\ rop+ \\ rop- \\ netrop \end{bmatrix} = \begin{bmatrix} c_1 \\ c_2 \\ c_3 \\ c_4 \\ c_5 \\ c_6 \\ c_7 \\ c_8 \\ c_9 \\ c_{10} \\ c_{11} \end{bmatrix} + A(l) \begin{bmatrix} roilp_{t-1} \\ bop_{t-1} \\ Inf_{t-1} \\ gdp_{t-1} \\ exch_{t-1} \\ gex_{t-1} \\ une_{t-1} \\ \text{int}\, r_{t-1} \\ rop+_{t-1} \\ rop-_{t-1} \\ netrop_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \\ \varepsilon_{5t} \\ \varepsilon_{6t} \\ \varepsilon_{7t} \\ \varepsilon_{8t} \\ \varepsilon_{9t} \\ \varepsilon_{10t} \\ \varepsilon_{11} \end{bmatrix} \qquad (3.8)$$

where *A*(*l*) is the lag polynomial operators, the error vectors are assumed to be mean zero, contemporaneously correlated, but not autocorrelated.

The unrestricted VAR system can be transformed into a moving average representation in order to analyze the system's response to a shock on real oil prices, which is:

$$y_t = \mu + \sum_{i=0}^{\infty} \psi_i \varepsilon_{t-i} \qquad (3.9)$$

with ψ_0 is the identity matrix and μ is the mean of process:

$$\mu = (I_p - \sum_{i=0}^{\infty} A_i)^{-1} c \quad (3.10)$$

The application of moving average representation is to obtain the forecast error variance decomposition (VDC) and the impulse response functions (IRF). In this study, the innovations of current and past one-step ahead forecast errors would be orthogonalised using Cholesky decomposition so that the resulting covariance matrix is diagonal. This assumes that the first variable in a per-specified ordering has an immediate impact on all markets and variables in the system, excluding the first variable and so on. In fact, pre-specified ordering of markets and variables is important and can change the dynamics of a VAR system. In this analysis, we will use two different orderings. The first one is as follows: *rop*, *bop*, gex,*inf*, *intr*, *exch gdp* and *une*. For robustness test we shall make use of an alternative ordering which is based on VAR Granger Causality test is as follow: *rop*, *intr*, *inf*, *gex*, *exch*, *gdp*, *une*and bop.

The alternative approach related to studies of the macroeconomics of oil price shocks is applying structural vector autoregressive models (SVAR). Essentially, the SVAR attempts to identify the variance decomposition and impulse response functions by imposing a priori restrictions on the covariance matrix of the structural errors and the contemporaneous and/or long-run impulse responses themselves. But the SVAR approach has also some drawbacks, one of them is validity of this a priori restrictions. In the case of linkages between macroeconomic variables in the system, it would be very difficult to impose a priori assumptions. In order to overcome the problems of the dependence of the orthogonalised impulse responses on the ordering of the variables in the VAR and the SVAR approach, the generalised VAR was developed by Pesaran and Shin (1998). This approach is invariant to the ordering of the variables in the VAR and therefore results in one unique solution.

3.3.3 Asymmetric Specification

It has been argued in the literature that the oil price shocks and macroeconomic relationship is non-linear and many studies suggested the possibility of asymmetric impact of oil price shocks on macroeconomic variables. Asymmetric impact implies that the macroeconomic consequences of increase in oil price are not the mirror image of decrease in oil price.

To examine the non-linearity and asymmetric impact of oil price shocks, we consider a few non-linear transformations of oil prices following the methods pioneered by Mork (1989), Hamilton (1996) and Lee et al. (1996).

Mork (1989) proposes an asymmetric definition of oil prices, which distinguishes between positive and negative changes, which have been defined as follows:

Real oil price increase: $doil_t(+) = \max[0, doil_t]$

Real oil price decrease: $doil_t(-) = \min[0, doil_t]$ (3.11)

Hamilton (1996) proposed the concept of net oil price increase/decrease. Net oil price increase (NOPI), which is the percentage change of the increase of oil price if the price of the current month (t) exceeds the twelve previous months' maximum. If the price of month (t) is lower than it had been at some point during the previous twelve months, the series is defined to be zero for period (t). So,

$NOPI_t = \max[0, oil_t - \max(oil_{t-1}, oil_{t-2}, oil_{t-3} \ldots\ldots oil_{t-12})]$

Similarly, net oil price decrease (NOPD) can be defined as,

$NOPD_t$ = min [0, oil_t – min ($oil_{t-1}, oil_{t-2}, oil_{t-3} \ldots \ldots oil_{t-12}$)] (3.12)

Lee et al. (1995) proposed to transform the oil price by the AR(12)-GARCH(1,1) error process as the frequent and erratic oil price movements could have different impact on real GNP as opposed to the stable oil price movements.

The proposed AR (12)-GARCH(1,1) error process is as follows:

$$
\begin{aligned}
oil_t &= const + \sum_{i=1}^{12} \beta_i oil_{t-i} + \varepsilon_t \\
\varepsilon_t &= v_t \sqrt{h}_t v_t \sim N(0,1) \\
h_t &= \lambda_o + \lambda_1 \varepsilon_{t-1}^2 + \lambda_2 h_{t-1} \\
O_t(+) &= \max(0, \frac{\hat{\varepsilon}_t}{\sqrt{h_t}}) \\
O_t(-) &= \min(0, \frac{\hat{\varepsilon}_t}{\sqrt{h_t}})
\end{aligned}
\qquad (3.13)
$$

$O_t(+)$ and $O_t(-)$ represent positive and negative oil price volatilities.

3.4 Method of Analysis

This study will employ the unit root tests, cointegration, Granger-causality, variance decomposition, impulses analysis and Principal Component- GARCH model (PC-GARCH).

3.4.1 The Unit Root Test

It is now common practice to examine the time-series properties of economic data as a guide to subsequent multivariate modelling and inference. If we find that the variables are integrated of order greater than or equal to one, then it could be the case that these variables are cointegrated (see Engle and Granger 1987). This requires non-standard distributional theory in order to perform valid statistical inference. Hence, we begin by testing the null hypothesis of an autoregressive unit root using various tests, including those suggested by Dickey and Fuller (1979, 1981), and Phillips and Perron (1988).

The order of integration was established using the Augmented Dickey Fuller (ADF) test as specified in equation below. Basically, the ADF test consists in running a regression of the first difference of the series against the series lagged once, lagged difference terms and optionally, a constant and a time trend. With two lagged difference terms, a constant term and a time trend, the regression can be presented as follows:

$$\Delta y_t = \alpha_1 y_{t-1} + \alpha_2 \Delta y_{t-1} + \alpha_3 \Delta y_{t-22} + \alpha_4 + \alpha_{5t} \qquad (3.14)$$

A variable becomes stationary if it is integrated of order zero (0) otherwise it becomes stationary of order which is differenced 1 (d) (Adams 1992) , Gujarati 1995).

3.4.2 Cointegration Test

We will implement Variance Autoregressive regression (VAR) based on cointegration test using methodology developed by Johanson (1991, 1995). This will be used to test the restriction imposed by the cointegration on the unrestricted VAR involving non-stationary series. In specifying cointegration test, we write a VAR model of order p as:

$$Y_t = A_t y_{t-1} + \ldots\ldots\ldots\ldots + A_p y_{t-p} + \beta x_t + \varepsilon_t \qquad (3.15)$$

Where $Y_t = k$ - vector of non stationary, I (1), variable

$X_t = d$ - vector deterministic variables

e = a vector of innovation

Equation 3.9 can be written as

$$\Delta Y_t = \Pi y_{t-1} + \sum_{t=1}^{p-1} \Pi_i \Delta y_{t-i} + \beta x_t + \sum{}_t \qquad (3.16)$$

where : $\Pi = \sum_{t=1}^{p} A_t - 1 \, \Pi_t = \sum_{j=t-1}^{p} A_j$

In accordance with the Granger's representation theorem, if the coefficient matrix π has reduced rank, r < k there exist k x r matrices a and P each with rank **r** in **a** way that $\pi = \alpha\beta$ and $\beta^1 y_t$, is stationary. In this case, r is the number of cointegrating relations (the cointegrating rank) while each column of P is the cointegrating vector. In Johansen, we estimate the π matrix in an unrestricted fonn and test whether we can reject the restriction in the reduced rank of π**.** It is pertinent to note that the cointegrating vector is not identified unless we impose some arbitrary normalization (E -views 8.0 version).

3.4.3 Impulse Response Function

A shock to the i-th variable not only directly affects the i-th variable but is also transmitted to all of the other endogenous variables through the dynamic (lag) structure of the VAR. An impulse response function traces the effect of a one-time shock to one of the innovations on current and future values of the endogenous variables.

Assuming a 2-variables VAR (1) model specified as

$$\begin{bmatrix} x_{1t} \\ x_{2t} \end{bmatrix} = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \begin{bmatrix} x_{1t-1} \\ x_{2t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix}$$

A disturbance in ε_{1t} has an instant and direct effect on x_{1t}. In period t+1, that disturbance in x_{1t} affects x_{1t-1} through the first equation and also affects x_{2t-1} through the second equation. These effects work through to period t+2, and so on. Thus, a random shock in one innovation in the VAR sets up a chain reaction over time in all variables in the VAR. Impulse response functions calculates these chain reactions.

One limitation that confronts impulse response functions is that a disturbance in one innovation is not contemporaneously isolated from the other innovations in the system, although it utimately leads to a chain reaction over time in all variables in the system. It is doubtful from the above bivariate model to hypothesize that one innovation receives a disturbance while the other does not. A solution to this problem is achieved by transforming the innovations to produce a new set of orthogonal innovations, which are pairwise uncorrelated and have unit variance.

3.4.4 Variance Decomposition

While impulse response functions trace the effects of a shock to one endogenous variable on to the other variables in the VAR, variancedecompositionseparates the variation in an endogenous variable into the component shocks to the VAR. Thus, the variance decomposition provides information about the relative importance of each random innovation in affecting the variables in the VAR.

Assumming two variables x_{1t} and x_{2t} in the system, the forecast error variance matrix Ω can be phrased in terms of the variances of orthogonal innovations as follows,

$$\Omega = p^{-1}\operatorname{var}(\mu)(p^{-1}) = \begin{bmatrix} k_{11} & k_{12} \\ k_{21} & k_{22} \end{bmatrix} \begin{bmatrix} \partial_1 & 0 \\ 0 & \partial_2 \end{bmatrix} \begin{bmatrix} k_{11} & k_{12} \\ k_{21} & k_{22} \end{bmatrix}$$

Where k's denote elements of p^{-1} and $\partial_1 = \operatorname{var}(\mu_1) =$ for i = 1,2. Since each u has a unit variance, ∂_1 and ∂_2 equal to 1. Multiplying out eq.(1) gives

$$\operatorname{var}(\hat{x}_{11}) = k^2{}_{11} + k^2{}_{12} \text{ and } \operatorname{var}(\hat{x}_{21}) = k^2{}_{21} + k^2{}_{22}$$

Where the second subcript1 of x's denotes the one period ahead forecast. Since p^{-1} is lower triagular marix by construction, and so is P^{-1}, which implies $c_{12} = 0$. Thus, all the variance of $\hat{x}_{11}$ is attributed to the first orthogonal innovation and is equal to $k^2{}_{11}$. The variance of $\hat{x}_{21}$ is decomposed into two parts. A part $k^2{}_{21} /(k^2{}_{21} + k^2{}_{22})$ is ascribed to the first orthogonal innovation and the second orthogonal innovation adds to the remaining proportion, $k^2{}_{21} /(k^2{}_{21} + k^2{}_{22})$ to give the decomposition of the forecast error variance.

3.4.5 The Principal Component –GARCH Model (PC-GARCH)

GARCH splits the variance forecasts into two components - autocorrelations, or volatility in the past, and innovations, or exogenous shocks in the volatility of returns. Using GARCH(1,1) leads us immediately to the question of how much of the innovation is truly "exogenous" and how much is it explained by "other factors" not considered in the model. To improve the model, we could begin by considering other explanatory variables that could influence the volatility of our estimate (in other words, to endogenise some of the exogeneity). However, adding explanatory variables leads us to a particular weakness of the GARCH: the parameter estimation problem. Due to correlations (usually not zero) between the variables used in the GARCH, the problem requires substantial amounts of data and computational power to come up with a reasonably robust estimate. Thus, we aim to improve the volatility forecast of an asset compared to that obtained with GARCH, but using a more tractable method that handles multiple independent variables. This is accomplished by using PC-GARCH. In what follows, we discuss the issues of multivariate GARCH estimation uncovered in the previous sections. We know that the number of parameters in a multivariate GARCH increases at the rate of the square of the number of variables. For example, using n variables will necessitate estimation of $2n(n + 1)$ parameters; this is because each additional variable brings with it terms of correlation with the other variables, and each of these correlation terms has its own parameter. The dimensionality of the problem and, hence, the computational power requirement is rather large. Further, a robust parameter estimation imposes demanding data requirements. Apart from estimation problems, there are practical issues of stability of prediction: a large number of parameters as inputs to the model would frequently result in unstable estimates. Due to the inherent data-fitting nature of every statistical procedure, there may be noise in the estimation period that is captured as signals into this model. One of the methods proposed to make the problem tractable is the PC-GARCH . Thus, the PCA method helps us reduce the modeling problem into n univariate GARCH models. The methodology for the analysis to be followed in the paper is that developed by Burns (2005). There are alternative methods developed in the literature that use PCA in conjunction with GARCH; such examples are Alexander (2000) and van der Weide (2002). PC-GARCH will be used to enable a tractable version of multivariate GARCH. This tractability arises from the lack of correlation among the multiple variables used, reducing the parameter set to a manageable number. The PC-GARCH model is the most appropriate model to use when evaluating the volatility of the returns of very large groups of stocks, containing hundreds or even thousands of variables. The appropriateness of the model is seen from the perspective of the quality/cost ratio of volatility forecast provided by PC-GARCH when compared to any other alternative model.

3.5 Nature And Sources Of Data

Quarterly data is basically secondary. The secondary data of oil price was collected from the International Monetary Fund and International Energy Agency websites. Data of key macroeconomic variables (i.e. real effective exchange rate (exch), inflation rate (inf), unemployment rate (une), real gross domestic product (gdp),real government spending (gex), Interest rate (intr), and balance of payment (bop) proxied by current account balance, will be obtained from the central Bank of Nigeria (CBN) publications, National Bureau of statistics (NRS)and the World Bank publications.

3.6 Data Justification

All variables are included to capture some of the most important transmission through which oil price fluctuations may affect economic activities indirectly. These channels include effects of oil prices shocks on inflation rate, exchange rate, growth in GDP, rate of unemployment, government spending and balance of payment, which then lead to changes in real economic activity.

(a) **Real Oil Price (ROP)** : Real oil price (Nominal oil price) is the price index in US dollars of Bonny Light crude oil. In the ordering of the variables, the real oil price changes are ranked as a largely exogenous variable, especially for the case of the Nigerian economy. Although Nigeria is one of the major suppliers of crude oil to the global markets, its production and export quota are predetermined by the OPEC criteria, domestic consumption and investment in oil fields. In addition, demand for crude oil is largely determined by global economic growth, energy intensity within industrialized economies, speculator operations in oil markets, the policy of key oil consumers on strategic petroleum reserves, among others. Hence, oil prices are regarded as exogenous for the Nigerian economy. It is expected that significant shocks in oil markets affect contemporaneously the other key macro-economic variables in the system.

(b) Real Effective Exchange Rate (EXCH): In an oil-exporting countries like Nigeria, a rise in world oil prices improves the trade balance, leading to a higher current account surplus and an improving net foreign asset position. At the same time, increase in oil prices tends to increase private disposable income in oil-exporting countries. This increases corporate profitability, raises domestic demand and stock prices thereby causing exchange rate to appreciate.

(c) **Inflation Rate (INF):** Inflation is defined as the annual changes in CPI of the Nigerian economy. According to Darby (1992), increase in oil price is a major cause of inflation both in Nigeria and abroad. Since oil is used as an input in the production process, to generate electricity and to transport output to the market. Higher crude oil price is expected to raise the price of petroleum products, thus transport costs, electricity bills, etc. and thus it will leads to inflation, reduced non-oil demand and lower investment in net oil importing countries, thus having a significant impact on employment and output as well. It would reduce real wealth and consumption spending.

(d) **Government Spending (GEX):**There is a clear positive correlation between government expenditure an oil prices. For an oil exporting country like Nigeria, government expenditure rises during oil boom while she cuts down its budget in recession.

(e) **Real Gross Domestic Product (RGDP):** lncrease in oil prices will cause a rise in GDP growth or manufacturing output growth. This may suggest that higher revenue accrued from higher oil prices is espected to translate to increase in manufacturing output or GDP growth rate.

(f) **Unemployment Rate (UNE):** Significant findings of the effects on the labor market from oil price disturbances also exist. Oil price fluctuations may cause sectoral shifts in the labor market, and these shifts contribute to changes in the natural rate of unemployment, an oil-related model for a country like Nigeria should be able to examine the effects of the unemployment rate from an oil-related shock.

(g) **Balance of Payments (BOP)** is the method countries use to monitor all international monetary transactions at a specific period of time. Usually, the BOP is calculated every quarter and every calendar year. All trades conducted by both the private and public sectors are accounted for in the BOP in order to determine how much money is going in and out of a country. If a country has received money, this is known as a credit, and, if a country has paid or given money, the transaction is counted as a debit. Theoretically, the BOP should be zero, meaning that assets (credits) and liabilities (debits) should balance. But in practice this is rarely the case and, thus, the BOP can tell the observer if a country has a deficit or a surplus and from which part of the economy the discrepancies are stemming.It is generally argued that for net oil-exporting countries, a price increase directly increases real national income through higher export earnings, though part of this gain would be later offset by losses from lower demand for exports generally due to the economic recession suffered by trading partners. Whereas in net oil-importing countries, higher oil prices lead to inflation, increased input costs, reduced non-oil demand and lower investment.

(h) **Interest Rate (INTR) :** Interest rates are regarded as the rental payment for the use of credit by borrowers and return for parting with liquidity by lenders. They lead to efficient allocation of resources in the promotion of economic growth and development. Oil price changes also influence foreign exchange markets and generate stock exchange panics, higher interest rate, produce inflation and eventually lead to monetary and financial instability. The monetization of oil receipt during oil boom will increase the demand for money for speculative purposes, pushing up the prices of stocks and keeping interest rate down.

3.7 Data Processing

The data collected for the thesis are processed using E-view (Econometric View) 8.0 Student Version application software. E-view is a window-based time series-processing package. The suitability of the package is enhanced by the interactive nature of the programme, which makes it user-friendly, and time efficient in term of output and robustness of statistics genera.

CHAPTER FOUR

PRESENTATION AND ANALYSIS OF RESULTS

4.1 Introduction

This chapter examines the result of the methodology in previous chapter. As stated in previous chapter, both GARCH and VAR models are implemented in the analysis.

4 .2 The Unit Root Test

Macroeconomic data usually exhibit stochastic trend that can be removedthrough only differencing. We employed theAugmented Dickey Fuller (ADF) and Phillip-Perron z test (PP), to test the order of integration of the variables. The regressions were run for all the series at both level and first difference and, with constant and trend in the equation. As usual, the appropriate lag level applied in the unit root test follows the SIC criterion. The results of the ADF and PP test are presented in Table 4.1 below. Taking into cognizance, the intercept as well as the trend properties, the results obtained shows that, with the exception of unemployment rate, real oil price changes, all other variables are characterized by unit root at level, while all the variables revealed evidence of stationarity at first difference mostly at 5 per cent significance level and as such are integrated of order one. Hence, the model is built on I (1) process with the efficacy of the VAR model in establishing the relationship among variables considered appropriate.

Table 4.1: Unit Root Test Result

	ADF				PP			
	Without trend		with trend		Without trend		with trend	
Variable	Level	First diff.	Level	First diff.	Level	First diff.	Level	First diff.
RGDP	2.642310	-4.664278***	2.257987	-4.664278***	5.595020	-4.395788***	4.623494	-4.836740***
EXCH	-0.046816	-10.41239***	-2.034560	-10.40770***	-0.121089	-10.41239***	-2.126494	-10.407758***
INF	-2.666660	-11.02401***	-2.783156	-11.00029***	-2.858974	-11.02158***	-2.966215	-10.99750***
INTR	-0.680105	-2.707491*	-0.526470	-3.52550*	-0.680105	-2.907491*	-0.526470	-3.32225*
GEX	0.809430	-4.812999***	2.106479	-4.430251***	1.045054	-7.756089***	0.186368	-7.833113***
UNE	-1.844635	-17.68449***	-4.365444***	-17.82544***	-2.937758*	-19.12464***	-5.460727***	-20.83615***
BOP	-2.097200	-2.959692**	-2.155189	-3.327699**	-2.607929	-6.064327***	-2.572319	-6.057575***
Roilprice	-0.977432	-10.56631***	-1.644741	-10.9999***	-1.052383	-9.185151***	-1.327123	-13.45237***
Roilprice+	-8.620879***	-9.272441***	-9.441259***	-9.28244***	-8.832775***	-64.79751***	-9.450003** *	-63.88225***
Roilprice-	-9.73014***	-10.75571***	-9.537908***	-10.71611***	-9.436508***	-56.49931***	-9.397246***	-55.60952***
Netoilprice	-8.295888***	-9.724664***	-8.908463***	-9.688732***	-8.3360400***	40.10097***	-8.697589***	39.92312***

Source: Author’s own computation. Note *, **, *** imply significance at 10, 5 and 1 percent respectively.

The result from the stationarity test therefore calls for long-term relationship.

4.2 Cointegration Test

We used the approach of Johansen and Juselius (1990) which contains likelihood ratio test of statistic, the maximum eigenvalue and the trace statistic to determine whether long run relationship exists among the variables takes into consideration the effects of including intercept and trend in models as the entire five deterministic trends recommended in the Johansen Cointegration techniques were tested for. Empirical evidence has shown that Johansen cointegration test is a more robust test than Engel Granger (EG) in testing for cointegrating relationship. Table 4.2 provides the summary of results obtained across the different levels for both the symmetry and asymmetry models built for oil price shocks. Specifically, the results indicate that a linear, non-linear as well as quadratic combination of two or more time series is non-stochastic, as a minimum of three (3) cointegrating equations were reported across trace and maximum eigenvalues statistics using critical values from Osterwald-Lenum (1992) at 5 per cent level, hence, we reject the null hypothesis of no cointegration and conclude that the variables for the models are cointegrated at either 5 per cent and/ or 1 per cent level of significance as provided by MacKinnon *et al.* (1999).

Table 4.2: (i) Cointegration test summary of symmetric oil price shock model

Data trend	None	None	Linear	Linear	Quadratic
Test type	No intercept	Intercept	Intercept	Intercept	Intercept
Trace	4	4	4	5	4
Max. Eigenvale	3	3	4	3	3

Source: Authors' own computations.

Table 4.2: (ii)Cointegration test summary of asymmetric oil price shock model:*Roilprice+*

Data trend	None	None	Linear	Linear	Quadratic
Test type	No intercept	Intercept	Intercept	Intercept	Intercept
Trace	5	5	5	5	5
Max. Eigenvale	5	5	5	4	4

Source: Authors' own computations.

Table 4.2: (iii) Cointegration test summary of asymmetric oil price shock model: *Roilprice-*

Data trend	None	None	Linear	Linear	Quadratic
Test type	No intercept	Intercept	Intercept	Intercept	Intercept
Trace	5	5	4	5	5
Max. Eigenvale	5	5	5	4	4

Source: Authors' own computations.

Table4.2: (iv) Cointegration test summary of asymmetric oil price shock model: Net*oilprice*

Data trend	None	None	Linear	Linear	Quadratic
Test type	No intercept	Intercept	Intercept	Intercept	Intercept
Trace	5	5	4	5	5
Max. Eigenvale	5	5	5	3	3

Source: Authors' own computations.

This therefore unveils the existence of a long run equilibrium relationship between real oil price and the variables used in the model and further points to the suitability of adopting the unrestricted VAR approach at levels.

4.3 Result Of The VAR Model

The estimation of a VAR model firstly requires the explicit choice of lag length in the model. The appropriate lag length selection of the VAR is another important step. Too few lags mean that the regression residuals do not behave as white noise processes. The coefficients from the estimated VAR are not of primary interest in this empirical work since the individual coefficients are very difficult to be interpreted. Rather, we focus on the impulse response functions (IRFS) and variance decomposition (VDC) generated from the VAR.

4.3.1: Optimal Lag Length Selection and Stability Test

As stated above, the optimal lag length is conducted for appropriate representation of the model. Using a sufficient lag length may help to reflect the long-term impact of variables on others. However, including longer lag lengths will lead to multicollinerarity problems and will increase the degrees of freedom (df) (Tang *et al.*, 2010). Empirical simulations show that for any $K \geq 11$, the model will become divergent with at least one auto regressive root that is greater than one. Accordingly, to determine the optimal lag length to use for our model, we employ five different lag order selection criteria (*LR*, *FPE*, *AIC*, *SIC*, *HQ*) to guide our decision. The essence of the batteryof tests is for confirmatory analysis. We therefore select different lag lengths for the different models based on the results obtained from the VAR lag length selection criteria: Likelihood Ratio (LR); Final Prediction Error (FPE); Akaike Information Criterion (AIC); Schwarz Information Criterion (SIC) and Hannan-Quinn Information Criterion (HQ). Table 4.3 shows the var lag length selection criteria results.

Table 4.3:VAR lag length selection criteria results for oil price shocks

Model	LR	FPE	AIC	SIC	HQ	Chosen lag.
Roilprice	5	5	5	5	5	5
Roilprice+	5	5	5	5	5	5
Roilprice-	9	9	9	9	9	9
Netoilprice	9	9	9	9	9	9

Source: Authors' own computations.

4.3.2 The Granger Causality Test Result

To analyse the statistical causality link between oil price shocks and the selected variables, we will perform bivariate Granger Causality Tests. The Granger (1969) approach assesses whether past information on one variable helps in the prediction of the outcome of some other variable, given past information on the latter. It is important to note that the statement "x Granger causes y" does not imply that y is the effect or the result of x. Granger causality measures precedence and information content but does not by itself indicate causality in the more common use of the term.

Table 4.4a, indicates rejection of the null hypothesis that symmetric oil price shocks does not Granger cause Interest rate, Real output and government expenditure in the country is rejected at 5 percent . However, we accept the null hypothesis that in Nigeria for the period under review, symmetric oil price does not Granger cause rate of Inflation, exchange rate, unemployment rate and Balance of payment. The result also reveals that oil price shock Granger causes real output, government spending and interest rate.

Table 4.4a: VAR Granger Casuality Test Result of symmetric oil price

Null Hypothesis:	Obs	F-Statistic	Prob.
EXCH does not Granger Cause ROP	135	8.40678	0.0044
ROP does not Granger Cause EXCH		3.80638	0.0532
UNE does not Granger Cause ROP	135	4.14760	0.0437
ROP does not Granger Cause UNE		2.19012	0.1413
INF does not Granger Cause ROP	135	0.03116	0.8602
ROP does not Granger Cause INF		0.78973	0.3758
INTR does not Granger Cause ROP	135	0.69398	0.4063
ROP does not Granger Cause INTR		4.07707	0.0455
GEX does not Granger Cause ROP	135	1.20054	0.2752
ROP does not Granger Cause GEX		5.10650	0.0255
GDP does not Granger Cause ROP	135	0.75227	0.3873
ROP does not Granger Cause GDP		8.25932	0.0047
BOP does not Granger Cause ROP	135	0.76596	0.3831
ROP does not Granger Cause BOP		1.24685	0.2662

Table 4.4b shows the pairwise granger causality test result between asymmetric oil price and the selected macroeconomic variables. From the table below, we conclude that there is a unidirectional relationship between net oil price and exchange rate. That is, net oil price (NETROP) does not granger causes exchange rate rather it is exchange rate that granger causes net oil price. Also, exchange rate is granger causes rise in oil price and itself is granger cause by fall in oil price.

There is no causal relationship between net oil price, positive oil price with other macroeconomic variables (i.e. real output, unemployment rate, interest rate, government expenditure, balance of payment and inflation rate). Finally the null hypothesis that negative oil price does not granger cause real output, inflation rate, unemployment rate, balance of payment and interest rate is accepted at 5 per cent levels.

Table 4.4b: VAR Granger Casuality Test Result of asymmetric oil price

EXCH does not Granger Cause NETROP	135	8.28215	0.0047
NETROP does not Granger Cause EXCH		1.38953	0.2406
GEX does not Granger Cause NETROP	135	0.02020	0.8872
NETROP does not Granger Cause GEX		0.31384	0.5763
GDP does not Granger Cause NETROP	135	0.12968	0.7193
NETROP does not Granger Cause GDP		0.11121	0.7393
UNE does not Granger Cause NETROP	135	1.74147	0.1892
NETROP does not Granger Cause UNE		1.72047	0.1919
INF does not Granger Cause NETROP	135	1.82859	0.1786
NETROP does not Granger Cause INF		0.29400	0.5886
INTR does not Granger Cause NETROP	135	0.25423	0.6150
NETROP does not Granger Cause INTR		0.25360	0.6154
BOP does not Granger Cause NETROP	135	0.66378	0.4167
NETROP does not Granger Cause BOP		0.63397	0.4273
EXCH does not Granger Cause ROP+	135	11.2539	0.0010
ROP+ does not Granger Cause EXCH		1.14152	0.2873
GEX does not Granger Cause ROP+	135	0.00055	0.9813

ROP+ does not Granger Cause GEX		0.00497	0.9439
GDP does not Granger Cause ROP+	135	0.05796	0.8101
ROP+ does not Granger Cause GDP		0.06230	0.8033
UNE does not Granger Cause ROP+	135	2.21210	0.1393
ROP+ does not Granger Cause UNE		0.32819	0.5677
INF does not Granger Cause ROP+	135	1.36856	0.2442
ROP+ does not Granger Cause INF		0.44483	0.5060
INTR does not Granger Cause ROP+	135	0.05900	0.8085
ROP+ does not Granger Cause INTR		0.33794	0.5620
BOP does not Granger Cause ROP+	135	0.72318	0.3966
ROP+ does not Granger Cause BOP		0.64492	0.4234
EXCH does not Granger Cause ROP-	135	0.00553	0.9408
ROP- does not Granger Cause EXCH		13.9072	0.0003
GEX does not Granger Cause ROP-	135	0.12955	0.7195
ROP- does not Granger Cause GEX		0.11049	0.7401
GDP does not Granger Cause ROP-	135	0.19274	0.6614
ROP- does not Granger Cause GDP		0.25556	0.6140
UNE does not Granger Cause ROP-	135	0.11228	0.7381
ROP- does not Granger Cause UNE		0.14075	0.7081
INF does not Granger Cause ROP-	135	1.34890	0.2476
ROP- does not Granger Cause INF		0.00202	0.9642
INTR does not Granger Cause ROP-	135	0.05125	0.8213
ROP- does not Granger Cause INTR		0.03043	0.8618
BOP does not Granger Cause ROP-	135	0.51503	0.4742
ROP- does not Granger Cause BOP		1.14682	0.2862

4.3.3 Impulse Response Function (IRFS)

In this section, the response of the selected macroeconomic indicators to fluctuations in oil price is reassessed. Since according to Sims, most estimated coefficients from VAR model are not statistically significant. Therefore, the impulse response functions and variance decompositions are further examined. Impulse response functions are dynamic simulations showing the response of an endogenous variable over time to a given shock. That is, it helps in tracking the contemporaneous and future paths of the key response variables to a one standard deviation increase in the current value of the stimulus variable. Thus, attempt is made to examine the effect of oil price shocks on the selected macroeconomic indicators using impulse response function for 12 periods. Here we considered the effect of oil price shocks on the selected macroeconomic variables by using orthogonalized impulse response functions with linear and non-linear (*SOP & NOPI*) oil price specifications in a basic VAR model. The essence of considering different specifications of oil price is to ascertain the robustness of our result on how the selected macroeconomic indicators response to the fluctuations in oil price. In the specific case of this study, output growth, exchange rate, balance of payment, interest rate, government expenditure and inflation are the key response variables, while real oil price is the major forcing factor. In what ensues, therefore, impulse responses to the real oil price shocks derived from the standard Cholesky factorization for each of the macroeconomic indicator models are displayed and discussed in turn.

Figure 4.1- 4.8 show the impulse response of selected macroeconomic variables from a one standard deviation shock of oil price. 95% confidence bounds are also provided to assess the statistical significance of the impulse response functions.

(a) Symmetric Effects

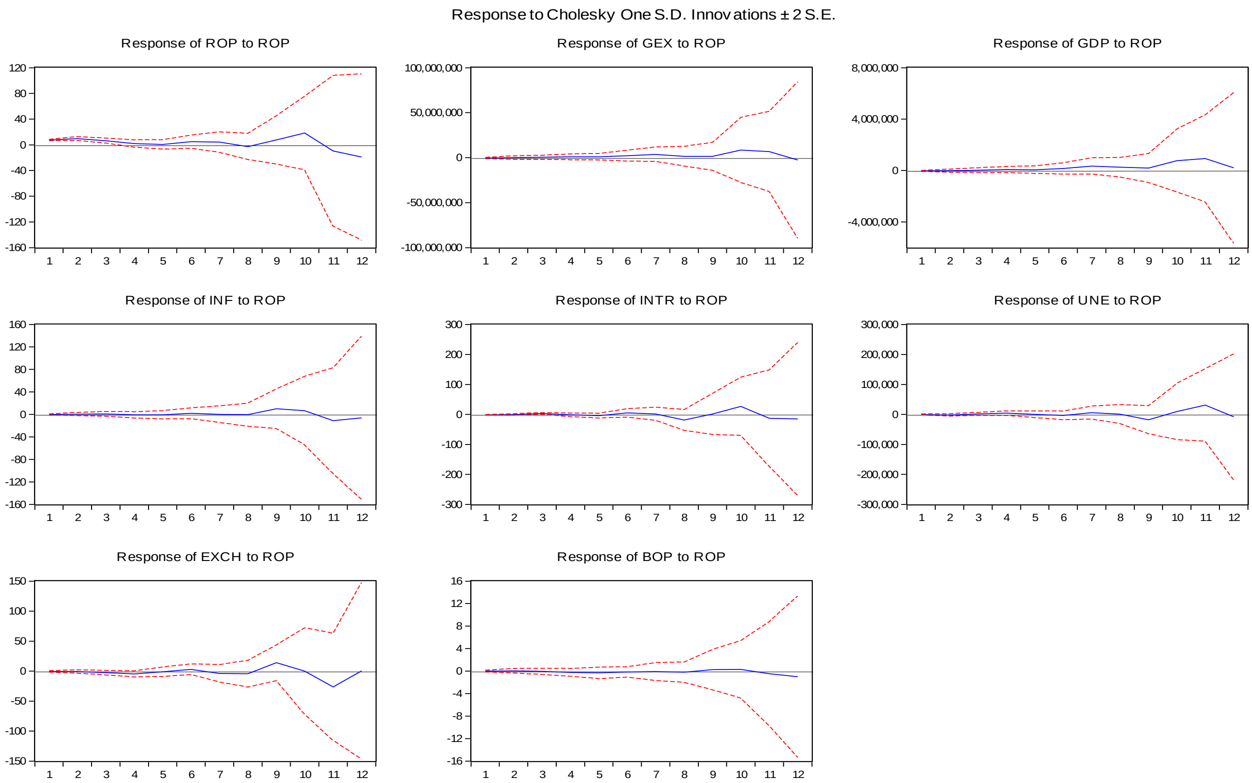
Figure 4.1 depicts statistical results of orthogonal impulse response of symmetric oil price shocks on the selected macroeconomic variables for a year (12 months) forecast horizon.

The shocks in real oil price slightly reduced real government expenditure for the first six periods but became marginally positive in the last three periods. The slight but steady falls in real government expenditure therefore reduced the general price level significantly for the first eight periods. However, shocks in real oil price significantly increased real GDP, interest rate and real effective exchange rate for the first three periods after initial shock; although these variables fell slightly before rising mildly for real GDP from the fifth to the twelfth periods, positive but insignificant for interest rate from sixth to twelfth period, and positively insignificant for real effective exchange rate from fourth to twelfth period. Balance of payment responds in positively insignificant manner after initial shocks in oil price all through the time horizon, thereafter volume of import rises moderately in the medium and long term. Unemployment rate responds was flat in an insignificant manner in the first seven periods and thereafter responded a positively insignificant fashion to shocks in oil price.

The reverse reaction to shocks in oil price by real government expenditure and real GDP suggests that growth motivating forces lies outside government expenditure, such forces seems likely to have neutral effect on general price levels.

Taking into cognizance the frequent adjustments in Nigerian fiscal framework in response to prevailing economic situation in the period covered, budgetary operations thus, became a function of different factors, and are designed to achieve specific objectives across different political regimes (Akinley et al, 2013). Reduction in real government expenditures and the corresponding ease in inflation, therefore reflect the effect of reflationary budget usually implemented by the Executive arm of government through the Federal Ministry of Finance and the Budget Office, in periods of oil price growth as witnessed during the Gulf war. Conversely, short run rise in real GDP, interest rate and real effective exchange rate, would be traced to the corresponding effects of contractionary monetary policy designed by the Central Bank of Nigeria (CBN) to achieve macroeconomic stabilization objectives, through upward review of benchmark interest rate, liquidity ratio and devaluation of local currency, so as to reduce the adverse effect of oil price growth. Medium-and long-run reactions also reflect appropriate adjustments in policy mix (fiscal and monetary) in accordance to prevailing political and economic conditions.

Figure 4.1: Orthogonalized impulse response function of selected macroeconomic variables to oil price shocks (ROP : linear specification gdp, gex inf, intr, exch, une and bop)



4.3.4 Impulse Response Functions

(b) Asymmetry Impact of Oil Price

As part of the objectives, the Impulse response function of the asymmetric impact of oil price is considered in this section. Figures 4.2to 4.8reveal the impulse response of an asymmetric impact of oil prices on output, inflation, balance of payment, government expenditure, exchange rate, interest rate and unemployment rate.

The figure shows a significant positive response of GDP to increase in oil price after the first two months all through the year. For response to net oil price, the figure displayed a negative response of GDP in the first four months but thereafter, responds positively all through the time horizon. On the response of GDP to decrease in oil price, it showed a positive response all through the period. These findings are consistent with that of Lee, Ni and Ratti (1995) for GNP growth in the US and Jimenz-Rodriguez and Sanchez (2005) for France, Italy, Norway and Canada.

Figure 4.2 Orthogonalized impulse response function of GDP to asymmetric oil price shocks (ROP+, ROP-, NetROP: Nonlinear specification GDP)

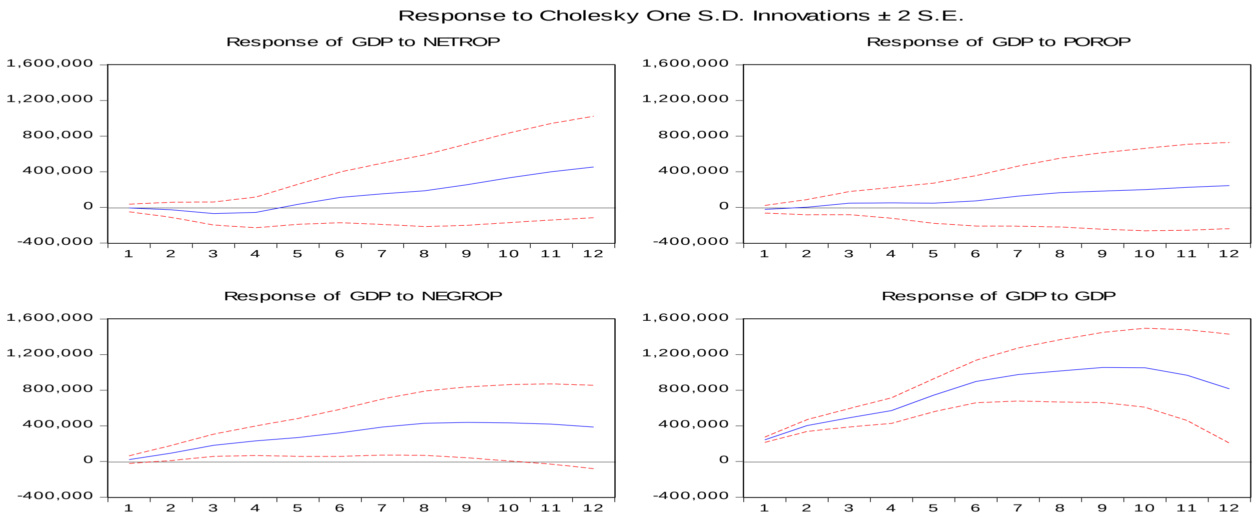
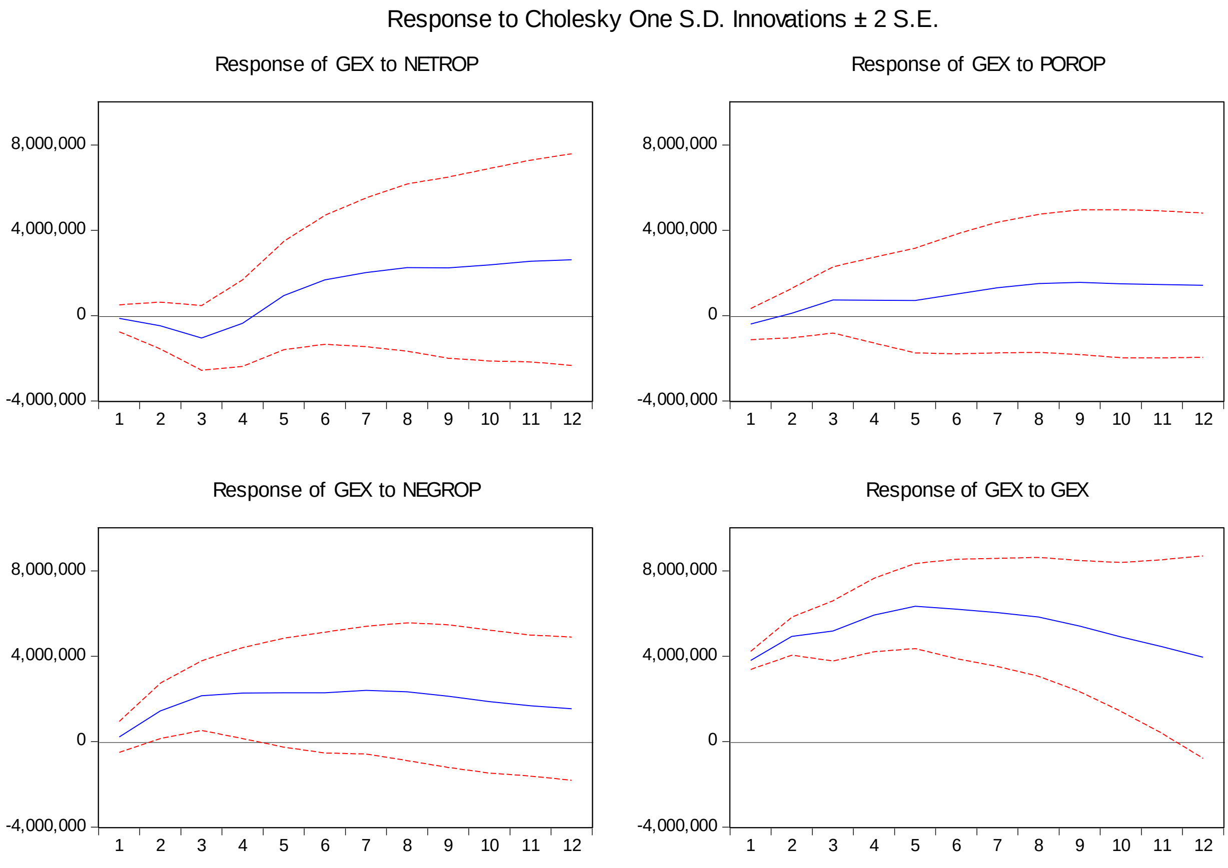


Figure 4.3 depicts the response of government expenditure to asymmetric oil price shock. The results suggest that rising oil price has positive effects on government expenditure especially after the first month. The response of government expenditure to net oil price is negative for the first four months but became positive after the fourth month. Government expenditure responded positively to oil price increase as indicated in the figure especially after two months. On the response to decrease in oil price, it also response positively.

Figure 4.3 Orthogonalized impulse response function of GEX to asymmetric oil price shocks (ROP+, ROP-, NetROP: Nonlinear specificationGEX)

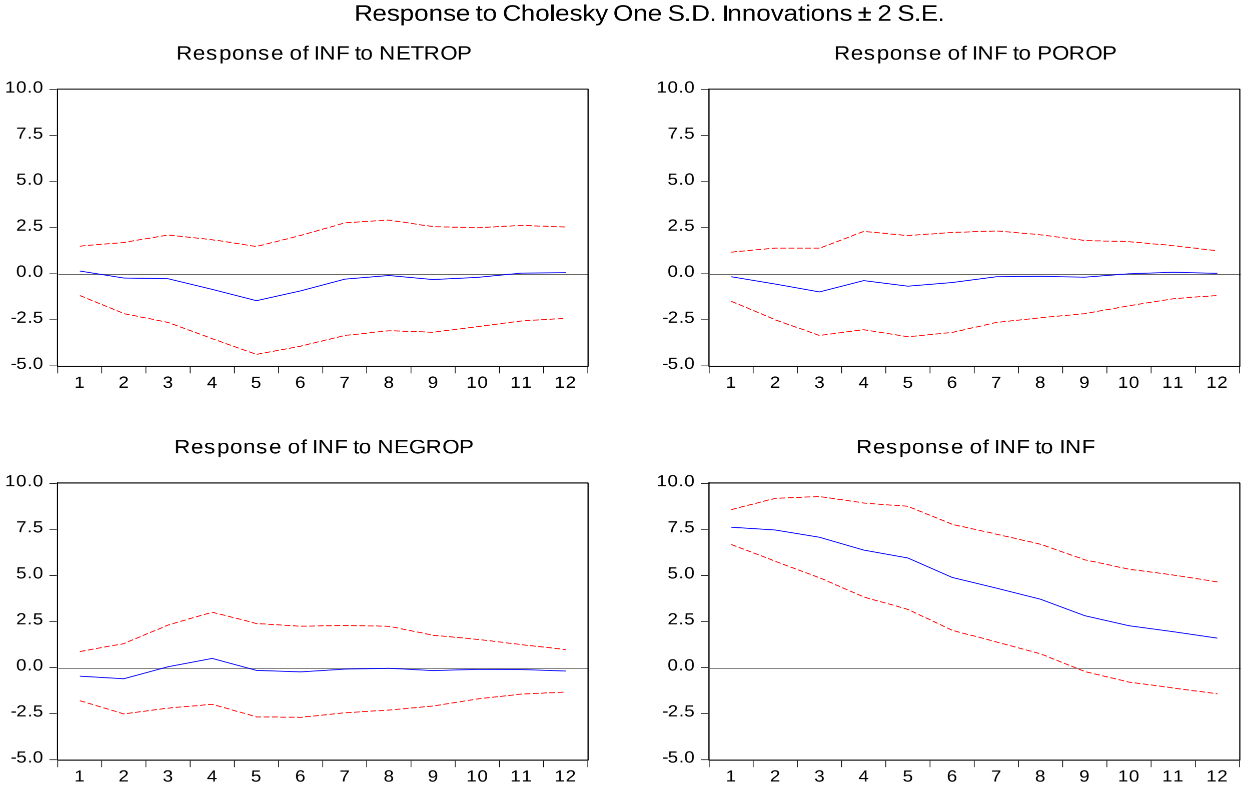


The results obtained with respect to real government expenditure and output thus reflect the dominant influence of public sector spending in overall economic activities, as efforts to ensure macroeconomic stability through effective coordination of fiscal and monetary policy prevent immediate monetization of oil proceeds through increase public spending, which therefore kept growth at modest levels.

On the response to own shock, the Nigerian inflation rate shown an inverse relationship with time. That is the inflation rate is decreasing with passage of time. Inflation rate responds negatively to both increase in oil price and the net oil price all through the time horizon as shown in figure 4.4 below. Inflation did not respond to shocks to oil prices in all the 12 months period after the occurrence of such a shock. The inflation rates responds negatively in the first three months and thereafter appear insignificant to decrease in oil price shocks. The general price level falls significantly from the third to seventh quarters to show that the Nigerian economy does not suffer from the usual inflationary pressures associated with positive changes in oil prices in the short run. This was made possible by policy response in the form of monetary tightening stance which effectively tamed growth in broad money supply in the medium-and long-run.

The statistically significant drop in long-run trend of inflation rate, could further be attributed to slight increase in import volumes coupled with the monetary tightening policy effects.

Figure 4.4 Orthogonalized impulse response function of INF to asymmetric oil price shocks (ROP+, ROP-, NetROP: Nonlinear specificationINF)



A cursory inspection of the impulse responses reported in Figures 4.5 showed thatthe interest rate is insignificant to its own shocks all through the period and the asymmetric oil price shocks for the time horizon of 12 month period. This conveys the reaction of interest rate to effective liquidity tightening measures by the monetary authority mostly through increase in benchmark interest rate.

Figure 4.5 Orthogonalized impulse response function of INTR to asymmetric oil price shocks (ROP+, ROP-, NetROP: Nonlinear specificationINTR)

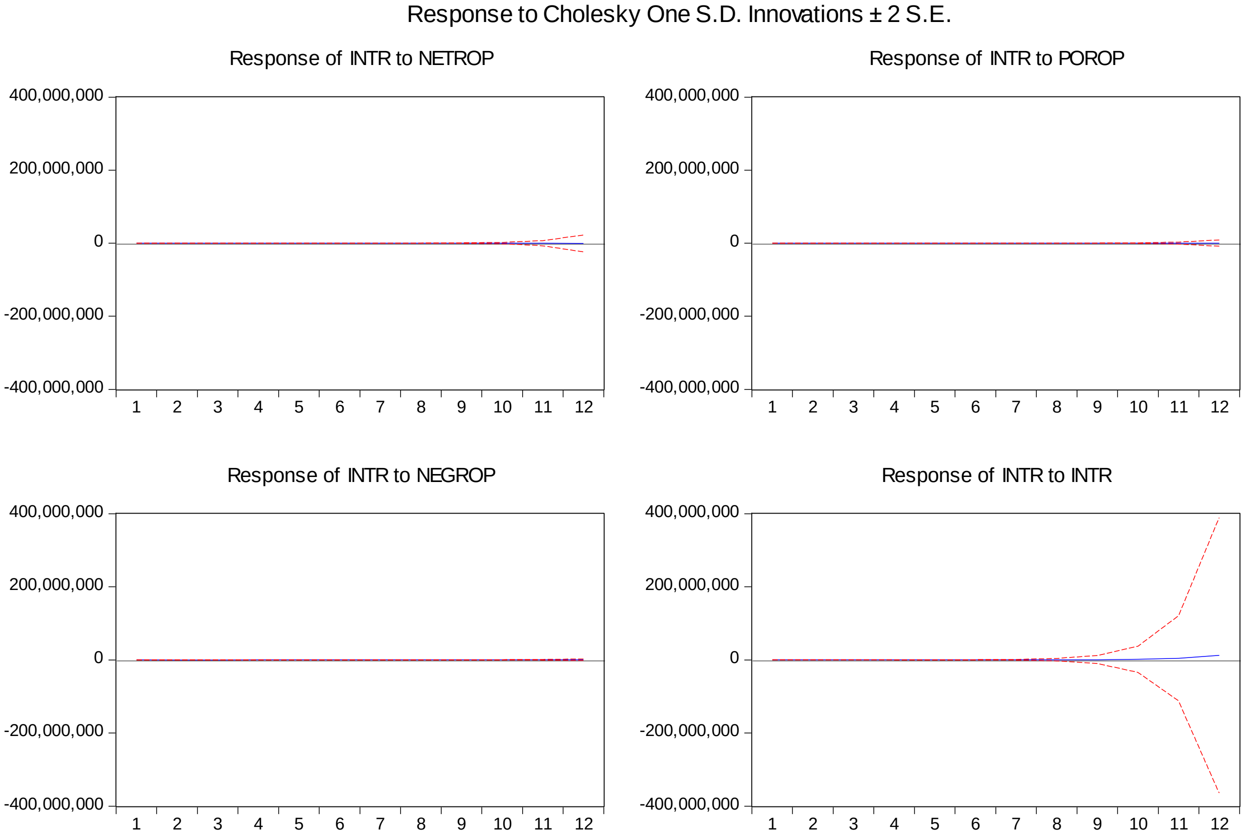
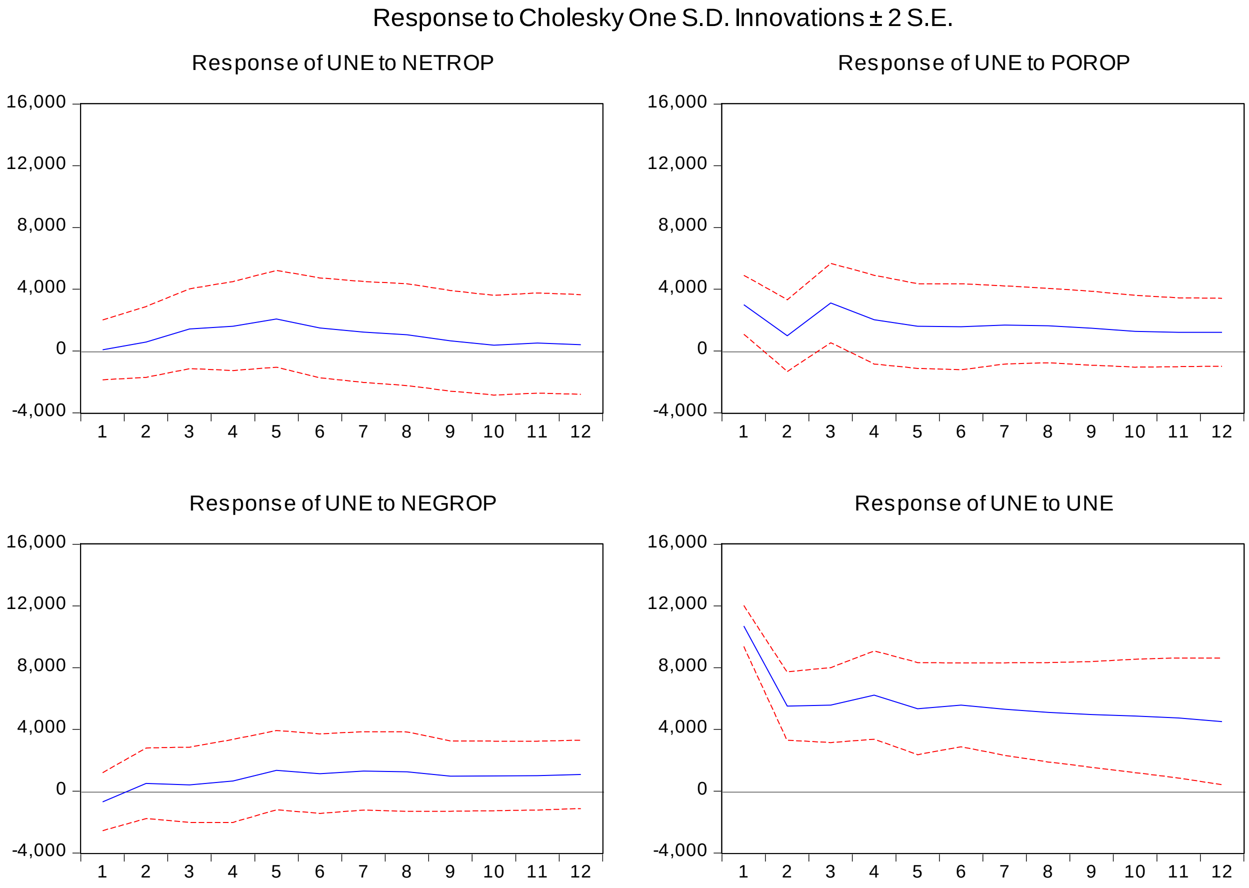


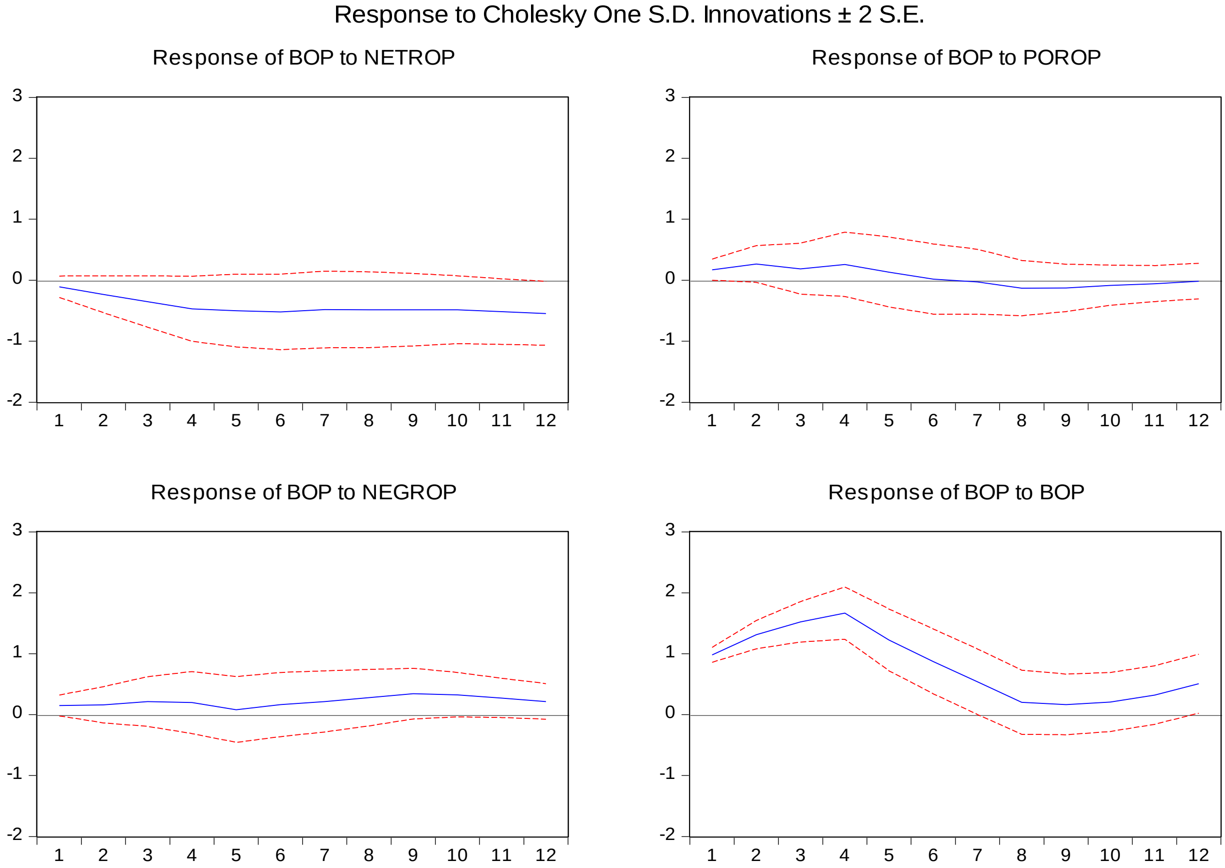
Figure 4.6 also shows the response of unemployment rate to asymmetric oil price shocks in Nigeria. A closer look at the figure reveals that unemployment rate responses positively to its own shocks but the positive response decreases with time. Unemployment rate response positively to the net oil price shocks, increase in oil price as well as decrease to oil price shocks.

Figure 4.6 Orthogonalized impulse response function of UNE to asymmetric oil price shocks (ROP+, ROP-, NetROP: Nonlinear specificationUNE)



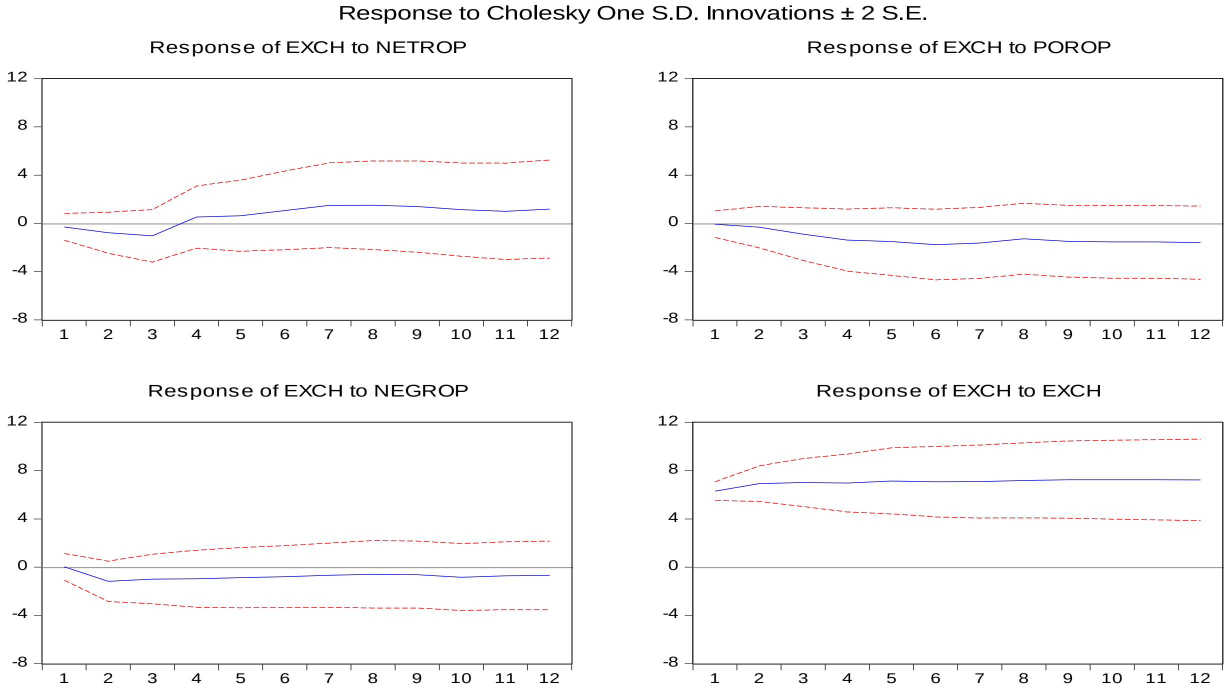
Using a response period of 12 months, the figures show that balance of payment response positively to its own shocks but decreased as time progresses. Balance of payment responses initially positive to oil price increase shock but after half of the year, it response negatively. A further observation shows that the balance of payment hovered within the horizon for the protracted period. On net oil price shocks its response negatively all through the time horizon. The balance of payment response positively to decrease in oil price shocks.

Figure 4.7 Orthogonalized impulse response function of BOP to asymmetric oil price shocks (ROP+, ROP-, NetROP: Nonlinear specificationBOP)



Finally, figure 4.8 display the impulse response of exchange rate to asymmetric oil price shocks for a period 12 months. The figure shows that exchange rate response positively to its own shocks.Real effective exchange rate jumped sharply in the first three quarters in response to positive changes in oil price, slows down in the medium to long term but was consistently significant throughout the periods to suggest the downside risk to the country's currency on increase oil price, particularly following the liberalization of the Nigerian foreign exchange market as part of the broad financial sector reforms programme of SAP.It responds negatively to both a fall and rise in oil price shocks all through the period. The response to net oil price shocks is negative in the first four months but positive after the fourth month till the end of the period.

Figure 4.8 Orthogonalized impulse response function of EXCH to asymmetric oil price shocks (ROP+, ROP-, NetROP: Nonlinear specificationEXCH)



4.3.5 Variance Decomposition

Variance decompositions are presented in Tables 4.5a and 4.5b following our different oil price specifications. The essence of the variance decomposition is to show the proportion of the forecast error variance of a variable that is attributable to its own innovations and other variables, including oil price as the impulse response functions basically analyze the qualitative response of the variables in the system to shocks in real oil prices.The results presented in table 4.5a accounts for the variance decompositions of the different variables attributable to oil shocks for four quarterly periods under symmetric specification while in table 4.5b, we have the variance decomposition of the variables with asymmetric specification for four quarterly period.

(a) Symmetric Effects

Table 4.5a demonstrates the variance decompositions of the VAR model in symmetry definition of oil price shock on the selected macroeconomic variables attributable to real oil price shocks. Oil price growth stimulates the volatility of the other variables in the model to varying degrees. Oil price shocks strongly accounts for 97.3 per cent of its own shock in the first quarter, while interest accounts for more than half of the remaining percentage of decomposition in real oil price shocks. In the second quarter, real oil price maintained an average of 76.1 per cent of own innovation while for the fourth quarter, it accounts for only six per cent of own shocks while real output alone accounts for over 82 percent of variation in real oil price.

Fluctuations in the country's BOP strongly accounts for its own fluctuation in the first three quarters, while real GDP explains 80 per cent of fluctuation in BOP in the last quarter. However, real oil price accounted for 1.6 per cent of decomposition in BOP in the second quarter excluding its own shocks. Oil price also accounts for 1.8 per cent and 0.9 per cent for third and fourth quarters respectively. The implication is that the effect of real oil price on BOP is insignificant at the medium and long term periods.

Fluctuations in effective exchange rate emanates from its own shocks between the first and second quarter except for the fourth quarter where real GDP proves strong again by accounting for over 79 per cent of fluctuations in effective exchange rate in the fourth quarter of the period under consideration. Oil price accounts for between 2.67 to 12.86 per cent throughout the periods. Oil price shows a significant impact at the medium term period.

Real GDP solely and strongly accounts for its fluctuation through the period with oil price shocks having 0.85 per cent in the first quarter, 1.03 percent in the second quarter, 3.84 percent and 6.53 per cent during third and fourth quarters respectively. This shows that the effect of real oil price on real GDP is gaining momentum in the process of time.

Surprisingly, fluctuations in real government expenditure is insignificant of own shocks for the four quarters under consideration. Rather, Real GDP proves strong account for fluctuations in real government expenditure all through the period under consideration. Oil price accounts for 5.99 per cent in the third quarter and 5.32 per cent during the last quarter.

Table 4.5a: Variance decomposition for symmetry effects

	Variance decomposition of ROP								
Quarter	**S.E**	**ROP**	**BOP**	**EXCH**	**GDP**	**GEX**	**INF**	**INTR**	**UNE**
1	11.2024	97.3555	0.0065	0.0482	0.2232	0.7209	0.0355	1.4984	0.1118
2	16.2372	76.1807	0.2440	0.5398	3.0708	14.3724	0.5640	4.5665	0.4617
3	25.7648	45.8761	0.7911	0.9203	20.6305	24.5234	1.1962	5.5227	0.5397
4	116.9555	6.0737	0.6637	0.5286	82.2502	7.4560	0.0618	2.8986	0.0673
	Variance decomposition of BOP								
Quarter	**S.E**	**ROP**	**BOP**	**EXCH**	**GDP**	**GEX**	**INF**	**INTR**	**UNE**
1	1.4518	0.1045	95.1941	0.3419	0.9297	0.9563	0.1735	0.7812	1.5188
2	2.8230	1.6266	80.5486	2.6934	7.6226	0.7196	0.6881	0.7018	5.3992
3	3.6522	1.8346	54.9980	4.5825	29.5124	1.4378	0.7493	2.4427	4.4427
4	8.7960	0.9914	10.6594	1.2509	80.5649	2.1894	0.5948	2.3313	1.4179

	Variance decomposition of EXCH								
Quarter	S.E	ROP	BOP	EXCH	GDP	GEX	INF	INTR	UNE
1	9.1385	2.6781	3.9705	75.8481	0.7964	9.1956	0.0731	7.2176	0.2207
2	16.3193	12.7639	6.9081	45.2868	0.8290	25.7039	0.0611	7.3355	1.1117
3	38.1323	10.9763	4.6931	22.2681	26.9701	28.1615	0.1832	5.7141	1.0336
4	122.6002	4.6469	1.0496	1.9289	79.0783	9.6869	0.0921	3.4244	0.0928
	Variance decomposition of GDP								
Quarter	**S.E**	**ROP**	**BOP**	**EXCH**	**GDP**	**GEX**	**INF**	**INTR**	**UNE**
1	4988849.47	0.8527	0.3171	0.3519	97.4810	0.6437	0.0008	0.3503	0.0026
2	119970000	1.0334	2.6974	0.6097	89.3462	2.4187	0.0277	3.7902	0.0768
3	233190000	3.8434	3.4668	1.0544	72.8718	6.8193	0.1461	11.6915	0.1067
4	5.02786000	6.5350	2.2175	0.5388	70.2374	9.4180	0.1560	10.7302	0.1671
	Variance decomposition of GEX								
Quarter	**S.E**	**ROP**	**BOP**	**EXCH**	**GDP**	**GEX**	**INF**	**INTR**	**UNE**
1	638716	0.8724	0.4546	0.2508	96.8397	1.1180	0.0008	0.4588	0.0049
2	117980000	2.0347	3.5086	0.5232	84.6612	4.1713	0.0463	4.8967	0.1581
3	193680000	5.9922	3.8408	1.0924	61.8721	11.2988	0.2375	15.3582	0.3079
4	603260000	5.3214	1.1021	0.4322	78.0467	8.3920	0.1003	6.4376	0.1657
	Variance decomposition of INF								
Quarter	**S.E**	**ROP**	**BOP**	**EXCH**	**GDP**	**GEX**	**INF**	**INTR**	**UNE**
1	9.6739	0.4308	5.4219	0.1880	0.5866	3.9648	84.1492	5.1464	0.1123
2	13.3664	1.7001	4.3729	1.7000	2.5991	7.5741	73.4247	7.6204	1.0088
3	25.7500	3.3553	3.1310	1.1773	31.7959	9.6195	41.9303	6.8895	2.1012
4	131.8412	1.4720	0.4999	0.4839	90.9643	3.0808	0.9767	2.4425	0.0798
	Variance decomposition of INTR								
Quarter	**S.E**	**ROP**	**BOP**	**EXCH**	**GDP**	**GEX**	**INF**	**INTR**	**UNE**
1	7.3168	10.7574	3.7032	0.7278	2.9224	37.8115	0.0245	43.4990	0.5543
2	14.6810	15.1610	2.5493	0.8532	5.3034	56.0880	0.0366	19.2453	0.7632
3	72.3420	8.3234	0.5834	0.6706	58.7197	26.3630	0.0126	4.8568	0.4705

4	220.4160	3.5840	1.4407	0.5496	84.4403	6.9270	0.0054	2.9881	0.0649
	Variance decomposition of UNE								
Quarter	**S.E**	**ROP**	**BOP**	**EXCH**	**GDP**	**GEX**	**INF**	**INTR**	**UNE**
1	11813.4007	1.90009	0.5883	0.3304	1.0122	9.5544	0.9535	11.0668	74.5937
2	16452.7567	10.2567	1.005	0.9864	1.9320	26.5886	1.5720	15.9228	41.7365
3	44376.74	9.9149	0.5445	0.7199	31.5558	28.3653	0.6526	14.2801	13.9666
4	12437.73	7.1231	1.4096	0.2340	70.2285	14.171	0.0679	5.4033	0.8152

Source: Authur's computation

The variance decomposition of inflation rate from the above table reveals that inflation shocks contribute 84.14 per cent and 73.42 per cent of own shocks in the first and second quarters. However in the long run, especially at the fourth quarter, it contributes only little to own variations (0.95%). Real GDP solely and strongly accounts for 90 per cent of fluctuation in inflation rate during the fourth quarter with oil price shocks having between 0.43 per cent and 3.35 per cent for the period.

For fluctuations in interest rate, its accounts for 43.4 per cent of own shocks in the first quarter while real GDP and real government expenditure jointly explains 61.3 per cent and 85.08 per cent in the second and third quarters respectively. However, oil price accounts for 10.7 in the first quarter and 15.1 in the second quarter.

Finally, unemployment rate shows strong accounts for its own shocks in the first quarter as it accounts for 74.5 of own variation. Real government expenditure and real GDP jointly accounts about 60 per cent of fluctuations in the rate of unemployment in the country. Oil price shocks relatively accounts for variations in unemployment rate in the short run with about 10.2 per cent but proved minimal with 9.9 percent in the long run. Other variables exhibit similar trend with oil price shock having less than 8 per cent influence in their variations over the fourth quarters.

(a) **Asymmetric Effects**

Table 4.5b shows the variance decompositions of the VAR models that captured the asymmetric effects of oil price shocks on the selected macroeconomic variables. Both oil price increases and decreases affect the volatility of the other variables in the model to varying degrees. For variations in BOP, both positive and negative oil price shocks had insignificant influence on balance of payment in the short and long run Balance of payment maintained an average of 86 per cent throughout the period. The net oil price however accounts for 11.3 percent of variation in Nigeria's balance of payment for the third quarter and 15.7 per cent for the fourth quarter.

The variance decomposition of interest rate also suggests that both positive and negative oil price shocks are insignificant in explaining fluctuations in interest rate. In most cases, if not at all times, the variable itself is the largest source of its own variation in succeeding periods.

The combined share of the asymmetric oil price increase and decrease account for more than 10 percent of the variance of the real GDP in Nigeria for second quarter. The table shows that a positive oil price shock is relatively less important than a negative oil price shock in explaining the variation in output. This holds for both the short and long run.This is also significant considering the fact that Dotsey and Reid (1992) found that oil prices explain between 5% and 6% of the variation in GNP, while Brown and Yucel (1999) show evidence that oil price shocks explain little of the variation in output. Jimenez-Rodriguez and Sanchez (2005) estimates from the decomposition of the forecast error variance show that oil price shock account for 8 percent of Germany's output variability, 9 percent in the UK, and 5 percent in Norway. This also confirms the findings of (Barsky andKilian, 2004and Olomola, 2006) and that oil price shocks had marginal impact on output.The increase in oil price shock from the variance decomposition does not have any effect on changes in the inflation rate.

On the variance decomposition of real government expenditure, both oil price increases and decreases affect the volatility of the other variables in the model to varying degrees. For real government expenditure (*GEX*), negative oil price shocks initially account for about 4.8 percent of its variation in the first quarter, increasing to a share of 10.8 percent in the fourth quarter after shock, while the positive oil price shocks account for an average of 2.1 percent of changes in real government expenditure in the third and fourth quarter. However, the instant (after first quarter) impacts of positive oil shocks are lesser than the impact of negative oil price shocks. The variance decomposition shows that the response of real government expenditure to a one standard deviation shock to negative oil price changes was significantly different from zero.This result confirms the hugemonetization of crude oil receipts and subsequent increase in real government expenditure as explained earlier. However, with the introduction of an oil stabilization fund by the central bank to save some part of oil windfalls, the picturemay differ in future.This result agrees with the foundings of Farzanegan and Markwardt (2008) where positive oil shocks accounted for an insignificant variation in government revenue.

The other important aspect of the nonlinear oil shock can be seen in the effects on real effective exchange (*EXCH*) rate fluctuation. While the positive oil shocks play a marginal role on variations in this variable, the negative oil shocks have a significant share in the long run. Volatility of EXCH due to oil price fluctuations is accounted for 13 percent. This finding is in line with previous studies that negative oil price shocks do significantly affects the real exchange rate (Amano and Van Norden 1998a and 1998b).

For variations in unemployment rate, both positive and negative oil price shocks explain more about changes in real effective exchange rate four quarters after shock, while the influence of positive shocks proves stronger than that of negative oil price shock in the long run.

Table 4.5b: Variance decomposition for Asymmetry effects

Quarter	S.E.	NETROP	ROP+	ROP-	BOP
Variance decomposition of BOP					BOP
1	3.646031	2.299399	2.941128	1.854928	92.90455
2	3.87726	6.475135	2.152915	1.459632	89.91232
3	3.970172	11.31871	1.933166	2.454106	84.29401
4	4.01219	15.70197	1.942855	4.259888	78.05093
Variance decomposition of INTR					INTR
1	3.158412	0.274468	0.051397	0.013371	99.66076
2	372.4402	0.399035	0.049081	0.000353	99.54951
3	16038.26	0.411387	0.051906	0.000344	99.53952
4	224861.8	0.412606	0.052122	0.000354	99.53458
Variance decomposition of INF					INF
1	3.626528	0.068671	0.383339	0.416038	99.13195
2	3.889990	1.028144	0.762656	0.366374	97.84282
3	3.975679	1.333509	0.734486	0.316498	97.61891
4	4.014882	1.290718	0.70272	0.310015	97.69655
Variance decomposition of GDP					GDP
1	3.623972	0.503793	0.494279	4.335381	94.66655
2	3.878874	0.85187	0.52967	10.95233	87.66613
3	3.978901	1.749205	1.124206	12.29023	84.83636
4	4.035433	4.684517	2.012051	12.86289	80.44055

Variance decomposition of GEX					GEX
1	3.538911	0.832116	0.823602	4.834618	93.50966
2	3.378372	1.724355	1.13828	10.52206	86.6152
3	3.929097	4.612924	2.183412	10.99648	82.20718
4	4.018419	7.624662	3.249723	10.78937	78.33625
Variance decomposition of EXCH					EXCH
1	3.517498	0.743731	0.254299	1.06502	97.93695
2	3.708833	1.071265	2.085811	1.620702	95.22222
3	3.785085	1.89216	13.060174	11.328837	73.71883
4	3.833336	2.117465	13.330349	11.204761	73.34743
Variance decomposition of UNE					UNE
1	3.623671	0.47518	7.80627	0.432105	91.28644
2	3.831722	2.978487	9.318817	1.019269	86.68343
3	3.928396	3.626263	8.865372	1.951508	85.55686
4	3.992068	3.219364	8.501897	2.303475	85.97527

Source: Author's computation

4.4 Results Of The EGARCH Models

This study employs the exponential GARCH model to investigate the volatility transmission of asymmetric oil price within the economy among the selected macroeconomic variables.In the first part of this section, descriptive statistics for all return series are presented.The summary statistics of the oil price series with the macroeconomic indicators are given in table 4.6. This shows that the distribution, on average, is positively skewed relative to the normal distribution (0 for the normal distribution). The positive skewness is an indication of non-symmetric series. The kurtosis for all the variables are larger than 1. Skewness indicates non-normality, while the relatively large kurtosis suggests that distribution of the oil price and the selected monetary indicators are leptokurtic, signaling the necessity of a peaked distribution to describe this series. The Jarque-Bera normality test rejects the hypothesis of normality for ROP-, NETROP, ROP+, UNE, BOP, EXCH, GDP, GEX, INF, and INTR at 5% level of significance.

Table 4.6: Summary Statistics of Volatility

Variable	ROP-	NETROP	ROP+	ROP	UNE	BOP	EXCH	GDP	GEX	INF	INTR
Mean	-2.23	1.66	2.37	53.22	39913	12.78	63.25	611264	5243267	20.72	17.18
Std. Dev.	6.12	3.67	4.16	29.52	19743	4.35	61.95	224227	1756781	16.38	63.80
Skewness	-7.49	3.51	2.67	0.74	0.36	0.65	0.32	4.51	3.86	1.59	11.45
Kurtosis	71.80	19.62	12.31	2.27	2.80	3.82	1.30	22.71	16.38	4.75	132.71
Jarque-Bera	28091	1845.76	652.4	15.55	3.133	13.40	18.83	2662.8	1352.99	74.36	98306.19
p-value	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

The leptokurtosis reflects the fact that the market is characterised by very frequent medium or large changes. These changes occur with greater frequency than what is predicted by the normal distribution. The empirical distribution confirms the presence of a non-constant variance or volatility clustering. This implies that volatility shocks today influence the expectation of volatility many periods in the future.

The results of estimating the EGARCH models for the ROP-, NETROP, ROP+, UNE, BOP, EXCH, GDP, GEX, INF, and INTR are presented in Tables 4.7 using the student-t EGARCH model which assumes the conditional distribution of oil price shocks and the selected macroeconomic indicators. As the oil price return series shows a strong departure from normality, all the models will be estimated with Student t as the conditional distribution for errors. The estimation will be done in such a way as to achieve convergence.

Table 4.7: Empirical result of EGARCH Model

	BOP	GDP	GEX	INF	INTR	EXCH	UNE
C	15.91****	1112901.8*	-251327**	18.61***	12.11***	0.13	24372.1***
ROP	-0.09***	5987.6***	87675.1**	-0.05***	-0.004	0.76***	-282.60***
ROP+	-0.01	-368.85	-11724.8	-0.11**	-0.19	0.44	865.12
ROP-	0.09***	-1235.76	-37264.2**	0.02	-0.02	-0.21	-187.27
NETROP	0.13***	-8095.63**	-97887.8**	0.16	-0.26	-0.99	-1061.44
ω	-1.85***	-0.62	-0.88	-0.39	3.70***	-0.44	5.00
α	2.43***	1.97***	2.84***	0.82**	1.96***	1.63***	0.78**
γ	0.38	-0.61*	-1.26***	0.02	-0.82***	0.30	-0.04
β	0.72***	0.97***	0.97***	0.93***	-0.32***	0.86***	0.71***

Note :, **, *** statistically significant at 10%, 5% and 1% significant level*

To gain some insight into the magnitude of the asymmetry we define the cumulative distance between the response of the selected macroeconomic variables to a positive shock of oil price and that of a negative shock as well.

In the mean equation, coefficient of real oil price for BOP, INF, INTR and UNE are negative while GDP, GEX and EXCH are positive. This implies that the real oil price has a significant (except INTR) negative impact on BOP, INF, INTR and UNE.

The variance equation in the above table shows that the coefficient of ARCH term (α) are positive in all the selected macroeconomic variables. This confirms that the ARCH effects are very pronounced implying the presence of volatility clustering. The short run effect of oil price shocks from the above table reveals that it is more in BOP, GDP, GEX and INTR but less in UNE. Conditional volatility tends to rise (fall) when the absolute value of the standardized residuals is larger (smaller) (Leon, 2007). The table also reveals that the coefficients of the GARCH term (β) which is the determinant of the degree of persistence are statistically significant in all the variables. Since the value of GDP and GEX are greater than 0.9, this appears to show that there is high persistence in volatility as the value of β for the oil price specifications. This implies that volatility takes longer time to die out following a shock in oil price. In other words, the long run effect of oil price shocks is more in GDP and GEX. The coefficients of γ, the asymmetry and leverage effects are negative for GDP, GEX, INTR and UNE. This is an indication that negative shocks on these variables reduce volatility more than positive shocks.

To gain some additional insight into the factors that drive the magnitude of this asymmetry, we applied the principal component analysis as indicated below.

4.5 Principal component analysis

4.5.1 Theoretical background

PCA is a multivariate statistical technique which calculates the principal directions of variability in data, and transforms the original set of correlated variables into a new set of uncorrelated variables. The new uncorrelated variables are linear combinations of the original variables. These principal components represent the most important directions of variability in a dataset.

Given a data matrix with p variables and n samples, the data are first centered on the means of each variable. This will insure that the cloud of data is centered on the origin of our principal components, but does not affect the spatial relationships of the data nor the variances along our variables. The first principal components (Y_1) is given by the linear combination of the variables $X_1, X_2, ..., X_p$:

$$Y_1 = a_{11}X_1 + a_{12}X_2 + ... + a_{1p}X_p. \tag{4.1}$$

and is calculated in such a way that it accounts for the greatest possible variance in the data set. Of course, one could make the variance of Y_1 as large as possible by choosing large values for the weights a_{11}, a_{12}, ...a_{1p}. To prevent this, weights are calculated with the constraint that their sum of squares is 1:

$$a_{211} + a_{212} + ... + a_{21p} = 1. \quad (4.2)$$

The second principal component is calculated in the same way, with the condition that it is uncorrelated with (i.e., perpendicular to) the first principal component and that it accounts for the next highest variance.

$$Y_2 = a_{21}X_1 + a_{22}X_2 + ... + a_{2p}X_p. \quad (4.3)$$

This continues until a total of p principal components have been calculated, equal to the original number of variables. At this point, the sum of the variances of all of the principal components will equal the sum of the variances of all of the variables, that is, all of the original information has been explained or accounted for. Collectively, all of these transformations of the original variables to the principal components is

$$Y = AX. \quad (4.4)$$

The rows of matrix A are called the eigenvectors of variance-covariance matrix of the original data. The elements of an eigenvector are the weights a_{ij} , and are also known as loadings. The elements in the diagonal of matrix S_y, the variance covariance matrix of the principal components, are known as the eigenvalues. Eigenvalues are the variance explained by each principal component and are constrained to decrease monotonically from the first principal component to the last.

4.5.2 Empirical results

Ideas of principal component analysis can be applied to determine what are the factors that can explain variations of crude oil prices. In order to do so, factors described above are used to build 8 principal components that may be represented as a linear combination of initial factors. Application of the above methodology reveals that the first three principal components are sufficient to explain more than 75 percent of total variation of the system of interest rate changes (Table 4). In particular, the first principal component (1) helps to explain more than 43% of the total variation over the period of study. The addition of a second principal component (PC2) contributes to increase that percentage up to almost 63% and the sum of the third principal component (PC3) does permit to explain more than 75% of the variance of the system.

Table 4.8: Principal Components Analysis

	PC1	**PC2**	**PC3**	**PC4**	**PC5**	**PC6**	**PC7**	**PC8**
Eigenvalue	3.450	1.5720	1.0419	0.7905	0.6315	0.2811	0.2149	0.0177
% of variance	43.13	19.65	13.02	9.88	7.89	3.51	2.69	0.22
Cum. %	43.13	62.78	75.80	85.68	93.58	97.09	99.78	1.00

Table 4.9 presents the factor loadings of the first three principal components. The first principal component shows positively correlated of oil price with all the macroeconomic variables except BOP and INF. This can be interpreted as a parallel shift of the term structure, which means that all the selected variables (except BOP and INF), move in the same direction with oil price. The second principal component shows the factor loadings have positive values for exchange rate changes and oil price.

Table 4.9: Factor loadings

Variable	PC 1	PC 2	PC 3	PC 4	PC 5	PC 6	PC 7	PC 8
ROP	0.3887	-0.3869	-0.2393	0.2719	0.0706	0.1410	0.7361	-0.0369
EXCH	0.3689	-0.0469	-0.5803	0.0023	0.2999	0.6309	-0.1842	-0.0541
BOP	-0.1357	0.6603	0.3536	-0.1435	-0.2099	0.0754	0.5918	-0.0110
GDP	0.4588	0.2889	-0.2366	0.0497	-0.3210	0.0061	-0.1918	-0.7124
GEX	0.4660	0.2304	-0.1539	0.1417	-0.4164	0.0929	-0.1707	0.6890
INF	-0.2094	0.3835	-0.1424	0.8087	0.3461	0.0894	-0.0835	-0.0082
INTR	0.2253	0.3559	-0.4448	-0.4579	0.6332	0.0237	0.0329	0.1112
UNE	0.4148	0.0421	0.4280	0.1389	0.2523	-0.7477	0.0114	0.0286

Because reduction of dimensionality, which is, focusing on a few principal components versus many variables, is a goal of principal components analysis, several criteria have been proposed for determining how many PCs should be investigated and how many should be ignored. One common criteria is to ignore principal components at the point at which the next PC offers little increase in the total variance explained. A second criterion is to include all those PCs up to a predetermined total percent variance explained, such as 90%. A third standard is to ignore components whose variance explained is less than 1 when a correlation matrix is used or less than the average variance explained when a covariance matrix is used, with the idea being that such a PC offers less than one variable's worth of information (Holland, 2008). A fourth standard is to ignore the last PCs whose variance explained is all roughly equal.

A close look at table 4.10 below reveals that the asymmetric effect of real oil price is more on rate of exchange rate and unemployment rate. This result further reveals that an increase and decrease in oil price affects unemployment rate and exchange rate while that of symmetric effect is on balance of payment and inflation rate.

Table 4.10: Principal Components Analysis

Type of Oil Price	Variables of interest	Level of PC	Nature of relationship	Degree of effect (%)
Linear (ROP)	BOP and INF	1	Negative	43.1
ROP+	EXCH and UNE	2	Positive	57.3
ROP-	EXCH and UNE	2	Negative	55.6
NETROP	EXCH and UNE	2	Positive	57.2

4.5.3 Principal Component–GARCH Model result

As stated earlier, GARCH splits the variance forecasts into two components - autocorrelations, or volatility in the past, and innovations, or exogenous shocks in the volatility of returns. Using GARCH (1,1) leads us immediately to the question of how much of the innovation is truly "exogenous" and how much is it explained by "other factors" not considered in the model. To improve the model, we could begin by considering other explanatory variables that could influence the volatility of our estimate (in other words, to endogenise some of the exogeneity). However, adding explanatory variables leads us to a particular weakness of the GARCH: the parameter estimation problem. Due to correlations (usually not zero) between the variables used in the GARCH, the problem requires substantial amounts of data and computational power to come up with a reasonably robust estimate. Thus, we aim to improve the volatility forecast of the selected macroeconomic variables compared to the result obtained with GARCH above by using a more tractable method that handles multiple independent variables. This is accomplished by using PC-GARCH.

The result is as shown in the table 4.9 below

Table 4.9 : Empirical result of PC-GARCH Model

	BOP	GDP	GEX	INF	INTR	EXCH	UNE
α	-0.05	-0.004	0.10*	0.09**	0.09**	0.16**	-0.02
β	-1.41**	-0.40**	-0.58**	-0.32**	-0.29**	0.67**	-0.85
γ	2.74**	1.42**	0.87**	0.65**	0.55**	-0.65**	1.87*
$\alpha+\beta$	-1.46	-0.404	-0.48	-0.23	-0.20	0.83	-0.87

Note :, **, *** statistically significant at 10%, 5% and 1*

Table 4.9 above shows that among the selected macroeconomic variables, real effective exchange rate (EXCH) model received the highest symmetric effect of 0.16, followed by real government expenditure model which shows 0.10. Both inflation rate and interest rate has 0.09 while others (BOP, GDP, UNE) have negative the magnitude effect or symmetric effect of oil price shocks.

All the variables under study exhibits positive conditional volatility coefficient except for real exchange rate which shows a conditional volatility coefficient of 0.64. The implication is that volatility in real exchange rate takes longer time to die out following oil price shocks than other selected macroeconomic variables (Alexander, 2009).

Finally, the result shows that asymmetric coefficient of real effective exchange rate model has a good news. That is, positive shocks of real oil price generates less volatility than negative shocks in the real effective exchange rate model while the other variables indicating that the leverage effect have bad news (i.e. positive innovations of oil price are more destabilising than negative innovations).

CHAPTER FIVE

SUMMARY, CONCLUSION AND POLICY RECOMMENDATION

5.1 Introduction

Nigeria is a country blessed with abundant human and natural resources but its rate of economic growth is still sluggish. This work assesses oil price shocks and macroeconomic performance in Nigeria between 1980 and 2013. The main focus is on the relationship between oil prices shocks and some key macroeconomic variables.

5.2 Summary

The main instruments of data analysis are GARCH and the vector autoregression techniques. In addition, ADF and PP techniques were employed to check the time series characteristics of the data. As a first step, the ADF and PP tests show that only the asymmetric oil price and UNE (with trend) are stationary at levels but the hypothesis of nonstationarity was rejected at first difference. This is consistent with the strand of empirical studies on characteristic of time series data, which according to Engle-Granger require differencing before they could attain stationarity.

Next, the Johansen cointegration test revealed at least three cointegration equation at 5 percent level using both the trace statistic and the maximum eigenvalue for both symmetric and asymmetric oil price. This therefore unveils the existence of a long run equilibrium relationship between real oil price and the variables used in the model and further points to the suitability of adopting the unrestricted VAR approach at levels.

The result of the EGARCH model illustrates that the symmetric price of oil is largely significant in all the variables except interest rate indicating that the symmetric oil price plays a role in the variance of the Nigerian key macroeconomic variables. For the asymmetry coefficient of oil price (EGARCH component) on the selected macroeconomic variables, increase in oil price reduces inflation rate while decrease in the price of oil significantly affects the country's balance of payment and real government expenditure. This indicates that positive shocks reduce volatility more than negative shocks in all the selected variables. The Variance autoregressive result also showed that oil price has an insignificant relationship with the selected variables. Since according to Sims, most estimated coefficients from VAR model are not statistically significant. Therefore, the impulse response functions and variance decompositions are further examined.

The impulse response function shows that there is no transmission of structural shocks in the inflation rate. That is, Inflation did not respond to shocks to oil prices in all the 12 months period after the occurrence of such a shock.

The interest rate appears to be insignificant in response to oil price shock in longer time horizon of 12 month period. Thus, the null hypothesis of no effect of oil price changes on interest rate cannot be rejected.

The response of real output to changes in oil price was initially positive in the first two months, depressed between the 3rd and 4th months then bounces back in the 6th month then hovered along the horizon in the remaining months.

A further observation shows that real government expenditure hovered within the horizon for the protracted period. Seemingly, additional researches have to be conducted in order to reveal this phenomenon.Both positive and negative shocks to real government expenditure proved influential in this regard in the short and long run. These findings are therefore relatively in line with the demand side transmission channel postulated by Tang *et al.* (2010), as positive shocks to oil price motivates variations in government spending, stimulate growth, inflationary pressures, increase interest and real effective exchange rate and real volume of import. Hence, this implies that proper coordination of fiscal and monetary policy is needed to ensure that while growth potential is embedded in positive shocks to oil price, the downside risks from inflation rate, interest rate, exchange rate and drastic fall in external reserves deserve immense attention.

The response of real exchange rate to one standard shock to linear oil price changes is significant at 5 per cent levels. Starting from the third month, responses to innovations in oil price begin to increase and completely die out. This is in line to our beliefs about “Dutch Disease” and so confirms the findings of Akinley and Ekpo (2013). According to “Dutch Disease”, we expect a significant appreciation of real exchange rate to increase in oil price. The role of state of oil fund of Nigeria should be intensified here. The establishment of oil stabilization fund and the government expenditure should help government to successfully save unexpected oil revenue increases in the next generations. By controlling government expenditures, funds could successfully tackle with possible appreciation in effective exchange rate.

Considering the asymmetric oil price specification, increase in oil price resulted to a sharp increase real government expenditure, real output but a decrease in inflation rate, exchange rate of the Nigerian naira with slight decrease in unemployment rate. However, the response of the macroeconomic indicators to decrease in asymmetric oil price shock show that Interest rate dropped alongside with the response of Nigeria naira to US dollar. Also, a negative oil price shock depresses real output and real government expenditure while the unemployment rate responds positive but inflation rate is insignificant.

Specifically, the results of the impulse response functions and variance decomposition analysis to a large extent confirmed that oil price shocks are only able to explain a small proportion of the forecast error variance of these macroeconomic variables. Oil price shocks, as revealed by variance decomposition, accounted for between 0.43 per cent and 3.35 per cent for the period. However, oil price accounts for 10.7 in the first quarter and 15.1 in the second quarter. Oil price shocks relatively accounts for variations in unemployment rate in the short run with about 10.2 per cent but proved minimal with 9.9 percent in the long run. Other variables exhibit similar trend with oil price shock having less than 8 per cent influence in their variations over the fourth quarters.

Finally, the pairwise granger test reveals that symmetric oil price shock Granger causes real output, government spending and interest rate while exchange rate and unemployment rate granger causes symmetric oil price. Also for the asymmetric oil price, exchange rate granger cause increase in oil price while decrease in oil price granger causes exchange rate in Nigeria.

In summary, the analysis of the oil price shock indicates that the empirical distribution of volatility in the oil price is non-normal, with very thick tails for the country. The leptokurtosis reflects the fact that the market is characterised by very frequent medium or large changes. These changes occur with greater frequency than what is predicted by the normal distribution. The empirical distribution confirms the presence of a non-constant variance or volatility clustering. This implies that volatility shocks today influence the expectation of volatility many periods in the future.

The evidence of asymmetric in beta (due to oil price shocks) suggests that abnormalities such as mean reversion in the selected variables may occur as a result of changes in expected returns caused by time variation and asymmetry rather than as a by-product of market efficiency. Furthermore the results presented by the PC-GARCH model may be a useful tool for investigating some hedging strategies, since the property of individual macroeconomic variable can be inferred from the analysis of a beta process.

5.3 Conclusion

This research work conducted an empirical analysis of oil price shocks and macroeconomic performance in Nigeria. There is an abundance of literature on the effects of oil shocks on advanced net oil importers and such studies have largely driven theoretical propositions about the oil–macroeconomy relationship. This study departs from other studies in focusing on how macroeconomic variables respond to not just symmetric oil price shocks of a developing net oil exporter but also asymmetric oil price shocks, thereby providing fresh insight into the oil–macroeconomy relationship and comparing the results with those from studies that have focused on developed oil-importing countries. The use of different models especially the PC-GARCH model in oil price further exposed the movement of oil price in relation to macroeconomic indicators.

The granger causality results shows a one directional causality where real oil price for the symmetric specification granger causes government expenditure, unemployment rate and exchange rate while for the asymmetric specification, both positive and negative oil price granger causes exchange rate of the naira.

This implies that volatility takes longer time to die out following a shock in oil price. In other words, the long run effect of oil price shocks is more in GDP and GEX. The coefficients of γ, the asymmetry and leverage effects are negative for GDP, GEX, INTR and UNE. Our findings demonstrate that oil price shocks do not have substantial effects on interest rate in Nigeria over the period covered by the study. However, the findings revealed that fluctuations in oil prices do substantially affect the real exchange rates in Nigeria which is consistent with the findings of Olomola and Adejumo (2006). Thus, we conclude that oil price shock is an important determinant of real exchange rates and in the long run real output, while real output and real government expenditure rather than oil price shocks that affects inflation rate in Nigeria.

5.4. Policy Recommendations

The results of the above analysis have a number of implications for policy. Our econometric results showed that most macroeconomic variables did not show considerable changes following the oil price shocks. It is not surprising that real government expenditure and real output from Nigeria respond to oil price shocks. This is because oil exports account for over 95% of Nigeria's total exports since 1980 and thus shocks in oil prices play a major role in affecting output. However, our finding that such shocks in oil prices are not reflected in some other macroeconomic variables highlights an important characteristic of the Nigerian economy, which is that a large proportion of foreign exchange earnings is spent on importation of consumer durables. This has been a feature of the economy since the oil boom of the 1970s and the importation of such consumer goods had the consequence that oil windfalls are not channelled into productive economic activities in the country. This calls for a rethinking of importation policy if oil windfalls are to be exploited for productive activities.

Although a policy of diversification is usually recommended for economies which depend solely on oil revenue, the applicability of such an option appears unclear from what we have found in the case of Nigeria.

Secondly, there is need to properly guide the deregulation of the foreign exchange market. The major lesson from the market-determined exchange rate experience in developing countries, including Nigeria, is that the exchange rate cannot be left to market forces alone. Policy makers should not assign to those forces in our economy a role, which is very much beyond them. The foreign exchange market could be properly guided, through strategic interventions, to ensure efficiency, orderliness and equitable allocation of foreign exchange resources.

Lastly, government should eschew unhealthy speculations in the foreign exchange, as well as rent-seeking behaviour, and adopt positive attitudes that are geared towards ensuring stable naira exchange rate. The abolition of dual exchange rate, that encourages rent seeking in the banking sector and in the parastatal, is in the right direction.

5.5 Suggestion For Further Research

Notwithstanding the many insights the recent literature has yielded, there is still more to be learned about how energy price shocks are transmitted throughout the economy. Future empirical work with disaggregate industry or plant level data augmented by structural models is likely to be promising. A recent example of such work is Herrera (2007). The challenge will be to combine a deeper understanding of the nature of energy price shocks with an explicit model of firm decisions and interactions. One difficulty with such extensions is the absence of disaggregate real GDP data.

Many empirical studies have therefore relied on disaggregate gross output data such as measures of industrial production (see, e.g., Lee and Ni 2002, Herrera 2007). This distinction matters because gross output may respond quite differently to energy price shocks than measures of value added such as real GDP (see, e.g., Barsky and Kilian 2002). This fact makes it difficult to relate conclusions of studies based on gross output to standard macroeconomic models based on value added production functions.

CONTRIBUTION TO KNOWLEDGE

This work contributes to the debate about the oil price shocks in Nigeria by analysing the volatility clustering of oil price using a time series approach as follows.

Firstly, unlike most previous empirical work, seven key macroeconomic variables with oil price is examined. Negative and positive as well as net oil price are considered. Most empirical studies focus on either symmetric or asymmetric oil price shocks (i.e. Kahya et al. 1994; Singh, 2002; and Olowe, 2009).

Secondly, the analysis is conducted over a longer sample period, 1980 to 2013, using relatively higher frequency data at quarterly interval. The yearly and monthly data have been used in a large number of previous empirical studies including those on Nigeria mentioned above.

Thirdly, GARCH models are employed. Unlike the widely used VAR and SVAR models that assume a constant variance and account for the oil price shocks via impulse response and variance decomposition analysis, GARCH models introduced by Engle (1982) and extended by Bollerslev (1986) take into account the distributional form of the oil price. Oil price exhibit leptokurtic, volatility clustering and leverage behaviour typically present in financial time series data and GARCH-type models capture this (Hu et al. 1997; Koutmos and Theodossiou, 1994; Brooks, 2001; Bauwens and Sucarrat, 2006; and Koay and Kwek, 2006). Thus, GARCH models estimate the path for the time-varying conditional variance of the oil price. This is in addition to determining the sources of volatility by specifying fundamental or control factors directly in and/or the mean and variance equations. Both symmetric and asymmetric versions of GARCH models are examined in order to capture the conditional volatility characterising oil price along its trend. Despite mixed results, recent empirical evidence has increasingly found strong support for the existence of asymmetry in OPEC (e.g.

Koay and Kwek, 2006; and Fidrmuc and Horváth, 2008). Thus, this evidence motivates us to extent the investigation to the oil price to determine whether oil price shocks (symmetric and asymmetric) have different effect on the key macroeconomic variables in Nigeria.

Finally, principal components analysis (PCA) is conducted on the estimated conditional variance. The motivation is to generate a new GARCH series (GARCH-PCA) that captures a common pattern in the estimated conditional variance. GARCH-PCA links volatility in the variables and reflects the interaction between oil price volatility and the key macroeconomic variables. The author is not aware of any study that has generated PCA oil price volatility series from GARCH models and applied it in empirical work as an alternative measure of oil price uncertainty. As the results indicate in chapters 4 and 5, the performance of GARCH-PCA as an alternative measure of oil price volatility is comparable to existing measures. The results reveal that fluctuations in oil prices do substantially affect the real exchange rates in Nigeria. GARCH-PCA mimics the pattern in the original oil price series and can thus be described as an index of oil price volatility capturing influences on the country's key macroeconomic variables.

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APPENDIX A

Null Hypothesis: INF has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.666660	0.0826
Test critical values:	1% level	-3.479281	
	5% level	-2.882910	
	10% level	-2.578244	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INF)
Method: Least Squares
Date: 07/17/14 Time: 06:15
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF(-1)	-0.101987	0.038245	-2.666660	0.0086
C	2.113089	1.011794	2.088457	0.0387

R-squared	0.050753	Mean dependent var	-0.010370
Adjusted R-squared	0.043616	S.D. dependent var	7.416172
S.E. of regression	7.252637	Akaike info criterion	6.815311
Sum squared resid	6995.899	Schwarz criterion	6.858352
Log likelihood	-458.0335	Hannan-Quinn criter.	6.832802
F-statistic	7.111076	Durbin-Watson stat	1.824471
Prob(F-statistic)	0.008612		

Null Hypothesis: INF has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.783156	0.2061
Test critical values:	1% level	-4.027463	
	5% level	-3.443450	
	10% level	-3.146455	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INF)
Method: Least Squares
Date: 07/17/14 Time: 06:16
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF(-1)	-0.107872	0.038759	-2.783156	0.0062
C	3.283102	1.595199	2.058114	0.0415
@TREND("1980Q1")	-0.015404	0.016233	-0.948954	0.3444

R-squared	0.057185	Mean dependent var	-0.010370
Adjusted R-squared	0.042900	S.D. dependent var	7.416172
S.E. of regression	7.255351	Akaike info criterion	6.823327
Sum squared resid	6948.495	Schwarz criterion	6.887889
Log likelihood	-457.5746	Hannan-Quinn criter.	6.849563
F-statistic	4.003135	Durbin-Watson stat	1.826257
Prob(F-statistic)	0.020518		

Null Hypothesis: EXCH has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.046816	0.9518
Test critical values:	1% level	-3.479281	
	5% level	-2.882910	
	10% level	-2.578244	

*MacKinnon (1996) one-sided p-values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXCH)
Method: Least Squares
Date: 07/17/14 Time: 06:17
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXCH(-1)	-0.000406	0.008664	-0.046816	0.9627
C	1.175600	0.759672	1.547511	0.1241

R-squared	0.000016	Mean dependent var	1.150222
Adjusted R-squared	-0.007502	S.D. dependent var	6.160739
S.E. of regression	6.183805	Akaike info criterion	6.496449
Sum squared resid	5085.847	Schwarz criterion	6.539490
Log likelihood	-436.5103	Hannan-Quinn criter.	6.513939
F-statistic	0.002192	Durbin-Watson stat	1.802658
Prob(F-statistic)	0.962730		

Null Hypothesis: EXCH has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.034560	0.5769
Test critical values:	1% level	-4.027463	
	5% level	-3.443450	
	10% level	-3.146455	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXCH)
Method: Least Squares
Date: 07/17/14 Time: 06:18
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXCH(-1)	-0.048236	0.023708	-2.034560	0.0439
C	-1.328317	1.379059	-0.963205	0.3372
@TREND("1980Q1")	0.080832	0.037373	2.162866	0.0324

R-squared	0.034242	Mean dependent var	1.150222
Adjusted R-squared	0.019610	S.D. dependent var	6.160739
S.E. of regression	6.100035	Akaike info criterion	6.476438
Sum squared resid	4911.777	Schwarz criterion	6.540999
Log likelihood	-434.1595	Hannan-Quinn criter.	6.502674
F-statistic	2.340122	Durbin-Watson stat	1.779656
Prob(F-statistic)	0.100300		

Null Hypothesis: GDP has a unit root
Exogenous: Constant
Lag Length: 8 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		2.642310	1.0000
Test critical values:	1% level	-3.482453	
	5% level	-2.884291	
	10% level	-2.578981	

*MacKinnon (1996) one-sided p-values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP)
Method: Least Squares
Date: 07/17/14 Time: 06:19
Sample (adjusted): 1982Q2 2013Q4
Included observations: 127 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	1.346662	0.509653	2.642310	0.0094
D(GDP(-1))	-0.500947	0.530906	-0.943571	0.3473
D(GDP(-2))	-1.562516	0.528586	-2.956032	0.0038
D(GDP(-3))	-1.243992	0.532533	-2.335990	0.0212
D(GDP(-4))	-1.023414	0.531923	-1.923988	0.0568
D(GDP(-5))	-1.280409	0.529945	-2.416116	0.0172
D(GDP(-6))	-1.902873	0.527601	-3.606649	0.0005
D(GDP(-7))	-1.030238	0.535188	-1.925003	0.0567
D(GDP(-8))	-8.864233	1.742876	-5.085981	0.0000
C	-79391.82	47758.63	-1.662356	0.0991

R-squared	0.747777	Mean dependent var	104972.0
Adjusted R-squared	0.728375	S.D. dependent var	443021.1
S.E. of regression	230892.2	Akaike info criterion	27.61276
Sum squared resid	6.24E+12	Schwarz criterion	27.83671
Log likelihood	-1743.410	Hannan-Quinn criter.	27.70375
F-statistic	38.54166	Durbin-Watson stat	1.989177
Prob(F-statistic)	0.000000		

Null Hypothesis: GDP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 8 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		2.257987	1.0000
Test critical values:	1% level	-4.031899	
	5% level	-3.445590	
	10% level	-3.147710	

*MacKinnon (1996) one-sided p-values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP)
Method: Least Squares
Date: 07/17/14 Time: 06:20

Sample (adjusted): 1982Q2 2013Q4
Included observations: 127 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	2.811720	1.245233	2.257987	0.0258
D(GDP(-1))	-1.966741	1.254549	-1.567688	0.1197
D(GDP(-2))	-3.041990	1.263214	-2.408136	0.0176
D(GDP(-3))	-2.723534	1.264909	-2.153146	0.0334
D(GDP(-4))	-2.506268	1.266987	-1.978132	0.0503
D(GDP(-5))	-2.769422	1.270508	-2.179776	0.0313
D(GDP(-6))	-3.388446	1.267108	-2.674157	0.0086
D(GDP(-7))	-2.512158	1.267696	-1.981673	0.0499
D(GDP(-8))	-9.608786	1.831482	-5.246454	0.0000
C	-71036.97	48063.53	-1.477981	0.1421
@TREND("1980Q1")	-1921.207	1490.747	-1.288755	0.2000

R-squared	0.751337	Mean dependent var	104972.0
Adjusted R-squared	0.729901	S.D. dependent var	443021.1
S.E. of regression	230242.8	Akaike info criterion	27.61429
Sum squared resid	6.15E+12	Schwarz criterion	27.86064
Log likelihood	-1742.507	Hannan-Quinn criter.	27.71438
F-statistic	35.04952	Durbin-Watson stat	2.026067
Prob(F-statistic)	0.000000		

Null Hypothesis: UNE has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.844635	0.3576
Test critical values:	1% level	-3.479656	
	5% level	-2.883073	
	10% level	-2.578331	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UNE)
Method: Least Squares
Date: 07/17/14 Time: 06:20
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UNE(-1)	-0.095766	0.051916	-1.844635	0.0673
D(UNE(-1))	-0.354006	0.084395	-4.194609	0.0001
C	4036.525	2241.234	1.801028	0.0740

R-squared	0.187508	Mean dependent var	177.5373
Adjusted R-squared	0.175104	S.D. dependent var	11920.65
S.E. of regression	10826.79	Akaike info criterion	21.43957
Sum squared resid	1.54E+10	Schwarz criterion	21.50444
Log likelihood	-1433.451	Hannan-Quinn criter.	21.46593
F-statistic	15.11622	Durbin-Watson stat	2.078453
Prob(F-statistic)	0.000001		

Null Hypothesis: UNE has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.365444	0.0034
Test critical values:	1% level	-4.027959	
	5% level	-3.443704	
	10% level	-3.146604	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UNE)
Method: Least Squares
Date: 07/17/14 Time: 06:21
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UNE(-1)	-0.302601	0.069317	-4.365444	0.0000
D(UNE(-1))	-0.275753	0.081622	-3.378418	0.0010
C	2813.699	2130.507	1.320671	0.1889
@TREND("1980Q1")	136.4528	32.41790	4.209179	0.0000

R-squared	0.284959	Mean dependent var	177.5373
Adjusted R-squared	0.268458	S.D. dependent var	11920.65
S.E. of regression	10195.76	Akaike info criterion	21.32673
Sum squared resid	1.35E+10	Schwarz criterion	21.41323
Log likelihood	-1424.891	Hannan-Quinn criter.	21.36188
F-statistic	17.26922	Durbin-Watson stat	2.070747
Prob(F-statistic)	0.000000		

Null Hypothesis: INTR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.680105	0.8471
Test critical values:	1% level	-3.479281	
	5% level	-2.882910	
	10% level	-2.578244	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INTR)
Method: Least Squares
Date: 07/17/14 Time: 06:22
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INTR(-1)	-0.845417	1.243069	-0.680105	0.4976
C	15.45621	15.59089	0.991362	0.3233

R-squared	0.003466	Mean dependent var	5.542593
Adjusted R-squared	-0.004027	S.D. dependent var	64.14230
S.E. of regression	64.27132	Akaike info criterion	11.17881
Sum squared resid	549396.7	Schwarz criterion	11.22185
Log likelihood	-752.5695	Hannan-Quinn criter.	11.19630
F-statistic	0.462543	Durbin-Watson stat	1.010513
Prob(F-statistic)	0.497620		

Null Hypothesis: INTR has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.526470	0.9812
Test critical values:	1% level	-4.027463	
	5% level	-3.443450	
	10% level	-3.146455	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INTR)
Method: Least Squares
Date: 07/17/14 Time: 06:22
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INTR(-1)	-0.653142	1.240607	-0.526470	0.5994
C	-2.681947	18.99965	-0.141158	0.8880
@TREND("1980Q1")	0.233581	0.141664	1.648840	0.1016

R-squared	0.023576	Mean dependent var	5.542593
Adjusted R-squared	0.008782	S.D. dependent var	64.14230
S.E. of regression	63.86003	Akaike info criterion	11.17324
Sum squared resid	538309.7	Schwarz criterion	11.23780
Log likelihood	-751.1934	Hannan-Quinn criter.	11.19947
F-statistic	1.593597	Durbin-Watson stat	1.030088
Prob(F-statistic)	0.207078		

Null Hypothesis: GEX has a unit root
Exogenous: Constant
Lag Length: 8 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.809430	0.9939
Test critical values:	1% level	-3.482453	
	5% level	-2.884291	
	10% level	-2.578981	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GEX)
Method: Least Squares
Date: 07/17/14 Time: 06:24
Sample (adjusted): 1982Q2 2013Q4
Included observations: 127 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GEX(-1)	0.346143	0.427638	0.809430	0.4199
D(GEX(-1))	-0.008669	0.459948	-0.018848	0.9850
D(GEX(-2))	-0.509143	0.455189	-1.118530	0.2656
D(GEX(-3))	-0.196009	0.460394	-0.425741	0.6711
D(GEX(-4))	-0.457281	0.458909	-0.996452	0.3211
D(GEX(-5))	-0.109418	0.462298	-0.236683	0.8133
D(GEX(-6))	-0.489903	0.458453	-1.068601	0.2874
D(GEX(-7))	-0.460461	0.462895	-0.994742	0.3219
D(GEX(-8))	19.59345	5.666038	3.458052	0.0008
C	-510727.5	421078.1	-1.212904	0.2276

R-squared	0.357484	Mean dependent var	619395.9
Adjusted R-squared	0.308060	S.D. dependent var	4452646.
S.E. of regression	3703841.	Akaike info criterion	33.16311
Sum squared resid	1.61E+15	Schwarz criterion	33.38706
Log likelihood	-2095.857	Hannan-Quinn criter.	33.25410
F-statistic	7.232965	Durbin-Watson stat	1.934944
Prob(F-statistic)	0.000000		

Null Hypothesis: GEX has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 8 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		2.106479	1.0000
Test critical values:	1% level	-4.031899	
	5% level	-3.445590	
	10% level	-3.147710	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GEX)
Method: Least Squares
Date: 07/17/14 Time: 06:25
Sample (adjusted): 1982Q2 2013Q4
Included observations: 127 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GEX(-1)	1.460659	0.693413	2.106479	0.0373
D(GEX(-1))	-1.156673	0.726099	-1.592995	0.1139
D(GEX(-2))	-1.645316	0.718605	-2.289598	0.0239
D(GEX(-3))	-1.336857	0.723623	-1.847451	0.0672
D(GEX(-4))	-1.591948	0.720328	-2.210033	0.0291
D(GEX(-5))	-1.246530	0.723372	-1.723221	0.0875
D(GEX(-6))	-1.617556	0.717355	-2.254890	0.0260
D(GEX(-7))	-1.591244	0.721323	-2.206007	0.0294
D(GEX(-8))	19.06804	5.598354	3.406008	0.0009
C	1221585.	950765.0	1.284844	0.2014
@TREND("1980Q1")	-37161.83	18344.16	-2.025813	0.0451

R-squared	0.379439	Mean dependent var	619395.9
Adjusted R-squared	0.325942	S.D. dependent var	4452646.
S.E. of regression	3655668.	Akaike info criterion	33.14409
Sum squared resid	1.55E+15	Schwarz criterion	33.39043
Log likelihood	-2093.650	Hannan-Quinn criter.	33.24417
F-statistic	7.092757	Durbin-Watson stat	1.934031
Prob(F-statistic)	0.000000		

Null Hypothesis: BOP has a unit root
Exogenous: Constant
Lag Length: 9 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.097200	0.2462
Test critical values:	1% level	-3.482879	
	5% level	-2.884477	
	10% level	-2.579080	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(BOP)
Method: Least Squares
Date: 07/17/14 Time: 06:25
Sample (adjusted): 1982Q3 2013Q4
Included observations: 126 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BOP(-1)	-0.043350	0.020670	-2.097200	0.0382
D(BOP(-1))	0.644127	0.085865	7.501669	0.0000
D(BOP(-2))	0.140886	0.086839	1.622376	0.1075
D(BOP(-3))	0.082763	0.088956	0.930372	0.3541
D(BOP(-4))	-0.949067	0.089340	-10.62314	0.0000
D(BOP(-5))	0.619070	0.113990	5.430940	0.0000
D(BOP(-6))	0.085779	0.088141	0.973201	0.3325
D(BOP(-7))	0.040014	0.089399	0.447592	0.6553
D(BOP(-8))	-0.608508	0.088532	-6.873290	0.0000
D(BOP(-9))	0.381863	0.087591	4.359618	0.0000
C	0.593442	0.280022	2.119273	0.0362

R-squared	0.653442	Mean dependent var	0.045396
Adjusted R-squared	0.623307	S.D. dependent var	1.340971
S.E. of regression	0.823026	Akaike info criterion	2.531595
Sum squared resid	77.89775	Schwarz criterion	2.779207
Log likelihood	-148.4905	Hannan-Quinn criter.	2.632192
F-statistic	21.68349	Durbin-Watson stat	2.040887
Prob(F-statistic)	0.000000		

Null Hypothesis: BOP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 9 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.155189	0.5099
Test critical values:	1% level	-4.032498	
	5% level	-3.445877	
	10% level	-3.147878	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(BOP)
Method: Least Squares
Date: 07/17/14 Time: 06:26
Sample (adjusted): 1982Q3 2013Q4
Included observations: 126 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BOP(-1)	-0.044546	0.020669	-2.155189	0.0333
D(BOP(-1))	0.632566	0.086343	7.326165	0.0000
D(BOP(-2))	0.141628	0.086725	1.633062	0.1052
D(BOP(-3))	0.082146	0.088839	0.924656	0.3571
D(BOP(-4))	-0.950790	0.089233	-10.65517	0.0000
D(BOP(-5))	0.603650	0.114632	5.265964	0.0000
D(BOP(-6))	0.087303	0.088033	0.991700	0.3234
D(BOP(-7))	0.039622	0.089280	0.443797	0.6580
D(BOP(-8))	-0.610208	0.088426	-6.900748	0.0000
D(BOP(-9))	0.367383	0.088385	4.156619	0.0001
C	0.783465	0.325271	2.408651	0.0176
@TREND("1980Q1")	-0.002377	0.002078	-1.143825	0.2551

R-squared	0.657374	Mean dependent var	0.045396
Adjusted R-squared	0.624314	S.D. dependent var	1.340971
S.E. of regression	0.821925	Akaike info criterion	2.536057
Sum squared resid	77.01389	Schwarz criterion	2.806179
Log likelihood	-147.7716	Hannan-Quinn criter.	2.645799
F-statistic	19.88405	Durbin-Watson stat	2.037026
Prob(F-statistic)	0.000000		

Null Hypothesis: ROP has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.977432	0.7601
Test critical values:	1% level	-3.480038	
	5% level	-2.883239	
	10% level	-2.578420	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ROP)
Method: Least Squares
Date: 07/17/14 Time: 06:27
Sample (adjusted): 1980Q4 2013Q4
Included observations: 133 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROP(-1)	-0.022816	0.023343	-0.977432	0.3302
D(ROP(-1))	0.295873	0.082154	3.601440	0.0005
D(ROP(-2))	-0.352742	0.083241	-4.237608	0.0000
C	1.333600	1.376504	0.968831	0.3344

R-squared	0.180133	Mean dependent var	0.127970
Adjusted R-squared	0.161067	S.D. dependent var	8.176053
S.E. of regression	7.488716	Akaike info criterion	6.894286
Sum squared resid	7234.433	Schwarz criterion	6.981213
Log likelihood	-454.4700	Hannan-Quinn criter.	6.929610
F-statistic	9.447555	Durbin-Watson stat	1.949602
Prob(F-statistic)	0.000011		

Null Hypothesis: ROP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.644741	0.7699
Test critical values:	1% level	-4.028496	
	5% level	-3.443961	
	10% level	-3.146755	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ROP)
Method: Least Squares
Date: 07/17/14 Time: 06:28
Sample (adjusted): 1980Q4 2013Q4
Included observations: 133 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROP(-1)	-0.038729	0.023547	-1.644741	0.1025
D(ROP(-1))	0.272338	0.080701	3.374662	0.0010
D(ROP(-2))	-0.371148	0.081575	-4.549782	0.0000
C	-1.079254	1.614860	-0.668326	0.5051
@TREND("1980Q1")	0.047068	0.017457	2.696250	0.0080

R-squared	0.224195	Mean dependent var	0.127970
Adjusted R-squared	0.199951	S.D. dependent var	8.176053
S.E. of regression	7.313106	Akaike info criterion	6.854082
Sum squared resid	6845.635	Schwarz criterion	6.962742
Log likelihood	-450.7965	Hannan-Quinn criter.	6.898238
F-statistic	9.247490	Durbin-Watson stat	1.977358
Prob(F-statistic)	0.000001		

Null Hypothesis: POROP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.620879	0.0000
Test critical values:	1% level	-3.479281	
	5% level	-2.882910	
	10% level	-2.578244	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(POROP)
Method: Least Squares
Date: 07/17/14 Time: 06:28
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
POROP(-1)	-0.715868	0.083039	-8.620879	0.0000
C	1.714101	0.398071	4.306015	0.0000

R-squared	0.358478	Mean dependent var	0.011926
Adjusted R-squared	0.353655	S.D. dependent var	4.995436
S.E. of regression	4.016110	Akaike info criterion	5.633209
Sum squared resid	2145.176	Schwarz criterion	5.676250
Log likelihood	-378.2416	Hannan-Quinn criter.	5.650700
F-statistic	74.31955	Durbin-Watson stat	2.028587
Prob(F-statistic)	0.000000		

Null Hypothesis: POROP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.441259	0.0000
Test critical values:	1% level	-4.027463	
	5% level	-3.443450	
	10% level	-3.146455	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(POROP)
Method: Least Squares
Date: 07/17/14 Time: 06:30
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
POROP(-1)	-0.808686	0.085655	-9.441259	0.0000
C	-0.020113	0.673159	-0.029878	0.9762
@TREND("1980Q1")	0.028749	0.009149	3.142265	0.0021

R-squared	0.403125	Mean dependent var	0.011926
Adjusted R-squared	0.394082	S.D. dependent var	4.995436
S.E. of regression	3.888484	Akaike info criterion	5.575887
Sum squared resid	1995.881	Schwarz criterion	5.640449
Log likelihood	-373.3724	Hannan-Quinn criter.	5.602123
F-statistic	44.57601	Durbin-Watson stat	1.984698
Prob(F-statistic)	0.000000		

Null Hypothesis: NEGROP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.573014	0.0000
Test critical values:	1% level	-3.479281	
	5% level	-2.882910	
	10% level	-2.578244	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(NEGROP)
Method: Least Squares
Date: 07/17/14 Time: 06:31
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NEGROP(-1)	-0.815897	0.085229	-9.573014	0.0000
C	-1.836191	0.555166	-3.307461	0.0012

R-squared	0.407948	Mean dependent var	5.26E-17
Adjusted R-squared	0.403497	S.D. dependent var	7.837554
S.E. of regression	6.053226	Akaike info criterion	6.453764
Sum squared resid	4873.326	Schwarz criterion	6.496805
Log likelihood	-433.6291	Hannan-Quinn criter.	6.471254
F-statistic	91.64259	Durbin-Watson stat	1.958076
Prob(F-statistic)	0.000000		

Null Hypothesis: NEGROP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.537908	0.0000
Test critical values:	1% level	-4.027463	
	5% level	-3.443450	
	10% level	-3.146455	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(NEGROP)
Method: Least Squares
Date: 07/17/14 Time: 06:31
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NEGROP(-1)	-0.816191	0.085573	-9.537908	0.0000
C	-1.714522	1.065186	-1.609598	0.1099
@TREND("1980Q1")	-0.001799	0.013423	-0.134025	0.8936

R-squared	0.408029	Mean dependent var	5.26E-17
Adjusted R-squared	0.399060	S.D. dependent var	7.837554
S.E. of regression	6.075698	Akaike info criterion	6.468443
Sum squared resid	4872.663	Schwarz criterion	6.533004
Log likelihood	-433.6199	Hannan-Quinn criter.	6.494679
F-statistic	45.49195	Durbin-Watson stat	1.957822
Prob(F-statistic)	0.000000		

Null Hypothesis: NETROP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.295888	0.0000
Test critical values:	1% level	-3.479281	
	5% level	-2.882910	
	10% level	-2.578244	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(NETROP)
Method: Least Squares
Date: 07/17/14 Time: 06:32
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NETROP(-1)	-0.681639	0.082166	-8.295888	0.0000
C	1.142553	0.330934	3.452508	0.0007

R-squared	0.341003	Mean dependent var	0.003407
Adjusted R-squared	0.336048	S.D. dependent var	4.293499
S.E. of regression	3.498483	Akaike info criterion	5.357240
Sum squared resid	1627.838	Schwarz criterion	5.400281
Log likelihood	-359.6137	Hannan-Quinn criter.	5.374731
F-statistic	68.82177	Durbin-Watson stat	2.026455
Prob(F-statistic)	0.000000		

Null Hypothesis: NETROP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.908463	0.0000
Test critical values:	1% level	-4.027463	
	5% level	-3.443450	
	10% level	-3.146455	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(NETROP)
Method: Least Squares
Date: 07/17/14 Time: 06:33
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NETROP(-1)	-0.754030	0.084642	-8.908463	0.0000
C	-0.198459	0.592475	-0.334965	0.7382
@TREND("1980Q1")	0.021500	0.007959	2.701217	0.0078

R-squared	0.375522	Mean dependent var	0.003407
Adjusted R-squared	0.366060	S.D. dependent var	4.293499
S.E. of regression	3.418499	Akaike info criterion	5.318252
Sum squared resid	1542.569	Schwarz criterion	5.382813
Log likelihood	-355.9820	Hannan-Quinn criter.	5.344488
F-statistic	39.68827	Durbin-Watson stat	1.987852
Prob(F-statistic)	0.000000		

AT FIRST DIFFERENCE ADF

Null Hypothesis: D(INF) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-11.02401	0.0000
Test critical values:	1% level	-3.479656	
	5% level	-2.883073	
	10% level	-2.578331	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INF,2)
Method: Least Squares
Date: 07/17/14 Time: 06:34
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INF(-1))	-0.958608	0.086956	-11.02401	0.0000
C	-0.019091	0.644877	-0.029604	0.9764

R-squared	0.479349	Mean dependent var	-0.011866
Adjusted R-squared	0.475405	S.D. dependent var	10.30664
S.E. of regression	7.464991	Akaike info criterion	6.873138
Sum squared resid	7355.844	Schwarz criterion	6.916390
Log likelihood	-458.5003	Hannan-Quinn criter.	6.890714
F-statistic	121.5287	Durbin-Watson stat	1.998423
Prob(F-statistic)	0.000000		

Null Hypothesis: D(INF) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-11.00029	0.0000
Test critical values:	1% level	-4.027959	
	5% level	-3.443704	
	10% level	-3.146604	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INF,2)
Method: Least Squares
Date: 07/17/14 Time: 06:35
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INF(-1))	-0.960315	0.087299	-11.00029	0.0000
C	0.503249	1.316348	0.382307	0.7029
@TREND("1980Q1")	-0.007626	0.016737	-0.455607	0.6494

R-squared	0.480173	Mean dependent var	-0.011866
Adjusted R-squared	0.472236	S.D. dependent var	10.30664
S.E. of regression	7.487499	Akaike info criterion	6.886480
Sum squared resid	7344.206	Schwarz criterion	6.951357
Log likelihood	-458.3942	Hannan-Quinn criter.	6.912844
F-statistic	60.50336	Durbin-Watson stat	1.998234
Prob(F-statistic)	0.000000		

Null Hypothesis: D(EXCH) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-10.41239	0.0000
Test critical values:	1% level	-3.479656	
	5% level	-2.883073	
	10% level	-2.578331	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXCH,2)
Method: Least Squares
Date: 07/17/14 Time: 06:36
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXCH(-1))	-0.901914	0.086619	-10.41239	0.0000
C	1.045069	0.542928	1.924874	0.0564

R-squared	0.450956	Mean dependent var	-7.46E-05
Adjusted R-squared	0.446796	S.D. dependent var	8.304253
S.E. of regression	6.176509	Akaike info criterion	6.494196
Sum squared resid	5035.703	Schwarz criterion	6.537448
Log likelihood	-433.1112	Hannan-Quinn criter.	6.511772
F-statistic	108.4178	Durbin-Watson stat	2.001339
Prob(F-statistic)	0.000000		

Null Hypothesis: D(EXCH) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-10.40770	0.0000
Test critical values:	1% level	-4.027959	
	5% level	-3.443704	
	10% level	-3.146604	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXCH,2)
Method: Least Squares
Date: 07/17/14 Time: 06:36
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXCH(-1))	-0.905545	0.087007	-10.40770	0.0000
C	0.449665	1.088276	0.413190	0.6801
@TREND("1980Q1")	0.008753	0.013856	0.631757	0.5286

R-squared	0.452624	Mean dependent var	-7.46E-05
Adjusted R-squared	0.444267	S.D. dependent var	8.304253
S.E. of regression	6.190615	Akaike info criterion	6.506080
Sum squared resid	5020.407	Schwarz criterion	6.570957
Log likelihood	-432.9073	Hannan-Quinn criter.	6.532444
F-statistic	54.16171	Durbin-Watson stat	2.000129
Prob(F-statistic)	0.000000		

Null Hypothesis: D(GDP) has a unit root
Exogenous: Constant
Lag Length: 7 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.664278	0.0002
Test critical values:	1% level	-3.482453	
	5% level	-2.884291	
	10% level	-2.578981	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP,2)
Method: Least Squares
Date: 07/17/14 Time: 06:37
Sample (adjusted): 1982Q2 2013Q4
Included observations: 127 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP(-1))	-8.134844	1.744074	-4.664278	0.0000
D(GDP(-1),2)	8.019471	1.754150	4.571713	0.0000
D(GDP(-2),2)	7.823556	1.770361	4.419188	0.0000
D(GDP(-3),2)	7.955751	1.760084	4.520097	0.0000
D(GDP(-4),2)	8.305897	1.776133	4.676393	0.0000
D(GDP(-5),2)	8.393049	1.771766	4.737109	0.0000
D(GDP(-6),2)	7.851182	1.766290	4.445012	0.0000
D(GDP(-7),2)	8.198005	1.767712	4.637636	0.0000
C	33667.97	21745.52	1.548272	0.1242

R-squared	0.473717	Mean dependent var	4165.684
Adjusted R-squared	0.438037	S.D. dependent var	315713.6
S.E. of regression	236672.2	Akaike info criterion	27.65497
Sum squared resid	6.61E+12	Schwarz criterion	27.85653
Log likelihood	-1747.091	Hannan-Quinn criter.	27.73686
F-statistic	13.27675	Durbin-Watson stat	1.949349
Prob(F-statistic)	0.000000		

Null Hypothesis: D(GDP) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 7 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.736031	0.0010
Test critical values:	1% level	-4.031899	
	5% level	-3.445590	
	10% level	-3.147710	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP,2)
Method: Least Squares
Date: 07/17/14 Time: 06:38
Sample (adjusted): 1982Q2 2013Q4
Included observations: 127 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP(-1))	-8.175796	1.726297	-4.736031	0.0000
D(GDP(-1),2)	8.035485	1.736151	4.628333	0.0000
D(GDP(-2),2)	7.835208	1.752185	4.471679	0.0000
D(GDP(-3),2)	7.956829	1.742003	4.567633	0.0000
D(GDP(-4),2)	8.300100	1.757890	4.721628	0.0000
D(GDP(-5),2)	8.387983	1.753567	4.783384	0.0000
D(GDP(-6),2)	7.849060	1.748145	4.489936	0.0000
D(GDP(-7),2)	8.186164	1.749564	4.678974	0.0000
C	-45079.65	47478.87	-0.949468	0.3443
@TREND("1980Q1")	1151.771	618.9868	1.860735	0.0653

R-squared	0.488843	Mean dependent var	4165.684
Adjusted R-squared	0.449524	S.D. dependent var	315713.6
S.E. of regression	234240.8	Akaike info criterion	27.64155
Sum squared resid	6.42E+12	Schwarz criterion	27.86551
Log likelihood	-1745.239	Hannan-Quinn criter.	27.73254
F-statistic	12.43252	Durbin-Watson stat	1.956584
Prob(F-statistic)	0.000000		

Null Hypothesis: D(UNE) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-17.68449	0.0000
Test critical values:	1% level	-3.479656	
	5% level	-2.883073	
	10% level	-2.578331	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UNE,2)
Method: Least Squares
Date: 07/17/14 Time: 06:39
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(UNE(-1))	-1.408982	0.079673	-17.68449	0.0000
C	279.6364	943.9753	0.296233	0.7675

R-squared	0.703198	Mean dependent var	-72.10448
Adjusted R-squared	0.700950	S.D. dependent var	19977.65
S.E. of regression	10924.88	Akaike info criterion	21.45029
Sum squared resid	1.58E+10	Schwarz criterion	21.49354
Log likelihood	-1435.169	Hannan-Quinn criter.	21.46786
F-statistic	312.7411	Durbin-Watson stat	2.120536
Prob(F-statistic)	0.000000		

Null Hypothesis: D(UNE) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-17.82544	0.0000
Test critical values:	1% level	-4.027959	
	5% level	-3.443704	
	10% level	-3.146604	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UNE,2)
Method: Least Squares
Date: 07/17/14 Time: 06:40
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(UNE(-1))	-1.419702	0.079645	-17.82544	0.0000
C	-2192.624	1915.275	-1.144809	0.2544
@TREND("1980Q1")	36.13045	24.38967	1.481384	0.1409

R-squared	0.708088	Mean dependent var	-72.10448
Adjusted R-squared	0.703631	S.D. dependent var	19977.65
S.E. of regression	10875.78	Akaike info criterion	21.44860
Sum squared resid	1.55E+10	Schwarz criterion	21.51347
Log likelihood	-1434.056	Hannan-Quinn criter.	21.47496
F-statistic	158.8828	Durbin-Watson stat	2.138253
Prob(F-statistic)	0.000000		

Null Hypothesis: D(INTR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.407491	0.9826
Test critical values:	1% level	-3.479656	
	5% level	-2.883073	
	10% level	-2.578331	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INTR,2)
Method: Least Squares
Date: 07/17/14 Time: 06:41
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INTR(-1))	1.314583	3.226043	0.407491	0.6843
C	5.530551	5.572384	0.992493	0.3228

R-squared	0.001256	Mean dependent var	5.562239
Adjusted R-squared	-0.006310	S.D. dependent var	64.29619
S.E. of regression	64.49872	Akaike info criterion	11.18598
Sum squared resid	549131.3	Schwarz criterion	11.22923
Log likelihood	-747.4607	Hannan-Quinn criter.	11.20356
F-statistic	0.166049	Durbin-Watson stat	1.011799
Prob(F-statistic)	0.684308		

Null Hypothesis: D(INTR) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.525505	0.9993
Test critical values:	1% level	-4.027959	
	5% level	-3.443704	
	10% level	-3.146604	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INTR,2)
Method: Least Squares
Date: 07/17/14 Time: 06:42
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INTR(-1))	1.685663	3.207700	0.525505	0.6001
C	-11.73565	11.26592	-1.041694	0.2995
@TREND("1980Q1")	0.251931	0.143225	1.758980	0.0809

R-squared	0.024301	Mean dependent var	5.562239
Adjusted R-squared	0.009405	S.D. dependent var	64.29619
S.E. of regression	63.99314	Akaike info criterion	11.17756
Sum squared resid	536460.9	Schwarz criterion	11.24244
Log likelihood	-745.8967	Hannan-Quinn criter.	11.20393
F-statistic	1.631347	Durbin-Watson stat	1.037138
Prob(F-statistic)	0.199615		

Null Hypothesis: D(GEX) has a unit root
Exogenous: Constant
Lag Length: 7 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		4.812999	1.0000
Test critical values:	1% level	-3.482453	
	5% level	-2.884291	
	10% level	-2.578981	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GEX,2)
Method: Least Squares
Date: 07/17/14 Time: 06:43
Sample (adjusted): 1982Q2 2013Q4
Included observations: 127 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GEX(-1))	21.69784	4.508174	4.812999	0.0000
D(GEX(-1),2)	-22.34057	4.519783	-4.942841	0.0000
D(GEX(-2),2)	-22.48868	4.522051	-4.973115	0.0000
D(GEX(-3),2)	-22.31947	4.523589	-4.934018	0.0000
D(GEX(-4),2)	-22.41297	4.519458	-4.959217	0.0000
D(GEX(-5),2)	-22.15589	4.515223	-4.906932	0.0000
D(GEX(-6),2)	-22.28290	4.505616	-4.945583	0.0000
D(GEX(-7),2)	-22.37697	4.496553	-4.976471	0.0000
C	-349477.8	370430.1	-0.943438	0.3474

R-squared	0.492636	Mean dependent var	-74757.70
Adjusted R-squared	0.458238	S.D. dependent var	5024730.
S.E. of regression	3698426.	Akaike info criterion	33.15294
Sum squared resid	1.61E+15	Schwarz criterion	33.35450
Log likelihood	-2096.212	Hannan-Quinn criter.	33.23483
F-statistic	14.32182	Durbin-Watson stat	1.944427
Prob(F-statistic)	0.000000		

Null Hypothesis: D(GEX) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 7 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		4.430251	1.0000
Test critical values:	1% level	-4.031899	
	5% level	-3.445590	
	10% level	-3.147710	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GEX,2)
Method: Least Squares
Date: 07/17/14 Time: 06:44
Sample (adjusted): 1982Q2 2013Q4
Included observations: 127 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GEX(-1))	23.21999	5.241235	4.430251	0.0000
D(GEX(-1),2)	-23.85743	5.246633	-4.547189	0.0000
D(GEX(-2),2)	-24.00094	5.244568	-4.576343	0.0000
D(GEX(-3),2)	-23.82559	5.240539	-4.546401	0.0000
D(GEX(-4),2)	-23.91268	5.231367	-4.571020	0.0000
D(GEX(-5),2)	-23.64809	5.221157	-4.529281	0.0000
D(GEX(-6),2)	-23.76795	5.206612	-4.564955	0.0000
D(GEX(-7),2)	-23.85346	5.191320	-4.594873	0.0000
C	44540.43	780455.1	0.057070	0.9546
@TREND("1980Q1")	-6503.397	11328.80	-0.574059	0.5670

R-squared	0.494061	Mean dependent var	-74757.70
Adjusted R-squared	0.455143	S.D. dependent var	5024730.
S.E. of regression	3708978.	Akaike info criterion	33.16588
Sum squared resid	1.61E+15	Schwarz criterion	33.38983
Log likelihood	-2096.033	Hannan-Quinn criter.	33.25687
F-statistic	12.69479	Durbin-Watson stat	1.951428
Prob(F-statistic)	0.000000		

Null Hypothesis: D(BOP) has a unit root
Exogenous: Constant
Lag Length: 12 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.959692	0.0417
Test critical values:	1% level	-3.484653	
	5% level	-2.885249	
	10% level	-2.579491	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(BOP,2)
Method: Least Squares
Date: 07/17/14 Time: 06:45
Sample (adjusted): 1983Q3 2013Q4
Included observations: 122 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(BOP(-1))	-0.635326	0.214660	-2.959692	0.0038
D(BOP(-1),2)	0.331511	0.197499	1.678546	0.0961
D(BOP(-2),2)	0.489921	0.196883	2.488389	0.0144
D(BOP(-3),2)	0.554011	0.195702	2.830900	0.0055
D(BOP(-4),2)	-0.742943	0.192543	-3.858590	0.0002
D(BOP(-5),2)	0.150123	0.155050	0.968223	0.3351
D(BOP(-6),2)	0.322383	0.156872	2.055074	0.0423
D(BOP(-7),2)	0.377482	0.156836	2.406864	0.0178
D(BOP(-8),2)	-0.754678	0.152846	-4.937511	0.0000
D(BOP(-9),2)	0.011839	0.098659	0.119997	0.9047
D(BOP(-10),2)	0.120947	0.099880	1.210918	0.2286
D(BOP(-11),2)	0.156553	0.099743	1.569561	0.1194
D(BOP(-12),2)	-0.349052	0.095459	-3.656574	0.0004
C	0.020356	0.070932	0.286975	0.7747

R-squared	0.724410	Mean dependent var	-0.003093
Adjusted R-squared	0.691237	S.D. dependent var	1.402355
S.E. of regression	0.779239	Akaike info criterion	2.446621
Sum squared resid	65.57905	Schwarz criterion	2.768393
Log likelihood	-135.2439	Hannan-Quinn criter.	2.577315
F-statistic	21.83742	Durbin-Watson stat	2.057887
Prob(F-statistic)	0.000000		

Null Hypothesis: D(BOP) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 12 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.127699	0.1046
Test critical values:	1% level	-4.034997	
	5% level	-3.447072	
	10% level	-3.148578	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(BOP,2)
Method: Least Squares
Date: 07/17/14 Time: 06:46
Sample (adjusted): 1983Q3 2013Q4
Included observations: 122 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(BOP(-1))	-0.728788	0.233011	-3.127699	0.0023
D(BOP(-1),2)	0.412102	0.212395	1.940262	0.0550
D(BOP(-2),2)	0.573175	0.212792	2.693593	0.0082
D(BOP(-3),2)	0.635331	0.210989	3.011196	0.0032
D(BOP(-4),2)	-0.665599	0.206629	-3.221223	0.0017
D(BOP(-5),2)	0.203817	0.163545	1.246239	0.2154
D(BOP(-6),2)	0.379662	0.166404	2.281565	0.0245
D(BOP(-7),2)	0.432681	0.165705	2.611144	0.0103
D(BOP(-8),2)	-0.703684	0.160631	-4.380759	0.0000
D(BOP(-9),2)	0.036168	0.101423	0.356605	0.7221
D(BOP(-10),2)	0.147350	0.103093	1.429287	0.1558
D(BOP(-11),2)	0.181016	0.102507	1.765882	0.0803
D(BOP(-12),2)	-0.329280	0.097345	-3.382590	0.0010
C	0.190521	0.179851	1.059323	0.2918
@TREND("1980Q1")	-0.002249	0.002185	-1.029547	0.3055

R-squared	0.727113	Mean dependent var	-0.003093
Adjusted R-squared	0.691408	S.D. dependent var	1.402355
S.E. of regression	0.779023	Akaike info criterion	2.453156
Sum squared resid	64.93578	Schwarz criterion	2.797913
Log likelihood	-134.6425	Hannan-Quinn criter.	2.593186
F-statistic	20.36457	Durbin-Watson stat	2.048402
Prob(F-statistic)	0.000000		

Null Hypothesis: D(ROP) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-10.56631	0.0000
Test critical values:	1% level	-3.480038	
	5% level	-2.883239	
	10% level	-2.578420	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ROP,2)
Method: Least Squares
Date: 07/17/14 Time: 06:46
Sample (adjusted): 1980Q4 2013Q4
Included observations: 133 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ROP(-1))	-1.083312	0.102525	-10.56631	0.0000
D(ROP(-1),2)	0.369266	0.081492	4.531326	0.0000
C	0.147343	0.649369	0.226901	0.8209

R-squared	0.477987	Mean dependent var	0.017744
Adjusted R-squared	0.469956	S.D. dependent var	10.28435
S.E. of regression	7.487431	Akaike info criterion	6.886627
Sum squared resid	7288.011	Schwarz criterion	6.951823
Log likelihood	-454.9607	Hannan-Quinn criter.	6.913120
F-statistic	59.51787	Durbin-Watson stat	1.958907
Prob(F-statistic)	0.000000		

Null Hypothesis: D(ROP) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-10.56631	0.0000
Test critical values:	1% level	-3.480038	
	5% level	-2.883239	
	10% level	-2.578420	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ROP,2)
Method: Least Squares
Date: 07/17/14 Time: 06:47
Sample (adjusted): 1980Q4 2013Q4
Included observations: 133 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ROP(-1))	-1.083312	0.102525	-10.56631	0.0000
D(ROP(-1),2)	0.369266	0.081492	4.531326	0.0000
C	0.147343	0.649369	0.226901	0.8209

R-squared	0.477987	Mean dependent var	0.017744
Adjusted R-squared	0.469956	S.D. dependent var	10.28435
S.E. of regression	7.487431	Akaike info criterion	6.886627
Sum squared resid	7288.011	Schwarz criterion	6.951823
Log likelihood	-454.9607	Hannan-Quinn criter.	6.913120
F-statistic	59.51787	Durbin-Watson stat	1.958907
Prob(F-statistic)	0.000000		

Null Hypothesis: D(ROP) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-10.99999	0.0000
Test critical values:	1% level	-4.028496	
	5% level	-3.443961	
	10% level	-3.146755	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ROP,2)
Method: Least Squares
Date: 07/17/14 Time: 06:49
Sample (adjusted): 1980Q4 2013Q4
Included observations: 133 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ROP(-1))	-1.134463	0.103133	-10.99999	0.0000
D(ROP(-1),2)	0.394621	0.080846	4.881155	0.0000
C	-2.597450	1.333769	-1.947451	0.0537
@TREND("1980Q1")	0.039871	0.017011	2.343881	0.0206

R-squared	0.499310	Mean dependent var	0.017744
Adjusted R-squared	0.487666	S.D. dependent var	10.28435
S.E. of regression	7.361281	Akaike info criterion	6.859959
Sum squared resid	6990.312	Schwarz criterion	6.946887
Log likelihood	-452.1873	Hannan-Quinn criter.	6.895283
F-statistic	42.88143	Durbin-Watson stat	1.987835
Prob(F-statistic)	0.000000		

Null Hypothesis: D(POROP) has a unit root
Exogenous: Constant
Lag Length: 5 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.272441	0.0000
Test critical values:	1% level	-3.481623	
	5% level	-2.883930	
	10% level	-2.578788	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(POROP,2)
Method: Least Squares
Date: 07/17/14 Time: 06:50
Sample (adjusted): 1981Q4 2013Q4
Included observations: 129 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(POROP(-1))	-4.097305	0.441880	-9.272441	0.0000
D(POROP(-1),2)	2.445588	0.387629	6.309089	0.0000
D(POROP(-2),2)	1.825476	0.325320	5.611326	0.0000
D(POROP(-3),2)	1.103783	0.243187	4.538817	0.0000
D(POROP(-4),2)	0.731621	0.161562	4.528420	0.0000
D(POROP(-5),2)	0.220227	0.089166	2.469862	0.0149
C	0.002591	0.334681	0.007742	0.9938

R-squared	0.803831	Mean dependent var	0.012481
Adjusted R-squared	0.794183	S.D. dependent var	8.376903
S.E. of regression	3.800356	Akaike info criterion	5.560802
Sum squared resid	1762.010	Schwarz criterion	5.715986
Log likelihood	-351.6717	Hannan-Quinn criter.	5.623856
F-statistic	83.31854	Durbin-Watson stat	2.040071
Prob(F-statistic)	0.000000		

Null Hypothesis: D(POROP) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 5 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.243084	0.0000
Test critical values:	1% level	-4.030729	
	5% level	-3.445030	
	10% level	-3.147382	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(POROP,2)
Method: Least Squares
Date: 07/17/14 Time: 06:51
Sample (adjusted): 1981Q4 2013Q4
Included observations: 129 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(POROP(-1))	-4.099814	0.443555	-9.243084	0.0000
D(POROP(-1),2)	2.447582	0.389089	6.290548	0.0000
D(POROP(-2),2)	1.827188	0.326547	5.595490	0.0000
D(POROP(-3),2)	1.104866	0.244096	4.526358	0.0000
D(POROP(-4),2)	0.732462	0.162171	4.516610	0.0000
D(POROP(-5),2)	0.220717	0.089503	2.466027	0.0151
C	0.219124	0.723266	0.302964	0.7624
@TREND("1980Q1")	-0.003050	0.009021	-0.338050	0.7359

R-squared	0.804016	Mean dependent var	0.012481
Adjusted R-squared	0.792678	S.D. dependent var	8.376903
S.E. of regression	3.814227	Akaike info criterion	5.575362
Sum squared resid	1760.347	Schwarz criterion	5.752715
Log likelihood	-351.6109	Hannan-Quinn criter.	5.647424
F-statistic	70.91374	Durbin-Watson stat	2.041047
Prob(F-statistic)	0.000000		

Null Hypothesis: D(NEGROP) has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-10.75571	0.0000
Test critical values:	1% level	-3.480425	
	5% level	-2.883408	
	10% level	-2.578510	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(NEGROP,2)
Method: Least Squares
Date: 07/17/14 Time: 06:52
Sample (adjusted): 1981Q1 2013Q4
Included observations: 132 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(NEGROP(-1))	-2.189881	0.203602	-10.75571	0.0000
D(NEGROP(-1),2)	0.660222	0.149333	4.421136	0.0000
D(NEGROP(-2),2)	0.223578	0.086183	2.594207	0.0106
C	0.001253	0.602654	0.002078	0.9983

R-squared	0.721911	Mean dependent var	0.009394
Adjusted R-squared	0.715394	S.D. dependent var	12.97870
S.E. of regression	6.923942	Akaike info criterion	6.737682
Sum squared resid	6136.445	Schwarz criterion	6.825040
Log likelihood	-440.6870	Hannan-Quinn criter.	6.773180
F-statistic	110.7617	Durbin-Watson stat	2.063313
Prob(F-statistic)	0.000000		

Null Hypothesis: D(NEGROP) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-10.71611	0.0000
Test critical values:	1% level	-4.029041	
	5% level	-3.444222	
	10% level	-3.146908	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(NEGROP,2)
Method: Least Squares
Date: 07/17/14 Time: 06:53
Sample (adjusted): 1981Q1 2013Q4
Included observations: 132 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(NEGROP(-1))	-2.190384	0.204401	-10.71611	0.0000
D(NEGROP(-1),2)	0.660572	0.149918	4.406228	0.0000
D(NEGROP(-2),2)	0.223727	0.086517	2.585929	0.0108
C	-0.183829	1.258484	-0.146072	0.8841
@TREND("1980Q1")	0.002663	0.015878	0.167716	0.8671

R-squared	0.721973	Mean dependent var	0.009394
Adjusted R-squared	0.713216	S.D. dependent var	12.97870
S.E. of regression	6.950379	Akaike info criterion	6.752612
Sum squared resid	6135.086	Schwarz criterion	6.861809
Log likelihood	-440.6724	Hannan-Quinn criter.	6.796985
F-statistic	82.44753	Durbin-Watson stat	2.063507
Prob(F-statistic)	0.000000		

Null Hypothesis: D(NETROP) has a unit root
Exogenous: Constant
Lag Length: 4 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.724664	0.0000
Test critical values:	1% level	-3.481217	
	5% level	-2.883753	
	10% level	-2.578694	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(NETROP,2)
Method: Least Squares
Date: 07/17/14 Time: 06:54
Sample (adjusted): 1981Q3 2013Q4
Included observations: 130 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(NETROP(-1))	-3.171412	0.326120	-9.724664	0.0000
D(NETROP(-1),2)	1.567174	0.274831	5.702328	0.0000
D(NETROP(-2),2)	1.129105	0.217581	5.189348	0.0000
D(NETROP(-3),2)	0.730989	0.154867	4.720099	0.0000
D(NETROP(-4),2)	0.251208	0.086980	2.888118	0.0046
C	-0.001019	0.316706	-0.003217	0.9974

R-squared	0.755647	Mean dependent var	0.044308
Adjusted R-squared	0.745794	S.D. dependent var	7.161314
S.E. of regression	3.610651	Akaike info criterion	5.450708
Sum squared resid	1616.563	Schwarz criterion	5.583056
Log likelihood	-348.2960	Hannan-Quinn criter.	5.504485
F-statistic	76.69257	Durbin-Watson stat	2.012651
Prob(F-statistic)	0.000000		

Null Hypothesis: D(NETROP) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 4 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.688732	0.0000
Test critical values:	1% level	-4.030157	
	5% level	-3.444756	
	10% level	-3.147221	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(NETROP,2)
Method: Least Squares
Date: 07/17/14 Time: 06:54
Sample (adjusted): 1981Q3 2013Q4
Included observations: 130 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(NETROP(-1))	-3.172572	0.327450	-9.688732	0.0000
D(NETROP(-1),2)	1.568225	0.275958	5.682840	0.0000
D(NETROP(-2),2)	1.129832	0.218464	5.171713	0.0000
D(NETROP(-3),2)	0.731379	0.155485	4.703845	0.0000
D(NETROP(-4),2)	0.251454	0.087329	2.879397	0.0047
C	0.113979	0.676764	0.168418	0.8665
@TREND("1980Q1")	-0.001631	0.008474	-0.192488	0.8477

R-squared	0.755721	Mean dependent var	0.044308
Adjusted R-squared	0.743805	S.D. dependent var	7.161314
S.E. of regression	3.624752	Akaike info criterion	5.465791
Sum squared resid	1616.076	Schwarz criterion	5.620197
Log likelihood	-348.2764	Hannan-Quinn criter.	5.528531
F-statistic	63.42034	Durbin-Watson stat	2.013055
Prob(F-statistic)	0.000000		

Null Hypothesis: INF has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.858974	0.0530
Test critical values:	1% level	-3.479281	
	5% level	-2.882910	
	10% level	-2.578244	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	51.82147
HAC corrected variance (Bartlett kernel)	60.22069

Phillips-Perron Test Equation
Dependent Variable: D(INF)
Method: Least Squares
Date: 07/17/14 Time: 06:55
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF(-1)	-0.101987	0.038245	-2.666660	0.0086
C	2.113089	1.011794	2.088457	0.0387

R-squared	0.050753	Mean dependent var	-0.010370
Adjusted R-squared	0.043616	S.D. dependent var	7.416172
S.E. of regression	7.252637	Akaike info criterion	6.815311
Sum squared resid	6995.899	Schwarz criterion	6.858352
Log likelihood	-458.0335	Hannan-Quinn criter.	6.832802
F-statistic	7.111076	Durbin-Watson stat	1.824471
Prob(F-statistic)	0.008612		

Null Hypothesis: INF has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.966215	0.1457
Test critical values:	1% level	-4.027463	
	5% level	-3.443450	
	10% level	-3.146455	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	51.47034
HAC corrected variance (Bartlett kernel)	59.60493

Phillips-Perron Test Equation
Dependent Variable: D(INF)
Method: Least Squares
Date: 07/17/14 Time: 06:56
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF(-1)	-0.107872	0.038759	-2.783156	0.0062
C	3.283102	1.595199	2.058114	0.0415
@TREND("1980Q1")	-0.015404	0.016233	-0.948954	0.3444

R-squared	0.057185	Mean dependent var	-0.010370
Adjusted R-squared	0.042900	S.D. dependent var	7.416172
S.E. of regression	7.255351	Akaike info criterion	6.823327
Sum squared resid	6948.495	Schwarz criterion	6.887889
Log likelihood	-457.5746	Hannan-Quinn criter.	6.849563
F-statistic	4.003135	Durbin-Watson stat	1.826257
Prob(F-statistic)	0.020518		

Null Hypothesis: EXCH has a unit root
Exogenous: Constant
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-0.121089	0.9439
Test critical values:	1% level	-3.479281	
	5% level	-2.882910	
	10% level	-2.578244	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	37.67294
HAC corrected variance (Bartlett kernel)	43.03414

Phillips-Perron Test Equation
Dependent Variable: D(EXCH)
Method: Least Squares
Date: 07/17/14 Time: 06:57
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXCH(-1)	-0.000406	0.008664	-0.046816	0.9627
C	1.175600	0.759672	1.547511	0.1241

R-squared	0.000016	Mean dependent var	1.150222
Adjusted R-squared	-0.007502	S.D. dependent var	6.160739
S.E. of regression	6.183805	Akaike info criterion	6.496449
Sum squared resid	5085.847	Schwarz criterion	6.539490
Log likelihood	-436.5103	Hannan-Quinn criter.	6.513939
F-statistic	0.002192	Durbin-Watson stat	1.802658
Prob(F-statistic)	0.962730		

Null Hypothesis: EXCH has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.126494	0.5261
Test critical values:	1% level	-4.027463	
	5% level	-3.443450	
	10% level	-3.146455	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	36.38353
HAC corrected variance (Bartlett kernel)	42.36091

Phillips-Perron Test Equation
Dependent Variable: D(EXCH)
Method: Least Squares
Date: 07/17/14 Time: 06:58
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXCH(-1)	-0.048236	0.023708	-2.034560	0.0439
C	-1.328317	1.379059	-0.963205	0.3372
@TREND("1980Q1")	0.080832	0.037373	2.162866	0.0324

R-squared	0.034242	Mean dependent var	1.150222
Adjusted R-squared	0.019610	S.D. dependent var	6.160739
S.E. of regression	6.100035	Akaike info criterion	6.476438
Sum squared resid	4911.777	Schwarz criterion	6.540999
Log likelihood	-434.1595	Hannan-Quinn criter.	6.502674
F-statistic	2.340122	Durbin-Watson stat	1.779656
Prob(F-statistic)	0.100300		

Null Hypothesis: GDP has a unit root
Exogenous: Constant
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		5.595020	1.0000
Test critical values:	1% level	-3.479281	
	5% level	-2.882910	
	10% level	-2.578244	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	1.14E+11
HAC corrected variance (Bartlett kernel)	2.32E+11

Phillips-Perron Test Equation
Dependent Variable: D(GDP)
Method: Least Squares
Date: 07/17/14 Time: 06:59
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	0.135229	0.015002	9.014150	0.0000
C	29200.78	30293.54	0.963928	0.3368

R-squared	0.379244	Mean dependent var	99068.76
Adjusted R-squared	0.374577	S.D. dependent var	430256.8
S.E. of regression	340263.0	Akaike info criterion	28.32753
Sum squared resid	1.54E+13	Schwarz criterion	28.37057
Log likelihood	-1910.108	Hannan-Quinn criter.	28.34502
F-statistic	81.25489	Durbin-Watson stat	0.954610
Prob(F-statistic)	0.000000		

Null Hypothesis: GDP has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		4.623494	1.0000
Test critical values:	1% level	-4.027463	
	5% level	-3.443450	
	10% level	-3.146455	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	1.10E+11
HAC corrected variance (Bartlett kernel)	2.21E+11

Phillips-Perron Test Equation
Dependent Variable: D(GDP)
Method: Least Squares
Date: 07/17/14 Time: 07:00
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	0.122317	0.016037	7.627125	0.0000
C	-78901.20	59514.87	-1.325739	0.1872
@TREND("1980Q1")	1687.839	803.3378	2.101033	0.0375

R-squared	0.399332	Mean dependent var	99068.76
Adjusted R-squared	0.390231	S.D. dependent var	430256.8
S.E. of regression	335977.8	Akaike info criterion	28.30945
Sum squared resid	1.49E+13	Schwarz criterion	28.37401
Log likelihood	-1907.888	Hannan-Quinn criter.	28.33569
F-statistic	43.87759	Durbin-Watson stat	0.970380
Prob(F-statistic)	0.000000		

Null Hypothesis: UNE has a unit root
Exogenous: Constant
Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.937158	0.0438
Test critical values:	1% level	-3.479281	
	5% level	-2.882910	
	10% level	-2.578244	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	1.29E+08
HAC corrected variance (Bartlett kernel)	1.01E+08

Phillips-Perron Test Equation
Dependent Variable: D(UNE)
Method: Least Squares
Date: 07/17/14 Time: 07:01
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UNE(-1)	-0.170661	0.051052	-3.342889	0.0011
C	6927.036	2247.041	3.082737	0.0025

R-squared	0.077509	Mean dependent var	176.2444
Adjusted R-squared	0.070573	S.D. dependent var	11876.10
S.E. of regression	11449.36	Akaike info criterion	21.54396
Sum squared resid	1.74E+10	Schwarz criterion	21.58700
Log likelihood	-1452.217	Hannan-Quinn criter.	21.56145
F-statistic	11.17491	Durbin-Watson stat	2.557351
Prob(F-statistic)	0.001077		

Null Hypothesis: UNE has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.460727	0.0001
Test critical values:	1% level	-4.027463	
	5% level	-3.443450	
	10% level	-3.146455	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	1.12E+08
HAC corrected variance (Bartlett kernel)	93085411

Phillips-Perron Test Equation
Dependent Variable: D(UNE)
Method: Least Squares
Date: 07/17/14 Time: 07:01
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UNE(-1)	-0.363073	0.063763	-5.694134	0.0000
C	4783.874	2149.987	2.225071	0.0278
@TREND("1980Q1")	143.4456	31.58172	4.542047	0.0000

R-squared	0.202197	Mean dependent var	176.2444
Adjusted R-squared	0.190110	S.D. dependent var	11876.10
S.E. of regression	10687.77	Akaike info criterion	21.41356
Sum squared resid	1.51E+10	Schwarz criterion	21.47812
Log likelihood	-1442.415	Hannan-Quinn criter.	21.43979
F-statistic	16.72723	Durbin-Watson stat	2.409107
Prob(F-statistic)	0.000000		

Null Hypothesis: INTR has a unit root
Exogenous: Constant
Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-0.680105	0.8471
Test critical values:	1% level	-3.479281	
	5% level	-2.882910	
	10% level	-2.578244	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	4069.605
HAC corrected variance (Bartlett kernel)	4069.605

Phillips-Perron Test Equation
Dependent Variable: D(INTR)
Method: Least Squares
Date: 07/17/14 Time: 07:02
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INTR(-1)	-0.845417	1.243069	-0.680105	0.4976
C	15.45621	15.59089	0.991362	0.3233

R-squared	0.003466	Mean dependent var	5.542593
Adjusted R-squared	-0.004027	S.D. dependent var	64.14230
S.E. of regression	64.27132	Akaike info criterion	11.17881
Sum squared resid	549396.7	Schwarz criterion	11.22185
Log likelihood	-752.5695	Hannan-Quinn criter.	11.19630
F-statistic	0.462543	Durbin-Watson stat	1.010513
Prob(F-statistic)	0.497620		

Null Hypothesis: INTR has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-0.526470	0.9812
Test critical values:	1% level	-4.027463	
	5% level	-3.443450	
	10% level	-3.146455	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	3987.479
HAC corrected variance (Bartlett kernel)	3987.479

Phillips-Perron Test Equation
Dependent Variable: D(INTR)
Method: Least Squares
Date: 07/17/14 Time: 07:03
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INTR(-1)	-0.653142	1.240607	-0.526470	0.5994
C	-2.681947	18.99965	-0.141158	0.8880
@TREND("1980Q1")	0.233581	0.141664	1.648840	0.1016

R-squared	0.023576	Mean dependent var	5.542593
Adjusted R-squared	0.008782	S.D. dependent var	64.14230
S.E. of regression	63.86003	Akaike info criterion	11.17324
Sum squared resid	538309.7	Schwarz criterion	11.23780
Log likelihood	-751.1934	Hannan-Quinn criter.	11.19947
F-statistic	1.593597	Durbin-Watson stat	1.030088
Prob(F-statistic)	0.207078		

Null Hypothesis: GEX has a unit root
Exogenous: Constant
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		1.045054	0.9969
Test critical values:	1% level	-3.479281	
	5% level	-2.882910	
	10% level	-2.578244	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	1.81E+13
HAC corrected variance (Bartlett kernel)	2.48E+13

Phillips-Perron Test Equation
Dependent Variable: D(GEX)
Method: Least Squares
Date: 07/17/14 Time: 07:04
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GEX(-1)	0.040071	0.022515	1.779755	0.0774
C	394347.8	383726.1	1.027681	0.3060

R-squared	0.023262	Mean dependent var	582653.8
Adjusted R-squared	0.015918	S.D. dependent var	4320185.
S.E. of regression	4285662.	Akaike info criterion	33.39415
Sum squared resid	2.44E+15	Schwarz criterion	33.43719
Log likelihood	-2252.105	Hannan-Quinn criter.	33.41164
F-statistic	3.167527	Durbin-Watson stat	1.354915
Prob(F-statistic)	0.077400		

Null Hypothesis: GEX has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		0.186368	0.9978
Test critical values:	1% level	-4.027463	
	5% level	-3.443450	
	10% level	-3.146455	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	1.77E+13
HAC corrected variance (Bartlett kernel)	2.41E+13

Phillips-Perron Test Equation
Dependent Variable: D(GEX)
Method: Least Squares
Date: 07/17/14 Time: 07:05
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GEX(-1)	0.020403	0.024839	0.821427	0.4129
C	-795882.8	760870.6	-1.046016	0.2975
@TREND("1980Q1")	18862.56	10442.04	1.806406	0.0731

R-squared	0.046825	Mean dependent var	582653.8
Adjusted R-squared	0.032383	S.D. dependent var	4320185.
S.E. of regression	4249659.	Akaike info criterion	33.38455
Sum squared resid	2.38E+15	Schwarz criterion	33.44911
Log likelihood	-2250.457	Hannan-Quinn criter.	33.41078
F-statistic	3.242263	Durbin-Watson stat	1.361874
Prob(F-statistic)	0.042208		

Null Hypothesis: BOP has a unit root
Exogenous: Constant
Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.607929	0.0938
Test critical values:	1% level	-3.479281	
	5% level	-2.882910	
	10% level	-2.578244	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	1.626430
HAC corrected variance (Bartlett kernel)	3.122719

Phillips-Perron Test Equation
Dependent Variable: D(BOP)
Method: Least Squares
Date: 07/17/14 Time: 07:05
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BOP(-1)	-0.052021	0.025400	-2.048059	0.0425
C	0.717922	0.342754	2.094570	0.0381

R-squared	0.030574	Mean dependent var	0.053481
Adjusted R-squared	0.023285	S.D. dependent var	1.300094
S.E. of regression	1.284869	Akaike info criterion	3.353894
Sum squared resid	219.5681	Schwarz criterion	3.396935
Log likelihood	-224.3879	Hannan-Quinn criter.	3.371385
F-statistic	4.194545	Durbin-Watson stat	1.040417
Prob(F-statistic)	0.042522		

Null Hypothesis: BOP has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.572319	0.2937
Test critical values:	1% level	-4.027463	
	5% level	-3.443450	
	10% level	-3.146455	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	1.623265
HAC corrected variance (Bartlett kernel)	3.098375

Phillips-Perron Test Equation
Dependent Variable: D(BOP)
Method: Least Squares
Date: 07/17/14 Time: 07:07
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BOP(-1)	-0.051193	0.025523	-2.005748	0.0469
C	0.805730	0.384829	2.093736	0.0382
@TREND("1980Q1")	-0.001447	0.002851	-0.507354	0.6128

R-squared	0.032460	Mean dependent var	0.053481
Adjusted R-squared	0.017801	S.D. dependent var	1.300094
S.E. of regression	1.288471	Akaike info criterion	3.366761
Sum squared resid	219.1408	Schwarz criterion	3.431323
Log likelihood	-224.2564	Hannan-Quinn criter.	3.392997
F-statistic	2.214267	Durbin-Watson stat	1.043273
Prob(F-statistic)	0.113275		

Null Hypothesis: ROP has a unit root
Exogenous: Constant
Bandwidth: 10 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.052383	0.7331
Test critical values:	1% level	-3.479281	
	5% level	-2.882910	
	10% level	-2.578244	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	64.62989
HAC corrected variance (Bartlett kernel)	51.41184

Phillips-Perron Test Equation
Dependent Variable: D(ROP)
Method: Least Squares
Date: 07/17/14 Time: 07:07
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROP(-1)	-0.030395	0.023985	-1.267267	0.2073
C	1.743367	1.445109	1.206392	0.2298

R-squared	0.011931	Mean dependent var	0.139185
Adjusted R-squared	0.004502	S.D. dependent var	8.117785
S.E. of regression	8.099492	Akaike info criterion	7.036184
Sum squared resid	8725.036	Schwarz criterion	7.079225
Log likelihood	-472.9424	Hannan-Quinn criter.	7.053674
F-statistic	1.605966	Durbin-Watson stat	1.553626
Prob(F-statistic)	0.207274		

Null Hypothesis: ROP has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 19 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.327123	0.8769
Test critical values:	1% level	-4.027463	
	5% level	-3.443450	
	10% level	-3.146455	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	62.20888
HAC corrected variance (Bartlett kernel)	26.70188

Phillips-Perron Test Equation
Dependent Variable: D(ROP)
Method: Least Squares
Date: 07/17/14 Time: 07:08
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROP(-1)	-0.043741	0.024343	-1.796862	0.0746
C	-0.350393	1.696674	-0.206517	0.8367
@TREND("1980Q1")	0.041149	0.018155	2.266520	0.0250

R-squared	0.048944	Mean dependent var	0.139185
Adjusted R-squared	0.034534	S.D. dependent var	8.117785
S.E. of regression	7.976385	Akaike info criterion	7.012819
Sum squared resid	8398.198	Schwarz criterion	7.077381
Log likelihood	-470.3653	Hannan-Quinn criter.	7.039055
F-statistic	3.396518	Durbin-Watson stat	1.592948
Prob(F-statistic)	0.036443		

Null Hypothesis: POROP has a unit root
Exogenous: Constant
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-8.832775	0.0000
Test critical values:	1% level	-3.479281	
	5% level	-2.882910	
	10% level	-2.578244	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	15.89019
HAC corrected variance (Bartlett kernel)	18.45606

Phillips-Perron Test Equation
Dependent Variable: D(POROP)
Method: Least Squares
Date: 07/17/14 Time: 07:09
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
POROP(-1)	-0.715868	0.083039	-8.620879	0.0000
C	1.714101	0.398071	4.306015	0.0000

R-squared	0.358478	Mean dependent var	0.011926
Adjusted R-squared	0.353655	S.D. dependent var	4.995436
S.E. of regression	4.016110	Akaike info criterion	5.633209
Sum squared resid	2145.176	Schwarz criterion	5.676250
Log likelihood	-378.2416	Hannan-Quinn criter.	5.650700
F-statistic	74.31955	Durbin-Watson stat	2.028587
Prob(F-statistic)	0.000000		

Null Hypothesis: POROP has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-9.450003	0.0000
Test critical values:	1% level	-4.027463	
	5% level	-3.443450	
	10% level	-3.146455	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	14.78430
HAC corrected variance (Bartlett kernel)	14.91328

Phillips-Perron Test Equation
Dependent Variable: D(POROP)
Method: Least Squares
Date: 07/17/14 Time: 07:10
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
POROP(-1)	-0.808686	0.085655	-9.441259	0.0000
C	-0.020113	0.673159	-0.029878	0.9762
@TREND("1980Q1")	0.028749	0.009149	3.142265	0.0021

R-squared	0.403125	Mean dependent var	0.011926
Adjusted R-squared	0.394082	S.D. dependent var	4.995436
S.E. of regression	3.888484	Akaike info criterion	5.575887
Sum squared resid	1995.881	Schwarz criterion	5.640449
Log likelihood	-373.3724	Hannan-Quinn criter.	5.602123
F-statistic	44.57601	Durbin-Watson stat	1.984698
Prob(F-statistic)	0.000000		

Null Hypothesis: NEGROP has a unit root
Exogenous: Constant
Bandwidth: 5 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-9.436508	0.0000
Test critical values:	1% level	-3.479281	
	5% level	-2.882910	
	10% level	-2.578244	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	36.09871
HAC corrected variance (Bartlett kernel)	29.59654

Phillips-Perron Test Equation
Dependent Variable: D(NEGROP)
Method: Least Squares
Date: 07/17/14 Time: 07:11
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NEGROP(-1)	-0.815897	0.085229	-9.573014	0.0000
C	-1.836191	0.555166	-3.307461	0.0012

R-squared	0.407948	Mean dependent var	5.26E-17
Adjusted R-squared	0.403497	S.D. dependent var	7.837554
S.E. of regression	6.053226	Akaike info criterion	6.453764
Sum squared resid	4873.326	Schwarz criterion	6.496805
Log likelihood	-433.6291	Hannan-Quinn criter.	6.471254
F-statistic	91.64259	Durbin-Watson stat	1.958076
Prob(F-statistic)	0.000000		

Null Hypothesis: NEGROP has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 5 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-9.397246	0.0000
Test critical values:	1% level	-4.027463	
	5% level	-3.443450	
	10% level	-3.146455	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	36.09380
HAC corrected variance (Bartlett kernel)	29.58026

Phillips-Perron Test Equation
Dependent Variable: D(NEGROP)
Method: Least Squares
Date: 07/17/14 Time: 07:12
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NEGROP(-1)	-0.816191	0.085573	-9.537908	0.0000
C	-1.714522	1.065186	-1.609598	0.1099
@TREND("1980Q1")	-0.001799	0.013423	-0.134025	0.8936

R-squared	0.408029	Mean dependent var	5.26E-17
Adjusted R-squared	0.399060	S.D. dependent var	7.837554
S.E. of regression	6.075698	Akaike info criterion	6.468443
Sum squared resid	4872.663	Schwarz criterion	6.533004
Log likelihood	-433.6199	Hannan-Quinn criter.	6.494679
F-statistic	45.49195	Durbin-Watson stat	1.957822
Prob(F-statistic)	0.000000		

Null Hypothesis: NETROP has a unit root
Exogenous: Constant
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-8.336040	0.0000
Test critical values:	1% level	-3.479281	
	5% level	-2.882910	
	10% level	-2.578244	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	12.05806
HAC corrected variance (Bartlett kernel)	12.41221

Phillips-Perron Test Equation
Dependent Variable: D(NETROP)
Method: Least Squares
Date: 07/17/14 Time: 07:14
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NETROP(-1)	-0.681639	0.082166	-8.295888	0.0000
C	1.142553	0.330934	3.452508	0.0007

R-squared	0.341003	Mean dependent var	0.003407
Adjusted R-squared	0.336048	S.D. dependent var	4.293499
S.E. of regression	3.498483	Akaike info criterion	5.357240
Sum squared resid	1627.838	Schwarz criterion	5.400281
Log likelihood	-359.6137	Hannan-Quinn criter.	5.374731
F-statistic	68.82177	Durbin-Watson stat	2.026455
Prob(F-statistic)	0.000000		

Null Hypothesis: NETROP has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 14 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-8.697589	0.0000
Test critical values:	1% level	-4.027463	
	5% level	-3.443450	
	10% level	-3.146455	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	11.42644
HAC corrected variance (Bartlett kernel)	9.152687

Phillips-Perron Test Equation
Dependent Variable: D(NETROP)
Method: Least Squares
Date: 07/17/14 Time: 07:15
Sample (adjusted): 1980Q2 2013Q4
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NETROP(-1)	-0.754030	0.084642	-8.908463	0.0000
C	-0.198459	0.592475	-0.334965	0.7382
@TREND("1980Q1")	0.021500	0.007959	2.701217	0.0078

R-squared	0.375522	Mean dependent var	0.003407
Adjusted R-squared	0.366060	S.D. dependent var	4.293499
S.E. of regression	3.418499	Akaike info criterion	5.318252
Sum squared resid	1542.569	Schwarz criterion	5.382813
Log likelihood	-355.9820	Hannan-Quinn criter.	5.344488
F-statistic	39.68827	Durbin-Watson stat	1.987852
Prob(F-statistic)	0.000000		

After First Difference

Null Hypothesis: D(INF) has a unit root
Exogenous: Constant
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-11.02158	0.0000
Test critical values:	1% level	-3.479656	
	5% level	-2.883073	
	10% level	-2.578331	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	54.89436
HAC corrected variance (Bartlett kernel)	54.37989

Phillips-Perron Test Equation
Dependent Variable: D(INF,2)
Method: Least Squares
Date: 07/17/14 Time: 07:16
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INF(-1))	-0.958608	0.086956	-11.02401	0.0000
C	-0.019091	0.644877	-0.029604	0.9764

R-squared	0.479349	Mean dependent var	-0.011866
Adjusted R-squared	0.475405	S.D. dependent var	10.30664
S.E. of regression	7.464991	Akaike info criterion	6.873138
Sum squared resid	7355.844	Schwarz criterion	6.916390
Log likelihood	-458.5003	Hannan-Quinn criter.	6.890714
F-statistic	121.5287	Durbin-Watson stat	1.998423
Prob(F-statistic)	0.000000		

Null Hypothesis: D(INF) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-10.99750	0.0000
Test critical values:	1% level	-4.027959	
	5% level	-3.443704	
	10% level	-3.146604	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	54.80751
HAC corrected variance (Bartlett kernel)	54.24085

Phillips-Perron Test Equation
Dependent Variable: D(INF,2)
Method: Least Squares
Date: 07/17/14 Time: 07:17
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INF(-1))	-0.960315	0.087299	-11.00029	0.0000
C	0.503249	1.316348	0.382307	0.7029
@TREND("1980Q1")	-0.007626	0.016737	-0.455607	0.6494

R-squared	0.480173	Mean dependent var	-0.011866
Adjusted R-squared	0.472236	S.D. dependent var	10.30664
S.E. of regression	7.487499	Akaike info criterion	6.886480
Sum squared resid	7344.206	Schwarz criterion	6.951357
Log likelihood	-458.3942	Hannan-Quinn criter.	6.912844
F-statistic	60.50336	Durbin-Watson stat	1.998234
Prob(F-statistic)	0.000000		

Null Hypothesis: D(EXCH) has a unit root
Exogenous: Constant
Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-10.41239	0.0000
Test critical values:	1% level	-3.479656	
	5% level	-2.883073	
	10% level	-2.578331	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	37.57987
HAC corrected variance (Bartlett kernel)	37.57987

Phillips-Perron Test Equation
Dependent Variable: D(EXCH,2)
Method: Least Squares
Date: 07/17/14 Time: 07:18
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXCH(-1))	-0.901914	0.086619	-10.41239	0.0000
C	1.045069	0.542928	1.924874	0.0564

R-squared	0.450956	Mean dependent var	-7.46E-05
Adjusted R-squared	0.446796	S.D. dependent var	8.304253
S.E. of regression	6.176509	Akaike info criterion	6.494196
Sum squared resid	5035.703	Schwarz criterion	6.537448
Log likelihood	-433.1112	Hannan-Quinn criter.	6.511772
F-statistic	108.4178	Durbin-Watson stat	2.001339
Prob(F-statistic)	0.000000		

Null Hypothesis: D(EXCH) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-10.40770	0.0000
Test critical values:	1% level	-4.027959	
	5% level	-3.443704	
	10% level	-3.146604	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	37.46572
HAC corrected variance (Bartlett kernel)	37.46572

Phillips-Perron Test Equation
Dependent Variable: D(EXCH,2)
Method: Least Squares
Date: 07/17/14 Time: 07:19
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXCH(-1))	-0.905545	0.087007	-10.40770	0.0000
C	0.449665	1.088276	0.413190	0.6801
@TREND("1980Q1")	0.008753	0.013856	0.631757	0.5286

R-squared	0.452624	Mean dependent var	-7.46E-05
Adjusted R-squared	0.444267	S.D. dependent var	8.304253
S.E. of regression	6.190615	Akaike info criterion	6.506080
Sum squared resid	5020.407	Schwarz criterion	6.570957
Log likelihood	-432.9073	Hannan-Quinn criter.	6.532444
F-statistic	54.16171	Durbin-Watson stat	2.000129
Prob(F-statistic)	0.000000		

Null Hypothesis: D(GDP) has a unit root
Exogenous: Constant
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.395788	0.0005
Test critical values:	1% level	-3.479656	
	5% level	-2.883073	
	10% level	-2.578331	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	8.21E+10
HAC corrected variance (Bartlett kernel)	8.56E+10

Phillips-Perron Test Equation
Dependent Variable: D(GDP,2)
Method: Least Squares
Date: 07/17/14 Time: 07:20
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP(-1))	-0.251573	0.058191	-4.323187	0.0000
C	28060.43	25559.74	1.097837	0.2743

R-squared	0.124029	Mean dependent var	3942.911
Adjusted R-squared	0.117393	S.D. dependent var	307345.2
S.E. of regression	288742.1	Akaike info criterion	27.99927
Sum squared resid	1.10E+13	Schwarz criterion	28.04252
Log likelihood	-1873.951	Hannan-Quinn criter.	28.01684
F-statistic	18.68994	Durbin-Watson stat	1.852246
Prob(F-statistic)	0.000030		

Null Hypothesis: D(GDP) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.836740	0.0007
Test critical values:	1% level	-4.027959	
	5% level	-3.443704	
	10% level	-3.146604	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	8.00E+10
HAC corrected variance (Bartlett kernel)	8.44E+10

Phillips-Perron Test Equation
Dependent Variable: D(GDP,2)
Method: Least Squares
Date: 07/17/14 Time: 07:20
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP(-1))	-0.293015	0.061779	-4.742980	0.0000
C	-55502.50	51432.18	-1.079140	0.2825
@TREND("1980Q1")	1277.896	684.5967	1.866641	0.0642

R-squared	0.146725	Mean dependent var	3942.911
Adjusted R-squared	0.133698	S.D. dependent var	307345.2
S.E. of regression	286062.7	Akaike info criterion	27.98794
Sum squared resid	1.07E+13	Schwarz criterion	28.05282
Log likelihood	-1872.192	Hannan-Quinn criter.	28.01431
F-statistic	11.26303	Durbin-Watson stat	1.827220
Prob(F-statistic)	0.000031		

Null Hypothesis: D(UNE) has a unit root
Exogenous: Constant
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-19.12464	0.0000
Test critical values:	1% level	-3.479656	
	5% level	-2.883073	
	10% level	-2.578331	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	1.18E+08
HAC corrected variance (Bartlett kernel)	84125754

Phillips-Perron Test Equation
Dependent Variable: D(UNE,2)
Method: Least Squares
Date: 07/17/14 Time: 07:26
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(UNE(-1))	-1.408982	0.079673	-17.68449	0.0000
C	279.6364	943.9753	0.296233	0.7675

R-squared	0.703198	Mean dependent var	-72.10448
Adjusted R-squared	0.700950	S.D. dependent var	19977.65
S.E. of regression	10924.88	Akaike info criterion	21.45029
Sum squared resid	1.58E+10	Schwarz criterion	21.49354
Log likelihood	-1435.169	Hannan-Quinn criter.	21.46786
F-statistic	312.7411	Durbin-Watson stat	2.120536
Prob(F-statistic)	0.000000		

Null Hypothesis: D(UNE) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 8 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-20.83615	0.0000
Test critical values:	1% level	-4.027959	
	5% level	-3.443704	
	10% level	-3.146604	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	1.16E+08
HAC corrected variance (Bartlett kernel)	63581592

Phillips-Perron Test Equation
Dependent Variable: D(UNE,2)
Method: Least Squares
Date: 07/17/14 Time: 07:27
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(UNE(-1))	-1.419702	0.079645	-17.82544	0.0000
C	-2192.624	1915.275	-1.144809	0.2544
@TREND("1980Q1")	36.13045	24.38967	1.481384	0.1409

R-squared	0.708088	Mean dependent var	-72.10448
Adjusted R-squared	0.703631	S.D. dependent var	19977.65
S.E. of regression	10875.78	Akaike info criterion	21.44860
Sum squared resid	1.55E+10	Schwarz criterion	21.51347
Log likelihood	-1434.056	Hannan-Quinn criter.	21.47496
F-statistic	158.8828	Durbin-Watson stat	2.138253
Prob(F-statistic)	0.000000		

Null Hypothesis: D(INTR) has a unit root
Exogenous: Constant
Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		0.407491	0.9826
Test critical values:	1% level	-3.479656	
	5% level	-2.883073	
	10% level	-2.578331	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	4097.995
HAC corrected variance (Bartlett kernel)	4097.995

Phillips-Perron Test Equation
Dependent Variable: D(INTR,2)
Method: Least Squares
Date: 07/17/14 Time: 07:28
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INTR(-1))	1.314583	3.226043	0.407491	0.6843
C	5.530551	5.572384	0.992493	0.3228

R-squared	0.001256	Mean dependent var	5.562239
Adjusted R-squared	-0.006310	S.D. dependent var	64.29619
S.E. of regression	64.49872	Akaike info criterion	11.18598
Sum squared resid	549131.3	Schwarz criterion	11.22923
Log likelihood	-747.4607	Hannan-Quinn criter.	11.20356
F-statistic	0.166049	Durbin-Watson stat	1.011799
Prob(F-statistic)	0.684308		

Null Hypothesis: D(INTR) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		0.525505	0.9993
Test critical values:	1% level	-4.027959	
	5% level	-3.443704	
	10% level	-3.146604	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	4003.440
HAC corrected variance (Bartlett kernel)	4003.440

Phillips-Perron Test Equation
Dependent Variable: D(INTR,2)
Method: Least Squares
Date: 07/17/14 Time: 07:29
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INTR(-1))	1.685663	3.207700	0.525505	0.6001
C	-11.73565	11.26592	-1.041694	0.2995
@TREND("1980Q1")	0.251931	0.143225	1.758980	0.0809

R-squared	0.024301	Mean dependent var	5.562239
Adjusted R-squared	0.009405	S.D. dependent var	64.29619
S.E. of regression	63.99314	Akaike info criterion	11.17756
Sum squared resid	536460.9	Schwarz criterion	11.24244
Log likelihood	-745.8967	Hannan-Quinn criter.	11.20393
F-statistic	1.631347	Durbin-Watson stat	1.037138
Prob(F-statistic)	0.199615		

Null Hypothesis: D(GEX) has a unit root
Exogenous: Constant
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-7.756089	0.0000
Test critical values:	1% level	-3.479656	
	5% level	-2.883073	
	10% level	-2.578331	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	1.64E+13
HAC corrected variance (Bartlett kernel)	1.68E+13

Phillips-Perron Test Equation
Dependent Variable: D(GEX,2)
Method: Least Squares
Date: 07/17/14 Time: 07:30
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GEX(-1))	-0.641877	0.083223	-7.712731	0.0000
C	351425.0	356341.7	0.986202	0.3258

R-squared	0.310655	Mean dependent var	-70831.18
Adjusted R-squared	0.305433	S.D. dependent var	4890742.
S.E. of regression	4075978.	Akaike info criterion	33.29393
Sum squared resid	2.19E+15	Schwarz criterion	33.33718
Log likelihood	-2228.693	Hannan-Quinn criter.	33.31151
F-statistic	59.48622	Durbin-Watson stat	1.898774
Prob(F-statistic)	0.000000		

Null Hypothesis: D(GEX) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-7.833113	0.0000
Test critical values:	1% level	-4.027959	
	5% level	-3.443704	
	10% level	-3.146604	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	1.61E+13
HAC corrected variance (Bartlett kernel)	1.55E+13

Phillips-Perron Test Equation
Dependent Variable: D(GEX,2)
Method: Least Squares
Date: 07/17/14 Time: 07:30
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GEX(-1))	-0.673529	0.085352	-7.891192	0.0000
C	-605679.8	719326.3	-0.842010	0.4013
@TREND("1980Q1")	14276.30	9335.708	1.529215	0.1286

R-squared	0.322745	Mean dependent var	-70831.18
Adjusted R-squared	0.312405	S.D. dependent var	4890742.
S.E. of regression	4055468.	Akaike info criterion	33.29116
Sum squared resid	2.15E+15	Schwarz criterion	33.35604
Log likelihood	-2227.508	Hannan-Quinn criter.	33.31753
F-statistic	31.21396	Durbin-Watson stat	1.877861
Prob(F-statistic)	0.000000		

Null Hypothesis: D(BOP) has a unit root
Exogenous: Constant
Bandwidth: 25 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-6.064327	0.0000
Test critical values:	1% level	-3.479656	
	5% level	-2.883073	
	10% level	-2.578331	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	1.317197
HAC corrected variance (Bartlett kernel)	0.477993

Phillips-Perron Test Equation
Dependent Variable: D(BOP,2)
Method: Least Squares
Date: 07/17/14 Time: 07:31
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(BOP(-1))	-0.530978	0.076852	-6.909122	0.0000
C	0.030525	0.099986	0.305289	0.7606

R-squared	0.265589	Mean dependent var	0.000916
Adjusted R-squared	0.260026	S.D. dependent var	1.344257
S.E. of regression	1.156354	Akaike info criterion	3.143234
Sum squared resid	176.5044	Schwarz criterion	3.186485
Log likelihood	-208.5967	Hannan-Quinn criter.	3.160810
F-statistic	47.73597	Durbin-Watson stat	2.023465
Prob(F-statistic)	0.000000		

Null Hypothesis: D(BOP) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 26 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-6.057575	0.0000
Test critical values:	1% level	-4.027959	
	5% level	-3.443704	
	10% level	-3.146604	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	1.315121
HAC corrected variance (Bartlett kernel)	0.415107

Phillips-Perron Test Equation
Dependent Variable: D(BOP,2)
Method: Least Squares
Date: 07/17/14 Time: 07:32
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(BOP(-1))	-0.532806	0.077188	-6.902670	0.0000
C	0.111430	0.204219	0.545640	0.5862
@TREND("1980Q1")	-0.001180	0.002594	-0.454785	0.6500

R-squared	0.266747	Mean dependent var	0.000916
Adjusted R-squared	0.255552	S.D. dependent var	1.344257
S.E. of regression	1.159844	Akaike info criterion	3.156582
Sum squared resid	176.2262	Schwarz criterion	3.221459
Log likelihood	-208.4910	Hannan-Quinn criter.	3.182945
F-statistic	23.82798	Durbin-Watson stat	2.022909
Prob(F-statistic)	0.000000		

Null Hypothesis: D(ROP) has a unit root
Exogenous: Constant
Bandwidth: 15 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-9.185151	0.0000
Test critical values:	1% level	-3.479656	
	5% level	-2.883073	
	10% level	-2.578331	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	62.99263
HAC corrected variance (Bartlett kernel)	29.83013

Phillips-Perron Test Equation
Dependent Variable: D(ROP,2)
Method: Least Squares
Date: 07/17/14 Time: 07:34
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ROP(-1))	-0.791531	0.085109	-9.300238	0.0000
C	0.094690	0.690895	0.137055	0.8912

R-squared	0.395866	Mean dependent var	-0.006791
Adjusted R-squared	0.391289	S.D. dependent var	10.24955
S.E. of regression	7.996691	Akaike info criterion	7.010745
Sum squared resid	8441.012	Schwarz criterion	7.053997
Log likelihood	-467.7199	Hannan-Quinn criter.	7.028321
F-statistic	86.49443	Durbin-Watson stat	1.844693
Prob(F-statistic)	0.000000		

Null Hypothesis: D(ROP) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 29 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-13.45237	0.0000
Test critical values:	1% level	-4.027959	
	5% level	-3.443704	
	10% level	-3.146604	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	61.80401
HAC corrected variance (Bartlett kernel)	6.677547

Phillips-Perron Test Equation
Dependent Variable: D(ROP,2)
Method: Least Squares
Date: 07/17/14 Time: 07:34
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ROP(-1))	-0.813262	0.085723	-9.487050	0.0000
C	-1.858307	1.409196	-1.318700	0.1896
@TREND("1980Q1")	0.028552	0.017988	1.587263	0.1149

R-squared	0.407265	Mean dependent var	-0.006791
Adjusted R-squared	0.398216	S.D. dependent var	10.24955
S.E. of regression	7.951061	Akaike info criterion	7.006621
Sum squared resid	8281.737	Schwarz criterion	7.071498
Log likelihood	-466.4436	Hannan-Quinn criter.	7.032985
F-statistic	45.00472	Durbin-Watson stat	1.853059
Prob(F-statistic)	0.000000		

Null Hypothesis: D(POROP) has a unit root
Exogenous: Constant
Bandwidth: 78 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-64.79759	0.0001
Test critical values:	1% level	-3.479656	
	5% level	-2.883073	
	10% level	-2.578331	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	21.07479
HAC corrected variance (Bartlett kernel)	0.755194

Phillips-Perron Test Equation
Dependent Variable: D(POROP,2)
Method: Least Squares
Date: 07/17/14 Time: 07:35
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(POROP(-1))	-1.392034	0.080018	-17.39648	0.0000
C	-0.006791	0.399572	-0.016996	0.9865

R-squared	0.696299	Mean dependent var	-0.006791
Adjusted R-squared	0.693998	S.D. dependent var	8.361512
S.E. of regression	4.625376	Akaike info criterion	5.915805
Sum squared resid	2824.021	Schwarz criterion	5.959057
Log likelihood	-394.3589	Hannan-Quinn criter.	5.933381
F-statistic	302.6375	Durbin-Watson stat	2.152308
Prob(F-statistic)	0.000000		

Null Hypothesis: D(POROP) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 78 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-63.88225	0.0001
Test critical values:	1% level	-4.027959	
	5% level	-3.443704	
	10% level	-3.146604	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	21.07371
HAC corrected variance (Bartlett kernel)	0.769033

Phillips-Perron Test Equation
Dependent Variable: D(POROP,2)
Method: Least Squares
Date: 07/17/14 Time: 07:36
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(POROP(-1))	-1.392115	0.080327	-17.33058	0.0000
C	0.051188	0.815738	0.062751	0.9501
@TREND("1980Q1")	-0.000846	0.010370	-0.081624	0.9351

R-squared	0.696314	Mean dependent var	-0.006791
Adjusted R-squared	0.691678	S.D. dependent var	8.361512
S.E. of regression	4.642878	Akaike info criterion	5.930680
Sum squared resid	2823.878	Schwarz criterion	5.995557
Log likelihood	-394.3555	Hannan-Quinn criter.	5.957044
F-statistic	150.1834	Durbin-Watson stat	2.152290
Prob(F-statistic)	0.000000		

Null Hypothesis: D(NEGROP) has a unit root
Exogenous: Constant
Bandwidth: 48 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-56.49931	0.0001
Test critical values:	1% level	-3.479656	
	5% level	-2.883073	
	10% level	-2.578331	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	54.30203
HAC corrected variance (Bartlett kernel)	2.114880

Phillips-Perron Test Equation
Dependent Variable: D(NEGROP,2)
Method: Least Squares
Date: 07/17/14 Time: 07:37
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(NEGROP(-1))	-1.340607	0.081842	-16.38045	0.0000
C	-0.002923	0.641389	-0.004557	0.9964

R-squared	0.670263	Mean dependent var	0.008582
Adjusted R-squared	0.667765	S.D. dependent var	12.88104
S.E. of regression	7.424607	Akaike info criterion	6.862289
Sum squared resid	7276.473	Schwarz criterion	6.905541
Log likelihood	-457.7734	Hannan-Quinn criter.	6.879865
F-statistic	268.3192	Durbin-Watson stat	2.228028
Prob(F-statistic)	0.000000		

Null Hypothesis: D(NEGROP) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 48 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-55.60982	0.0001
Test critical values:	1% level	-4.027959	
	5% level	-3.443704	
	10% level	-3.146604	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	54.29663
HAC corrected variance (Bartlett kernel)	2.160927

Phillips-Perron Test Equation
Dependent Variable: D(NEGROP,2)
Method: Least Squares
Date: 07/17/14 Time: 07:38
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(NEGROP(-1))	-1.340659	0.082151	-16.31948	0.0000
C	-0.133050	1.309326	-0.101617	0.9192
@TREND("1980Q1")	0.001900	0.016644	0.114135	0.9093

R-squared	0.670296	Mean dependent var	0.008582
Adjusted R-squared	0.665262	S.D. dependent var	12.88104
S.E. of regression	7.452521	Akaike info criterion	6.877115
Sum squared resid	7275.749	Schwarz criterion	6.941992
Log likelihood	-457.7667	Hannan-Quinn criter.	6.903479
F-statistic	133.1630	Durbin-Watson stat	2.228179
Prob(F-statistic)	0.000000		

Null Hypothesis: D(NETROP) has a unit root
Exogenous: Constant
Bandwidth: 28 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-40.10097	0.0001
Test critical values:	1% level	-3.479656	
	5% level	-2.883073	
	10% level	-2.578331	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	15.94242
HAC corrected variance (Bartlett kernel)	1.426365

Phillips-Perron Test Equation
Dependent Variable: D(NETROP,2)
Method: Least Squares
Date: 07/17/14 Time: 07:39
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(NETROP(-1))	-1.367668	0.080946	-16.89599	0.0000
C	0.003433	0.347528	0.009878	0.9921

R-squared	0.683813	Mean dependent var	0.003433
Adjusted R-squared	0.681418	S.D. dependent var	7.127409
S.E. of regression	4.022931	Akaike info criterion	5.636711
Sum squared resid	2136.284	Schwarz criterion	5.679963
Log likelihood	-375.6597	Hannan-Quinn criter.	5.654287
F-statistic	285.4744	Durbin-Watson stat	2.151500
Prob(F-statistic)	0.000000		

Null Hypothesis: D(NETROP) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 28 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-39.92312	0.0001
Test critical values:	1% level	-4.027959	
	5% level	-3.443704	
	10% level	-3.146604	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	15.93954
HAC corrected variance (Bartlett kernel)	1.423895

Phillips-Perron Test Equation
Dependent Variable: D(NETROP,2)
Method: Least Squares
Date: 07/17/14 Time: 07:39
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(NETROP(-1))	-1.367795	0.081252	-16.83408	0.0000
C	0.098411	0.709430	0.138718	0.8899
@TREND("1980Q1")	-0.001387	0.009018	-0.153748	0.8780

R-squared	0.683870	Mean dependent var	0.003433
Adjusted R-squared	0.679044	S.D. dependent var	7.127409
S.E. of regression	4.037892	Akaike info criterion	5.651456
Sum squared resid	2135.899	Schwarz criterion	5.716333
Log likelihood	-375.6476	Hannan-Quinn criter.	5.677820
F-statistic	141.6932	Durbin-Watson stat	2.151688
Prob(F-statistic)	0.000000		

ROP BOP EXCH GDP GEX INF INTR UNE

Date: 07/17/14 Time: 10:01
Sample (adjusted): 1981Q2 2013Q4
Included observations: 131 after adjustments
Trend assumption: Linear deterministic trend
Series: ROP BOP EXCH GDP GEX INF INTR UNE
Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.626963	302.0489	159.5297	0.0000
At most 1 *	0.330789	172.8727	125.6154	0.0000
At most 2 *	0.293142	120.2559	95.75366	0.0004
At most 3 *	0.206284	74.80867	69.81889	0.0189
At most 4	0.144983	44.54380	47.85613	0.0990
At most 5	0.113540	24.02468	29.79707	0.1994
At most 6	0.054242	8.236597	15.49471	0.4404
At most 7	0.007082	0.930983	3.841466	0.3346

Trace test indicates 4 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 *	0.626963	129.1762	52.36261	0.0000
At most 1 *	0.330789	52.61682	46.23142	0.0092
At most 2 *	0.293142	45.44719	40.07757	0.0113
At most 3	0.206284	30.26487	33.87687	0.1271
At most 4	0.144983	20.51911	27.58434	0.3063
At most 5	0.113540	15.78809	21.13162	0.2375
At most 6	0.054242	7.305614	14.26460	0.4536
At most 7	0.007082	0.930983	3.841466	0.3346

Max-eigenvalue test indicates 3 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 Cointegrating Coefficients (normalized by b'*S11*b=I):

ROP	BOP	EXCH	GDP	GEX	INF	INTR	UNE
0.014718	-0.091389	0.001871	3.57E-05	-1.92E-06	-0.002878	0.041724	1.66E-05
0.004741	0.697625	-0.010008	-8.75E-06	2.21E-06	0.029019	-0.489779	-5.52E-05
-0.022718	-0.254947	0.010599	1.63E-06	-5.65E-07	0.073449	0.017930	4.47E-05
0.008631	-0.253520	0.047465	1.40E-05	-2.11E-06	0.031731	0.175652	-0.000105
0.082736	0.377576	0.003282	-1.62E-06	-2.48E-07	0.012837	0.013428	-5.01E-06
0.022989	0.247710	-0.020406	1.12E-06	6.62E-07	0.034755	-0.365174	-2.26E-05
-5.76E-05	-0.289430	0.027009	2.08E-06	-7.68E-07	-0.006587	0.084389	-1.34E-05
0.014441	0.290384	0.017250	6.77E-06	-1.36E-06	0.005538	-0.307501	-3.82E-06

Unrestricted Adjustment Coefficients (alpha):

D(ROP)	-1.208214	1.065327	1.054696	-0.205011	-0.645207	-1.383265	0.698199	-0.187727
D(BOP)	-0.088777	-0.115665	-0.150632	-0.048725	-0.218312	0.100796	0.068683	0.000518
D(EXCH)	-0.401661	1.749924	-0.330832	-1.554943	-0.683828	0.148918	-0.293247	0.180314
D(GDP)	-25126.06	33347.95	-2869.216	-12052.57	49763.81	35278.93	31966.54	2946.135
D(GEX)	-427328.3	489888.2	-22931.59	-198950.3	783767.4	523041.8	512712.5	59836.64
D(INF)	-0.232626	0.172953	-3.005658	0.185760	0.913629	-1.006644	-0.176979	0.006004
D(INTR)	5.192229	0.962538	-0.900614	0.026797	-0.145818	0.898961	0.022717	-0.123776
D(UNE)	-669.7811	3227.548	-612.5028	3010.435	-650.1097	389.3270	101.0607	184.2431

1 Cointegrating Equation(s): Log likelihood -6758.070

Normalized cointegrating coefficients (standard error in parentheses)

ROP	BOP	EXCH	GDP	GEX	INF	INTR	UNE
1.000000	-6.209336	0.127118	0.002429	-0.000130	-0.195567	2.834873	0.001127
	(4.56813)	(0.33310)	(0.00021)	(2.1E-05)	(0.49490)	(3.72470)	(0.00067)

Adjustment coefficients (standard error in parentheses)

D(ROP)	-0.017783
	(0.00968)
D(BOP)	-0.001307
	(0.00119)
D(EXCH)	-0.005912
	(0.00833)
D(GDP)	-369.8059
	(342.659)
D(GEX)	-6289.427
	(5393.53)
D(INF)	-0.003424
	(0.01018)
D(INTR)	0.076419
	(0.00833)
D(UNE)	-9.857853
	(13.8748)

2 Cointegrating Equation(s): Log likelihood -6731.762

Normalized cointegrating coefficients (standard error in parentheses)

ROP	BOP	EXCH	GDP	GEX	INF	INTR	UNE
1.000000	0.000000	0.036504	0.002256	-0.000106	0.060180	-1.462769	0.000610
		(0.27436)	(0.00019)	(1.4E-05)	(0.48656)	(1.78580)	(0.00066)
0.000000	1.000000	-0.014593	-2.79E-05	3.88E-06	0.041188	-0.692126	-8.33E-05
		(0.01053)	(7.1E-06)	(5.4E-07)	(0.01868)	(0.06855)	(2.5E-05)

Adjustment coefficients (standard error in parentheses)

D(ROP)	-0.012732	0.853616
	(0.01003)	(0.45659)
D(BOP)	-0.001855	-0.072578
	(0.00124)	(0.05652)
D(EXCH)	0.002385	1.257498
	(0.00831)	(0.37790)
D(GDP)	-211.7010	25560.59
	(356.171)	(16206.4)
D(GEX)	-3966.833	380811.2
	(5614.02)	(255448.)
D(INF)	-0.002604	0.141916
	(0.01069)	(0.48632)
D(INTR)	0.080983	0.196977
	(0.00862)	(0.39208)
D(UNE)	5.444173	2312.827
	(13.6678)	(621.908)

3 Cointegrating Equation(s): Log likelihood -6709.038

Normalized cointegrating coefficients (standard error in parentheses)

ROP	BOP	EXCH	GDP	GEX	INF	INTR	UNE
1.000000	0.000000	0.000000	0.002039	-9.66E-05	-0.343868	-0.554639	0.000433
			(0.00016)	(9.9E-06)	(0.41689)	(1.58993)	(0.00044)
0.000000	1.000000	0.000000	5.88E-05	1.30E-07	0.202714	-1.055170	-1.26E-05
			(1.7E-05)	(1.0E-06)	(0.04295)	(0.16379)	(4.6E-05)
0.000000	0.000000	1.000000	0.005938	-0.000257	11.06861	-24.87754	0.004841
			(0.00093)	(5.6E-05)	(2.35426)	(8.97873)	(0.00251)

Adjustment coefficients (standard error in parentheses)

D(ROP)	-0.036692	0.584725	-0.001743
	(0.01759)	(0.47899)	(0.00941)
D(BOP)	0.001567	-0.034175	-0.000605
	(0.00217)	(0.05901)	(0.00116)
D(EXCH)	0.009901	1.341842	-0.021770
	(0.01473)	(0.40116)	(0.00788)
D(GDP)	-146.5192	26292.09	-411.1513
	(632.941)	(17236.2)	(338.499)
D(GEX)	-3445.882	386657.5	-5945.132
	(9977.10)	(271695.)	(5335.78)
D(INF)	0.065678	0.908198	-0.034024
	(0.01704)	(0.46411)	(0.00911)
D(INTR)	0.101443	0.426585	-0.009464
	(0.01511)	(0.41137)	(0.00808)
D(UNE)	19.35878	2468.983	-40.04496
	(24.2304)	(659.839)	(12.9585)

4 Cointegrating Equation(s): Log likelihood -6693.906

Normalized cointegrating coefficients (standard error in parentheses)

ROP	BOP	EXCH	GDP	GEX	INF	INTR	UNE
1.000000	0.000000	0.000000	0.000000	-1.40E-05	-3.655293	7.690329	-0.002143
				(9.2E-06)	(0.69519)	(2.50432)	(0.00074)
0.000000	1.000000	0.000000	0.000000	2.51E-06	0.107249	-0.817475	-8.69E-05
				(3.3E-07)	(0.02503)	(0.09016)	(2.7E-05)
0.000000	0.000000	1.000000	0.000000	-1.65E-05	1.425444	-0.867456	-0.002663
				(5.5E-06)	(0.41289)	(1.48739)	(0.00044)
0.000000	0.000000	0.000000	1.000000	-0.040548	1623.936	-4043.365	1.263696
				(0.00514)	(387.638)	(1396.41)	(0.41402)

Adjustment coefficients (standard error in parentheses)

D(ROP)	-0.038461	0.636699	-0.011474	-5.37E-05
	(0.01843)	(0.50546)	(0.03179)	(2.5E-05)
D(BOP)	0.001146	-0.021822	-0.002918	-3.09E-06
	(0.00227)	(0.06218)	(0.00391)	(3.1E-06)
D(EXCH)	-0.003520	1.736051	-0.095576	-5.20E-05
	(0.01476)	(0.40476)	(0.02545)	(2.0E-05)
D(GDP)	-250.5435	29347.66	-983.2312	-1.363924
	(662.487)	(18172.7)	(1142.82)	(0.90681)
D(GEX)	-5162.998	437095.4	-15388.39	-22.39397
	(10441.4)	(286418.)	(18011.9)	(14.2922)
D(INF)	0.067281	0.861104	-0.025207	-1.21E-05
	(0.01786)	(0.48980)	(0.03080)	(2.4E-05)
D(INTR)	0.101674	0.419792	-0.008192	0.000176
	(0.01583)	(0.43433)	(0.02731)	(2.2E-05)
D(UNE)	45.34148	1705.778	102.8465	-0.010890
	(23.8224)	(653.472)	(41.0948)	(0.03261)

5 Cointegrating Equation(s): Log likelihood -6683.646

Normalized cointegrating coefficients (standard error in parentheses)

ROP	BOP	EXCH	GDP	GEX	INF	INTR	UNE
1.000000	0.000000	0.000000	0.000000	0.000000	-75.09512	90.95955	-0.058709
					(15.5438)	(56.2067)	(0.01392)
0.000000	1.000000	0.000000	0.000000	0.000000	12.97036	-15.81053	0.010098
					(2.69502)	(9.74524)	(0.00241)
0.000000	0.000000	1.000000	0.000000	0.000000	-83.19090	97.76012	-0.069662
					(17.6716)	(63.9008)	(0.01582)
0.000000	0.000000	0.000000	1.000000	0.000000	-205902.7	237846.7	-163.0557
					(43023.4)	(155573.)	(38.5225)
0.000000	0.000000	0.000000	0.000000	1.000000	-5118085.	5965565.	-4052.494
					(1068262)	(3862852)	(956.506)

Adjustment coefficients (standard error in parentheses)

D(ROP)	-0.091843	0.393084	-0.013591	-5.26E-05	4.66E-06
	(0.05575)	(0.55726)	(0.03169)	(2.5E-05)	(2.3E-06)
D(BOP)	-0.016916	-0.104251	-0.003634	-2.74E-06	1.57E-07
	(0.00662)	(0.06613)	(0.00376)	(3.0E-06)	(2.8E-07)
D(EXCH)	-0.060097	1.477854	-0.097820	-5.09E-05	8.27E-06
	(0.04446)	(0.44447)	(0.02527)	(2.0E-05)	(1.9E-06)

D(GDP)	3866.701	48137.28	-819.9271	-1.444451	0.136482
	(1965.70)	(19649.0)	(1117.33)	(0.88540)	(0.08208)
D(GEX)	59682.56	733027.1	-12816.39	-23.66224	2.138803
	(30982.3)	(309697.)	(17610.8)	(13.9552)	(1.29373)
D(INF)	0.142871	1.206069	-0.022208	-1.36E-05	1.91E-06
	(0.05370)	(0.53673)	(0.03052)	(2.4E-05)	(2.2E-06)
D(INTR)	0.089610	0.364735	-0.008671	0.000176	-7.33E-06
	(0.04814)	(0.48120)	(0.02736)	(2.2E-05)	(2.0E-06)
D(UNE)	-8.445815	1460.312	100.7131	-0.009838	0.002557
	(72.2234)	(721.941)	(41.0529)	(0.03253)	(0.00302)

6 Cointegrating Equation(s): Log likelihood -6675.752

Normalized cointegrating coefficients (standard error in parentheses)

ROP	BOP	EXCH	GDP	GEX	INF	INTR	UNE
1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-30.52214	-0.015498
						(14.1198)	(0.00408)
0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	5.171676	0.002635
						(2.47121)	(0.00071)
0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	-36.81814	-0.021793
						(16.7633)	(0.00484)
0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	-95243.01	-44.57592
						(39664.2)	(11.4550)
0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	-2313982.	-1107.465
						(983381.)	(284.000)
0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	-1.617704	0.000575
						(0.58021)	(0.00017)

Adjustment coefficients (standard error in parentheses)

D(ROP)	-0.123643	0.050436	0.014635	-5.42E-05	3.75E-06	0.048995
	(0.05621)	(0.56484)	(0.03340)	(2.5E-05)	(2.3E-06)	(0.05764)
D(BOP)	-0.014599	-0.079283	-0.005691	-2.63E-06	2.24E-07	-0.015010
	(0.00678)	(0.06809)	(0.00403)	(3.0E-06)	(2.8E-07)	(0.00695)
D(EXCH)	-0.056674	1.514742	-0.100859	-5.08E-05	8.37E-06	-0.025306
	(0.04595)	(0.46170)	(0.02730)	(2.0E-05)	(1.9E-06)	(0.04711)
D(GDP)	4677.723	56876.22	-1539.816	-1.404892	0.159852	2311.804
	(2006.18)	(20158.1)	(1192.02)	(0.87440)	(0.08235)	(2057.06)
D(GEX)	71706.68	862589.8	-23489.39	-23.07574	2.485283	35688.46
	(31668.0)	(318199.)	(18816.2)	(13.8026)	(1.29987)	(32471.1)
D(INF)	0.119729	0.956713	-0.001667	-1.47E-05	1.24E-06	-0.232437
	(0.05474)	(0.54998)	(0.03252)	(2.4E-05)	(2.2E-06)	(0.05612)
D(INTR)	0.110276	0.587417	-0.027015	0.000177	-6.74E-06	-0.022941
	(0.04908)	(0.49314)	(0.02916)	(2.1E-05)	(2.0E-06)	(0.05032)
D(UNE)	0.504363	1556.752	92.76868	-0.009401	0.002814	151.3094
	(74.5827)	(749.405)	(44.3149)	(0.03251)	(0.00306)	(76.4740)

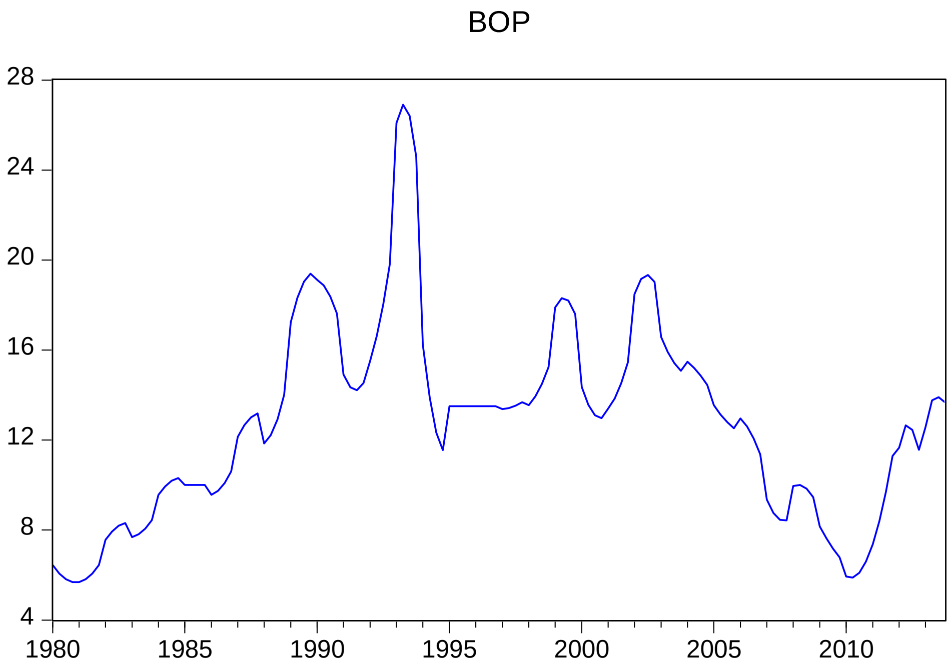
7 Cointegrating Equation(s): Log likelihood -6672.099

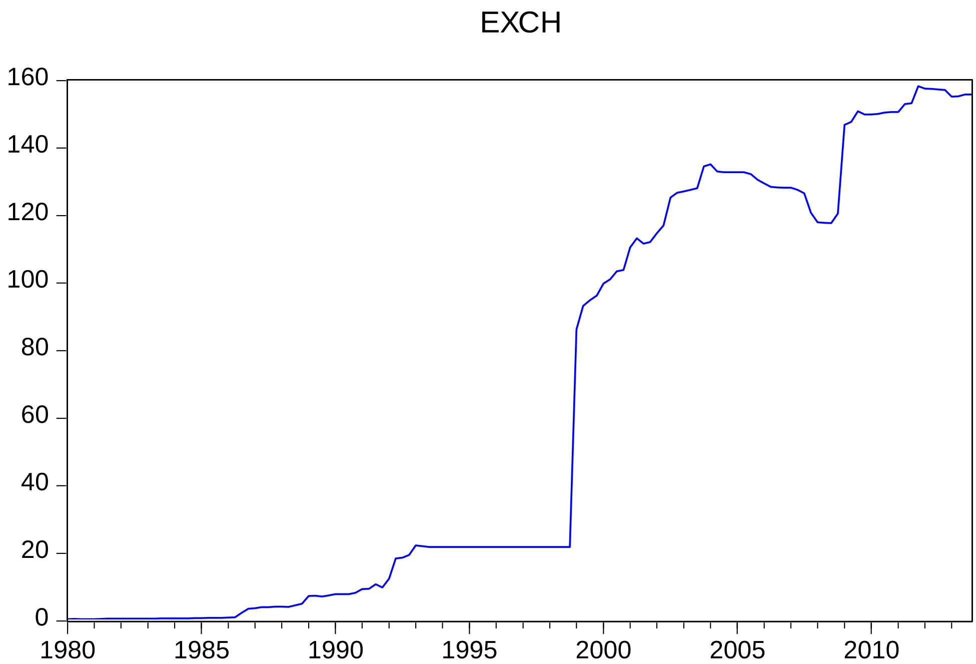
Normalized cointegrating coefficients (standard error in parentheses)

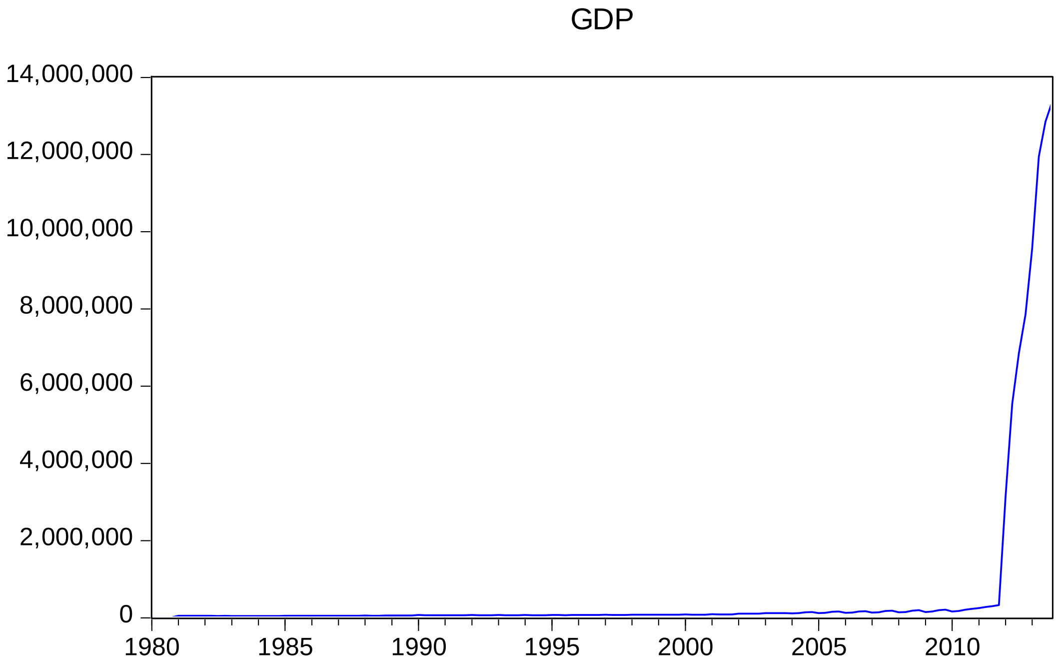
ROP	BOP	EXCH	GDP	GEX	INF	INTR	UNE
1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.002580
							(0.00113)
0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-0.000429
							(0.00018)
0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	1.49E-05
							(0.00132)
0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	11.83721
							(3.98759)
0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	263.1234
							(93.3980)
0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.001534
							(0.00031)
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000592
							(0.00015)

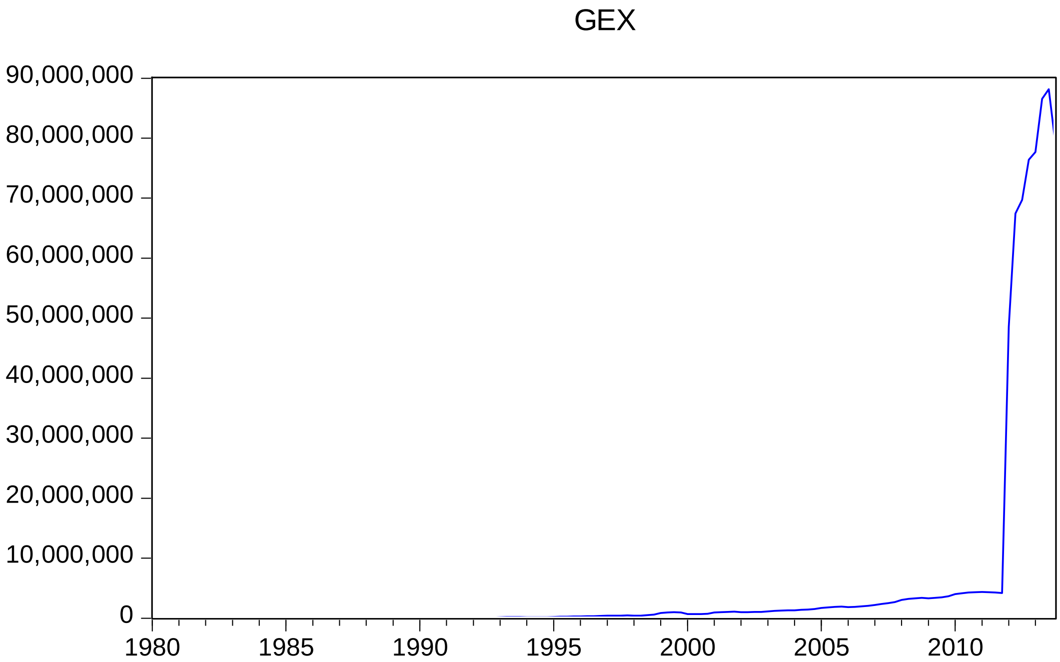
Adjustment coefficients (standard error in parentheses)

D(ROP)	-0.123683	-0.151644	0.033493	-5.27E-05	3.21E-06	0.044396	-0.033898
	(0.05585)	(0.58884)	(0.03713)	(2.4E-05)	(2.3E-06)	(0.05741)	(0.39648)
D(BOP)	-0.014602	-0.099162	-0.003836	-2.48E-06	1.71E-07	-0.015463	0.007743
	(0.00675)	(0.07114)	(0.00449)	(2.9E-06)	(2.8E-07)	(0.00694)	(0.04790)
D(EXCH)	-0.056657	1.599617	-0.108780	-5.14E-05	8.60E-06	-0.023374	-1.241207
	(0.04587)	(0.48365)	(0.03049)	(2.0E-05)	(1.9E-06)	(0.04715)	(0.32565)
D(GDP)	4675.883	47624.13	-676.4158	-1.338513	0.135290	2101.229	-29067.06
	(1984.53)	(20924.6)	(1319.33)	(0.86616)	(0.08318)	(2039.97)	(14088.8)
D(GEX)	71677.17	714195.2	-9641.281	-22.01110	2.091320	32311.05	-430333.2
	(31315.1)	(330182.)	(20818.5)	(13.6676)	(1.31254)	(32189.8)	(222316.)
D(INF)	0.119739	1.007936	-0.006447	-1.51E-05	1.38E-06	-0.231271	0.249257
	(0.05471)	(0.57687)	(0.03637)	(2.4E-05)	(2.3E-06)	(0.05624)	(0.38842)
D(INTR)	0.110274	0.580842	-0.026401	0.000177	-6.76E-06	-0.023091	-0.594551
	(0.04908)	(0.51747)	(0.03263)	(2.1E-05)	(2.1E-06)	(0.05045)	(0.34842)
D(UNE)	0.498546	1527.502	95.49828	-0.009192	0.002737	150.6437	-1233.296
	(74.5770)	(786.330)	(49.5793)	(0.03255)	(0.00313)	(76.6602)	(529.446)


BOP
28
24
20
16
12
8
4
1980
1985
1990
1995
2000
2005
2010


EXCH
160
140
120
100
80
60
40
20
0
1980
1985
1990
1995
2000
2005
2010


GDP
14,000,000
12,000,000
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
0
1980
1985
1990
1995
2000
2005
2010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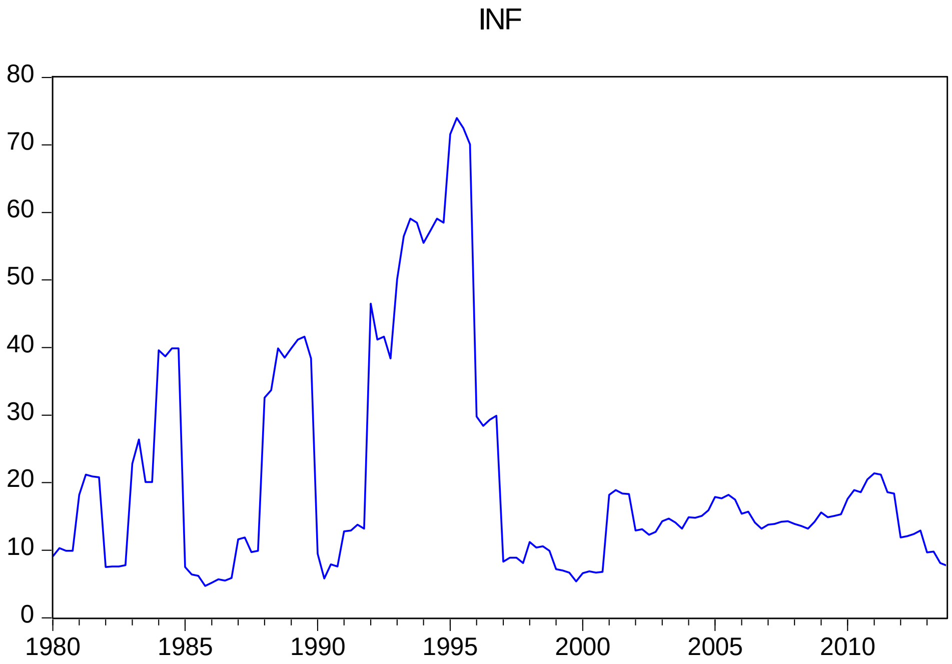
90,000,000
80,000,000
70,000,000
60,000,000
50,000,000
40,000,000
30,000,000
20,000,000
10,000,000
0
1980
1985
1990
1995
2000
2005
2010


INF
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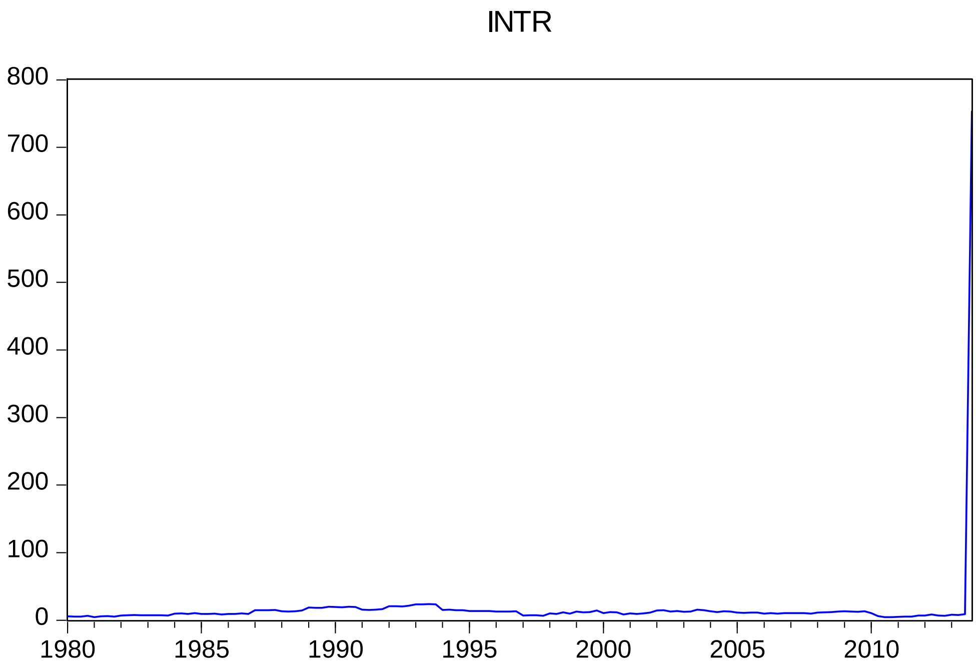
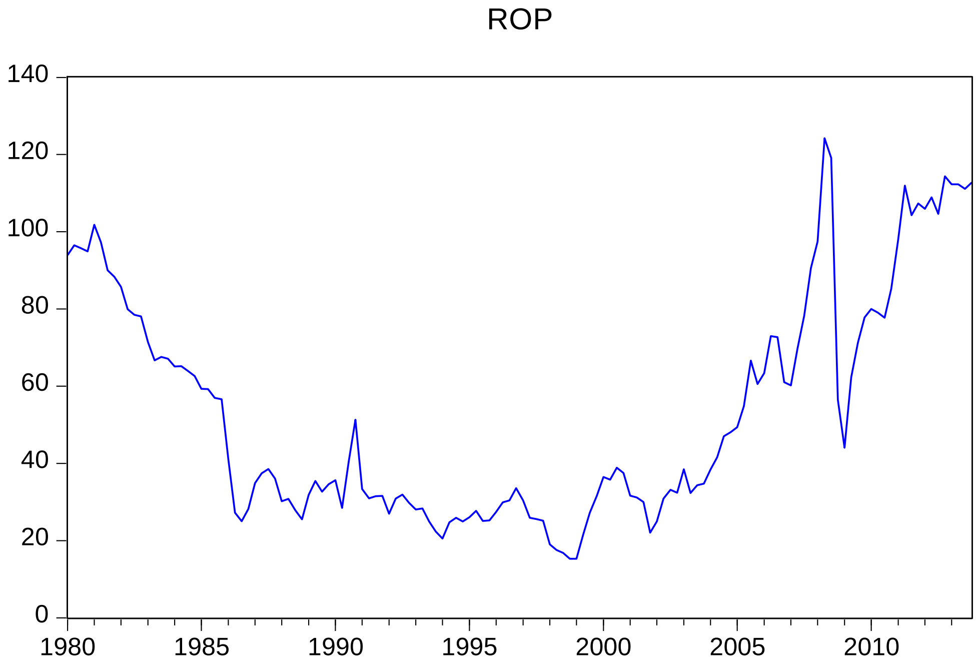
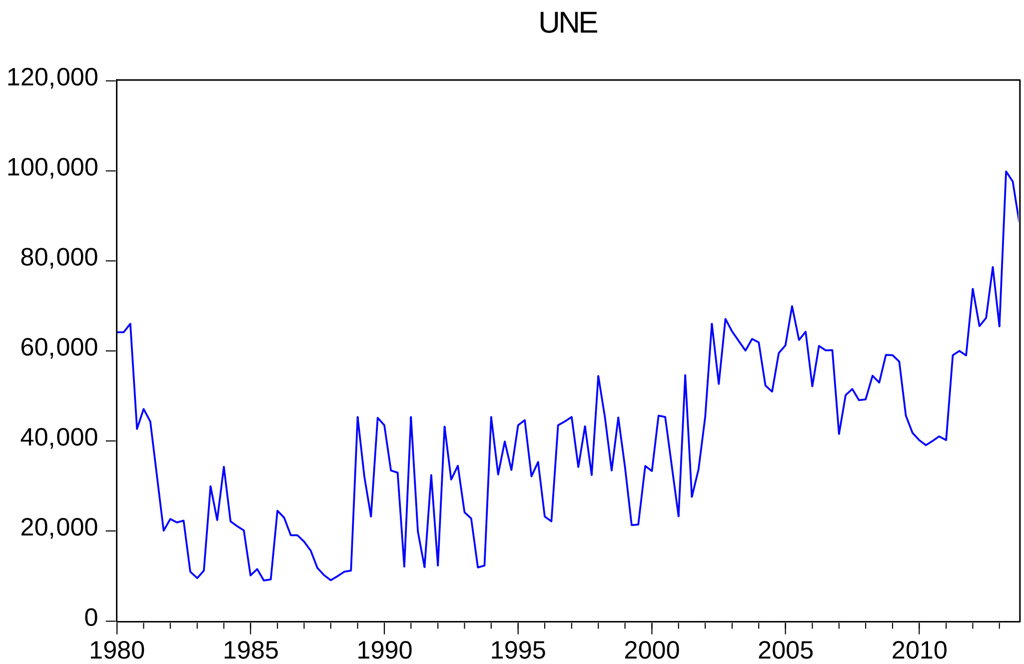
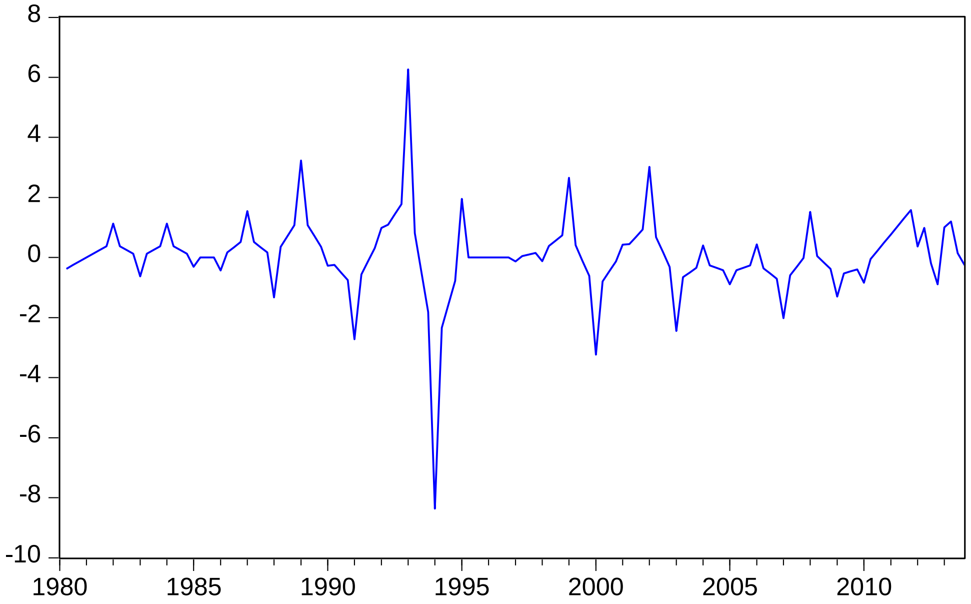
70
60
50
40
30
20
10
0
1980
1985
1990
1995
2000
2005
2010


INTR
800
700
600
500
400
300
200
100
0
1980
1985
1990
1995
2000
2005
2010

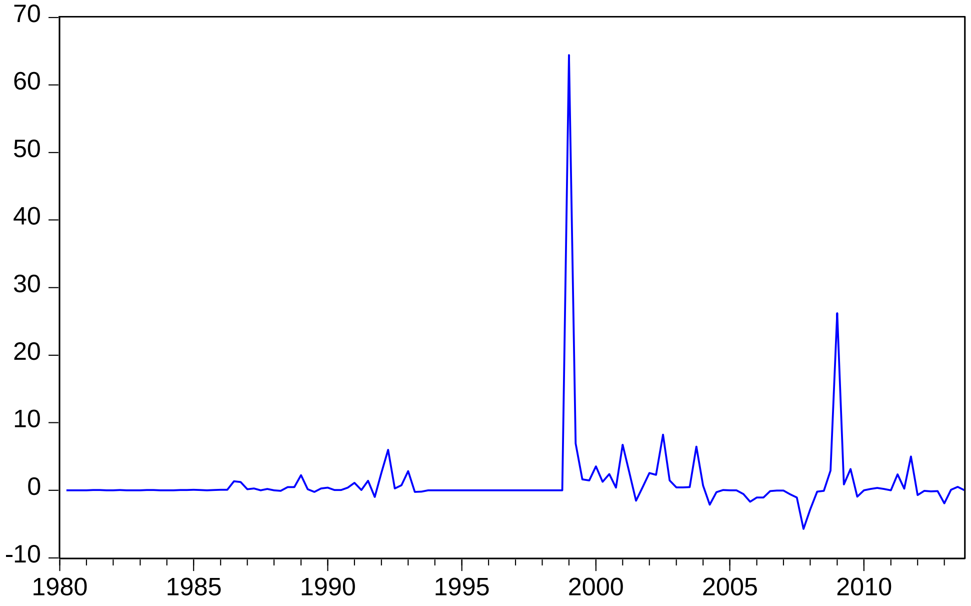

ROP
140
120
100
80
60
40
20
0
1980
1985
1990
1995
2000
2005
2010


UNE
120,000
100,000
80,000
60,000
40,000
20,000
0
1980
1985
1990
1995
2000
2005
2010

D(BOP)


8
6
4
2
0
-2
-4
-6
-8
-10
1980
1985
1990
1995
2000
2005
2010

D(EXCH)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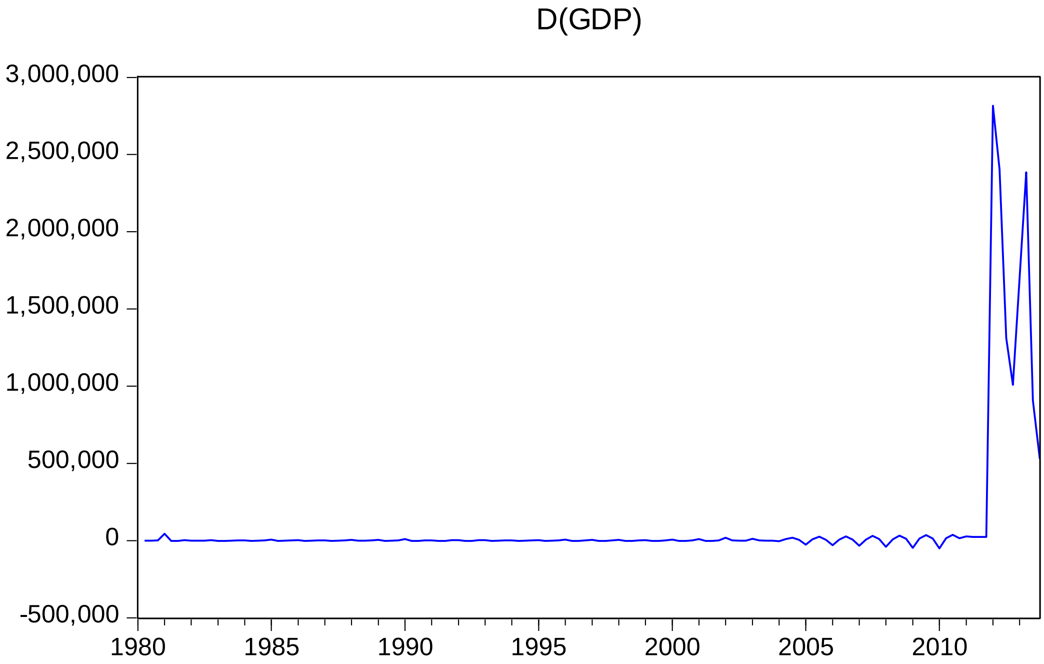
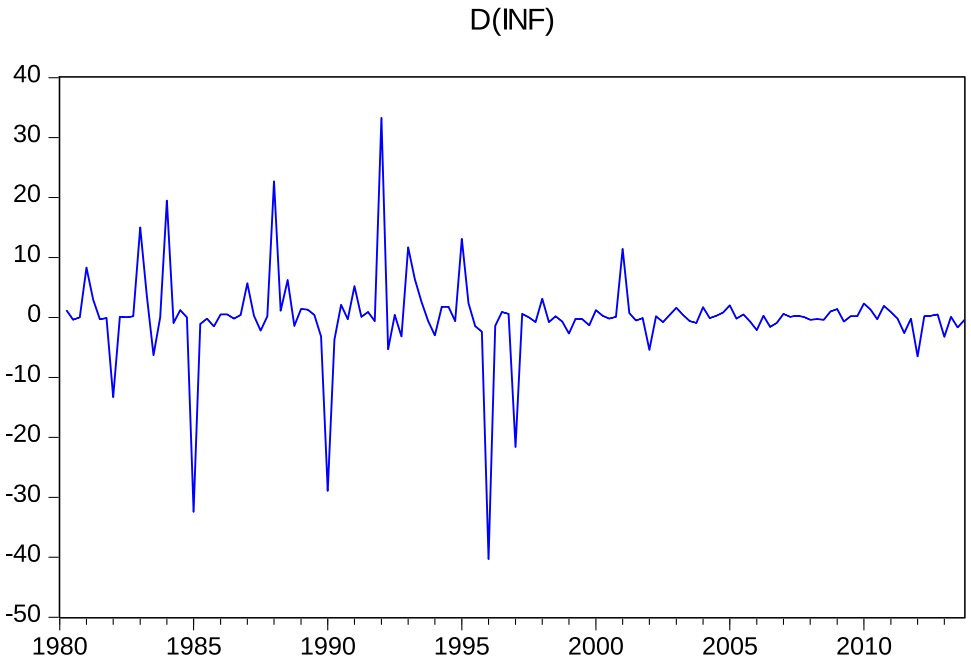
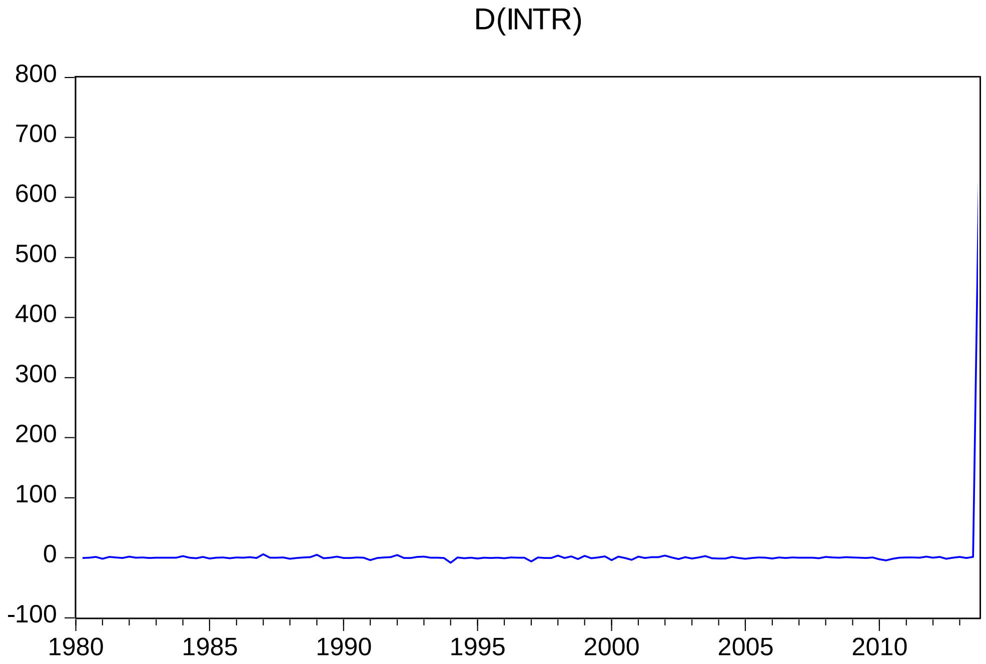
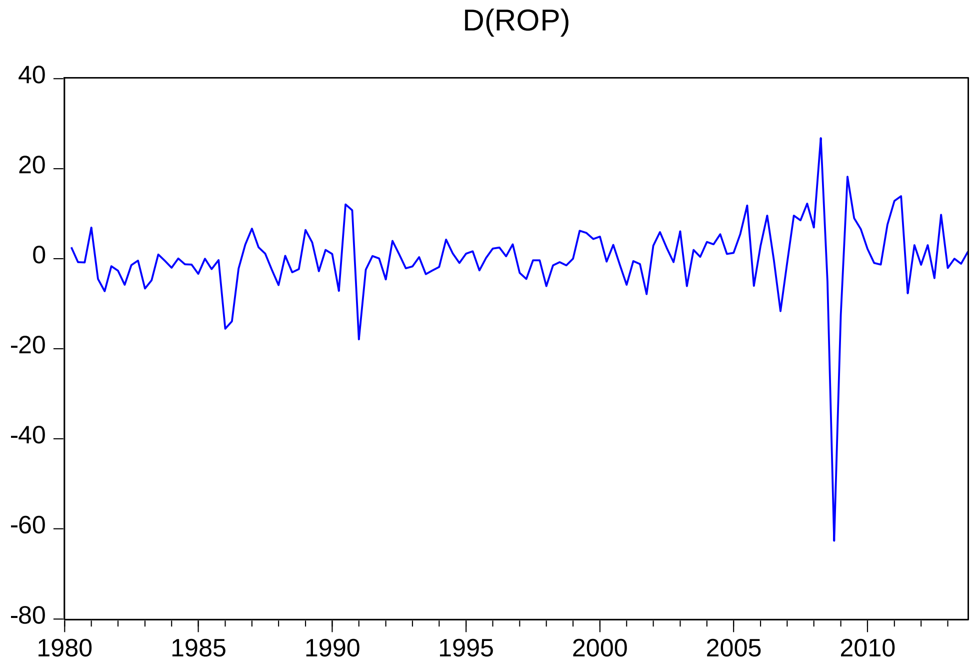
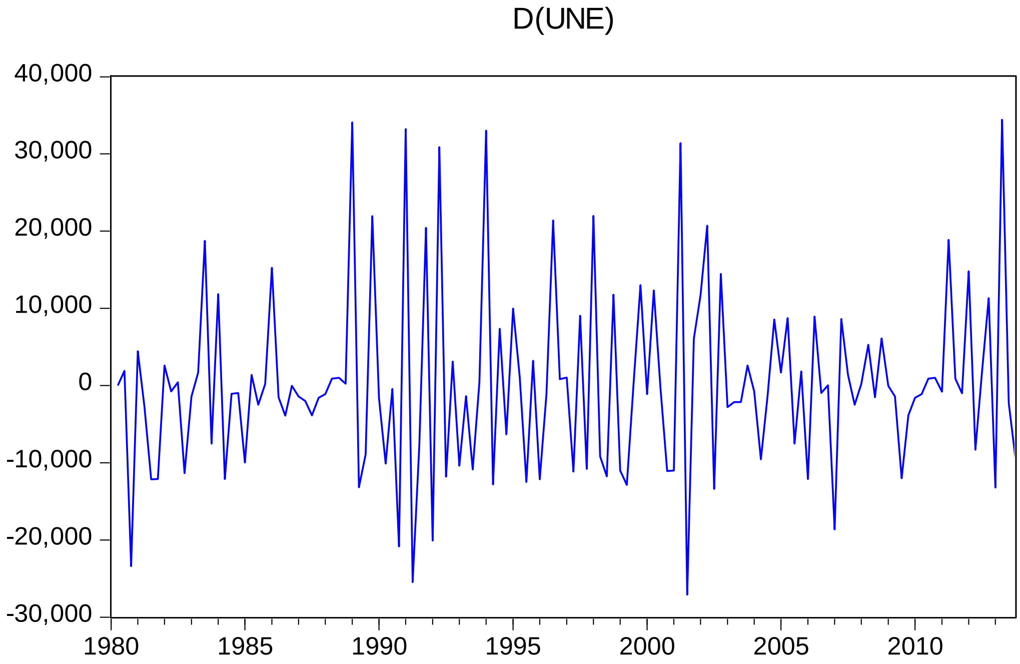
30
20
10
0
-10
1980
1985
1990
1995
2000
2005
2010


D(GDP)
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
-500,000
1980
1985
1990
1995
2000
2005
2010


D(INF)
40
30
20
10
0
-10
-20
-30
-40
-50
1980
1985
1990
1995
2000
2005
2010


D(INTR)
800
700
600
500
400
300
200
100
0
-100
1980
1985
1990
1995
2000
2005
2010


D(ROP)
40
20
0
-20
-40
-60
-80
1980
1985
1990
1995
2000
2005
2010



Date: 07/17/14 Time: 21:09
Sample (adjusted): 1981Q2 2013Q4
Included observations: 131 after adjustments
Trend assumption: Linear deterministic trend
Series: POROP EXCH GDP GEX INF INTR BOP UNE
Lags interval (in first differences): 1 to 4
Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.612669	330.6121	159.5297	0.0000
At most 1 *	0.411277	206.3617	125.6154	0.0000
At most 2 *	0.305684	136.9581	95.75366	0.0000
At most 3 *	0.259638	89.16554	69.81889	0.0007
At most 4 *	0.211840	49.78485	47.85613	0.0326
At most 5	0.092331	18.59972	29.79707	0.5220
At most 6	0.034728	5.909097	15.49471	0.7063
At most 7	0.009715	1.278858	3.841466	0.2581

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 *	0.612669	124.2504	52.36261	0.0000
At most 1 *	0.411277	69.40362	46.23142	0.0000
At most 2 *	0.305684	47.79255	40.07757	0.0056
At most 3 *	0.259638	39.38069	33.87687	0.0100
At most 4 *	0.211840	31.18512	27.58434	0.0165
At most 5	0.092331	12.69063	21.13162	0.4811
At most 6	0.034728	4.630239	14.26460	0.7876
At most 7	0.009715	1.278858	3.841466	0.2581

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 Cointegrating Coefficients (normalized by b'*S11*b=I):

POROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
0.102955	0.005660	3.82E-05	-2.26E-06	0.007383	0.031802	-0.173623	1.35E-05
0.673791	0.017117	-5.93E-08	-1.10E-06	0.069055	-0.303987	0.215908	-3.90E-05
0.097695	0.015007	7.81E-06	-2.37E-06	-0.019609	0.484226	-0.652340	6.37E-05
0.370563	0.000546	3.34E-06	-5.14E-07	-0.051577	-0.057463	0.122570	-5.74E-05
0.124253	-0.050796	-1.27E-05	2.09E-06	-0.019513	-0.313655	0.398492	8.72E-05
0.063578	0.001063	4.73E-06	-3.15E-07	0.031546	-0.215075	-0.106551	-3.02E-05
0.075181	-0.025274	-3.13E-07	5.35E-07	0.023949	-0.090185	0.169648	-1.38E-06
-0.032369	-0.012801	-7.30E-06	1.33E-06	-0.006965	0.313093	-0.239461	1.55E-06

Unrestricted Adjustment Coefficients (alpha):

D(POROP)	-0.574970	-1.718906	-0.585677	-1.003314	-0.537652	-0.123236	-0.112994	0.017906
D(EXCH)	-0.540328	-0.334252	-1.705108	0.164342	1.728138	-0.139578	0.129952	-0.262075
D(GDP)	-27520.19	54374.83	-26299.49	-1790.205	24233.46	26211.04	-27293.46	9755.535
D(GEX)	-458077.5	875962.6	-370777.8	-36448.97	380858.5	391587.4	-448708.5	143189.6
D(INF)	-0.870087	-1.171992	-0.260435	2.393446	-0.178372	-1.142201	-0.207040	0.194573
D(INTR)	4.795573	-0.446797	-1.201346	0.871701	0.503260	0.601057	0.066579	0.138263
D(BOP)	-0.103109	-0.242013	0.051553	0.122151	0.026417	0.177984	0.000895	-0.030327
D(UNE)	-275.5884	1691.517	-3509.939	1004.385	-2499.344	322.4725	-180.3758	-210.5868

1 Cointegrating Equation(s): Log likelihood -6677.321

Normalized cointegrating coefficients (standard error in parentheses)

POROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.054974	0.000371	-2.20E-05	0.071715	0.308894	-1.686396	0.000132
	(0.04883)	(3.3E-05)	(3.2E-06)	(0.07292)	(0.54766)	(0.66856)	(9.9E-05)

Adjustment coefficients (standard error in parentheses)

D(POROP)	-0.059196
	(0.03956)
D(EXCH)	-0.055629
	(0.05907)
D(GDP)	-2833.338
	(2370.03)
D(GEX)	-47161.31
	(37263.2)

D(INF)	-0.089580
	(0.07052)
D(INTR)	0.493728
	(0.05714)
D(BOP)	-0.010616
	(0.00847)
D(UNE)	-28.37317
	(97.6761)

2 Cointegrating Equation(s): Log likelihood -6642.619

Normalized cointegrating coefficients (standard error in parentheses)

POROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	-0.000319	1.59E-05	0.128922	-1.104115	2.044493	-0.000221
		(2.9E-05)	(2.0E-06)	(0.06859)	(0.47550)	(0.52739)	(8.3E-05)
0.000000	1.000000	0.012561	-0.000689	-1.040617	25.70340	-67.86692	0.006405
		(0.00104)	(7.2E-05)	(2.48035)	(17.1955)	(19.0719)	(0.00302)

Adjustment coefficients (standard error in parentheses)

D(POROP)	-1.217380	-0.032676
	(0.23334)	(0.00617)
D(EXCH)	-0.280845	-0.008779
	(0.39042)	(0.01033)
D(GDP)	33803.95	774.9557
	(15232.8)	(402.897)
D(GEX)	543054.7	12400.91
	(239136.)	(6324.96)
D(INF)	-0.879258	-0.024985
	(0.45981)	(0.01216)
D(INTR)	0.192680	0.019494
	(0.37701)	(0.00997)
D(BOP)	-0.173682	-0.004726
	(0.05351)	(0.00142)
D(UNE)	1111.356	27.39331
	(635.979)	(16.8212)

3 Cointegrating Equation(s): Log likelihood -6618.723

Normalized cointegrating coefficients (standard error in parentheses)

POROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	0.000000	2.18E-06	0.164336	-1.544700	1.689304	-0.000197
			(5.7E-07)	(0.03551)	(0.24511)	(0.25941)	(4.2E-05)
0.000000	1.000000	0.000000	-0.000150	-2.434317	43.04214	-53.88888	0.005489
			(1.9E-05)	(1.18272)	(8.16314)	(8.63913)	(0.00141)
0.000000	0.000000	1.000000	-0.042866	110.9514	-1380.325	-1112.782	0.072924
			(0.00363)	(225.672)	(1557.60)	(1648.42)	(0.26938)

Adjustment coefficients (standard error in parentheses)

D(POROP)	-1.274598	-0.041465	-2.65E-05
	(0.23214)	(0.00791)	(1.3E-05)
D(EXCH)	-0.447427	-0.034367	-3.40E-05
	(0.37596)	(0.01281)	(2.1E-05)
D(GDP)	31234.61	380.2905	-1.260765
	(15278.3)	(520.457)	(0.86583)
D(GEX)	506831.4	6836.809	-20.46083
	(240185.)	(8181.95)	(13.6114)

D(INF)	-0.904701	-0.028893	-3.52E-05
	(0.46415)	(0.01581)	(2.6E-05)
D(INTR)	0.075314	0.001466	0.000174
	(0.37149)	(0.01265)	(2.1E-05)
D(BOP)	-0.168645	-0.003952	-3.53E-06
	(0.05394)	(0.00184)	(3.1E-06)
D(UNE)	768.4511	-25.27883	-0.038046
	(593.768)	(20.2268)	(0.03365)

4 Cointegrating Equation(s): Log likelihood -6599.033

Normalized cointegrating coefficients (standard error in parentheses)

POROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	0.000000	0.000000	-0.057337	-0.558591	0.754418	-0.000172
				(0.03156)	(0.19525)	(0.18780)	(2.7E-05)
0.000000	1.000000	0.000000	0.000000	12.82814	-24.85254	10.47907	0.003777
				(2.24182)	(13.8686)	(13.3393)	(0.00189)
0.000000	0.000000	1.000000	0.000000	4469.392	-20768.74	17268.52	-0.416170
				(844.946)	(5227.09)	(5027.61)	(0.71364)
0.000000	0.000000	0.000000	1.000000	101675.0	-452298.6	428804.3	-11.40971
				(17839.2)	(110359.)	(106147.)	(15.0669)

Adjustment coefficients (standard error in parentheses)

D(POROP)	-1.646389	-0.042012	-2.98E-05	5.10E-06
	(0.25129)	(0.00754)	(1.3E-05)	(1.1E-06)
D(EXCH)	-0.386528	-0.034278	-3.34E-05	5.55E-06
	(0.42675)	(0.01280)	(2.1E-05)	(1.9E-06)
D(GDP)	30571.22	379.3140	-1.266746	0.065977
	(17349.6)	(520.581)	(0.86896)	(0.07760)
D(GEX)	493324.7	6816.926	-20.58261	0.974544
	(272741.)	(8183.70)	(13.6604)	(1.21993)
D(INF)	-0.017779	-0.027588	-2.72E-05	2.64E-06
	(0.49165)	(0.01475)	(2.5E-05)	(2.2E-06)
D(INTR)	0.398334	0.001942	0.000177	-7.96E-06
	(0.41615)	(0.01249)	(2.1E-05)	(1.9E-06)
D(BOP)	-0.123380	-0.003886	-3.12E-06	3.14E-07
	(0.06048)	(0.00181)	(3.0E-06)	(2.7E-07)
D(UNE)	1140.639	-24.73093	-0.034690	0.006585
	(669.557)	(20.0903)	(0.03354)	(0.00299)

5 Cointegrating Equation(s): Log likelihood -6583.440

Normalized cointegrating coefficients (standard error in parentheses)

POROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	0.000000	0.000000	0.000000	-0.656439	0.773391	-0.000135
					(0.13081)	(0.13668)	(1.9E-05)
0.000000	1.000000	0.000000	0.000000	0.000000	-2.960763	6.234102	-0.004688
					(3.37348)	(3.52469)	(0.00050)
0.000000	0.000000	1.000000	0.000000	0.000000	-13141.53	15789.55	-3.365436
					(3411.98)	(3564.92)	(0.50614)
0.000000	0.000000	0.000000	1.000000	0.000000	-278785.9	395159.0	-78.50305
					(62892.0)	(65710.9)	(9.32951)
0.000000	0.000000	0.000000	0.000000	1.000000	-1.706543	0.330910	0.000660
					(1.10382)	(1.15329)	(0.00016)

Adjustment coefficients (standard error in parentheses)

D(POROP)	-1.713194	-0.014702	-2.30E-05	3.97E-06	-0.049220
	(0.25075)	(0.01772)	(1.3E-05)	(1.3E-06)	(0.02876)
D(EXCH)	-0.171801	-0.122061	-5.54E-05	9.17E-06	-0.035833
	(0.40916)	(0.02891)	(2.1E-05)	(2.1E-06)	(0.04693)
D(GDP)	33582.31	-851.6605	-1.575675	0.116682	3686.811
	(17458.9)	(1233.80)	(0.90820)	(0.08987)	(2002.66)
D(GEX)	540647.6	-12529.34	-25.43779	1.771430	58825.85
	(274460.)	(19395.9)	(14.2773)	(1.41279)	(31482.6)
D(INF)	-0.039942	-0.018527	-2.50E-05	2.27E-06	-0.202214
	(0.49761)	(0.03517)	(2.6E-05)	(2.6E-06)	(0.05708)
D(INTR)	0.460865	-0.023622	0.000170	-6.91E-06	-0.026667
	(0.41943)	(0.02964)	(2.2E-05)	(2.2E-06)	(0.04811)
D(BOP)	-0.120098	-0.005228	-3.45E-06	3.69E-07	-0.025300
	(0.06120)	(0.00432)	(3.2E-06)	(3.2E-07)	(0.00702)
D(UNE)	830.0874	102.2269	-0.002829	0.001355	180.5678
	(647.499)	(45.7582)	(0.03368)	(0.00333)	(74.2727)

6 Cointegrating Equation(s): Log likelihood -6577.095

Normalized cointegrating coefficients (standard error in parentheses)

POROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.342087	7.95E-05
						(0.41692)	(0.00011)
0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	8.799112	-0.003723
						(2.53056)	(0.00065)
0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	27174.51	0.919923
						(8471.28)	(2.18768)
0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	636680.7	12.40700
						(178201.)	(46.0198)
0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	1.809347	0.001216
						(1.34599)	(0.00035)
0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.866334	0.000326
						(0.63629)	(0.00016)

Adjustment coefficients (standard error in parentheses)

D(POROP)	-1.721029	-0.014833	-2.35E-05	4.01E-06	-0.053107	0.473436
	(0.25136)	(0.01771)	(1.3E-05)	(1.3E-06)	(0.03042)	(0.21829)
D(EXCH)	-0.180675	-0.122209	-5.61E-05	9.21E-06	-0.040236	-1.262696
	(0.41032)	(0.02891)	(2.1E-05)	(2.1E-06)	(0.04967)	(0.35634)
D(GDP)	35248.76	-823.8091	-1.451785	0.108431	4513.653	-43274.75
	(17387.0)	(1225.01)	(0.90748)	(0.08948)	(2104.52)	(15099.4)
D(GEX)	565544.1	-12113.25	-23.58690	1.648162	71178.71	-661973.6
	(273527.)	(19271.3)	(14.2761)	(1.40765)	(33107.6)	(237539.)
D(INF)	-0.112561	-0.019741	-3.04E-05	2.63E-06	-0.238245	0.366562
	(0.49064)	(0.03457)	(2.6E-05)	(2.5E-06)	(0.05939)	(0.42608)
D(INTR)	0.499080	-0.022983	0.000173	-7.10E-06	-0.007707	-0.630606
	(0.41798)	(0.02945)	(2.2E-05)	(2.2E-06)	(0.05059)	(0.36298)
D(BOP)	-0.108782	-0.005039	-2.61E-06	3.13E-07	-0.019685	0.041668
	(0.05970)	(0.00421)	(3.1E-06)	(3.1E-07)	(0.00723)	(0.05184)
D(UNE)	850.5897	102.5696	-0.001304	0.001254	190.7404	-1565.704
	(649.062)	(45.7297)	(0.03388)	(0.00334)	(78.5624)	(563.665)

7 Cointegrating Equation(s): Log likelihood -6574.780

Normalized cointegrating coefficients (standard error in parentheses)

POROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE

1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-0.022790
							(0.00890)
0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-0.153664
							(0.05851)
0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	-462.1477
							(180.179)
0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	-10836.96
							(4222.84)
0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	-0.029616
							(0.01192)
0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	-0.014437
							(0.00571)
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.017041
							(0.00665)

Adjustment coefficients (standard error in parentheses)

D(POROP)	-1.729524	-0.011977	-2.35E-05	3.95E-06	-0.055814	0.483626	-0.232501
	(0.25232)	(0.01942)	(1.3E-05)	(1.3E-06)	(0.03133)	(0.22000)	(0.26764)
D(EXCH)	-0.170905	-0.125494	-5.61E-05	9.28E-06	-0.037124	-1.274416	1.879666
	(0.41202)	(0.03171)	(2.1E-05)	(2.1E-06)	(0.05117)	(0.35925)	(0.43704)
D(GDP)	33196.82	-133.9944	-1.443229	0.093823	3859.994	-40813.29	35688.59
	(17324.2)	(1333.32)	(0.90020)	(0.08952)	(2151.38)	(15105.4)	(18376.4)
D(GEX)	531809.8	-772.5931	-23.44624	1.408004	60432.45	-621506.9	539987.7
	(272334.)	(20959.6)	(14.1510)	(1.40718)	(33819.4)	(237454.)	(288873.)
D(INF)	-0.128127	-0.014508	-3.03E-05	2.52E-06	-0.243204	0.385234	0.376779
	(0.49255)	(0.03791)	(2.6E-05)	(2.5E-06)	(0.06117)	(0.42946)	(0.52246)
D(INTR)	0.504085	-0.024666	0.000173	-7.06E-06	-0.006112	-0.636610	0.109239
	(0.41981)	(0.03231)	(2.2E-05)	(2.2E-06)	(0.05213)	(0.36604)	(0.44531)
D(BOP)	-0.108715	-0.005061	-2.61E-06	3.14E-07	-0.019664	0.041587	-0.061294
	(0.05996)	(0.00461)	(3.1E-06)	(3.1E-07)	(0.00745)	(0.05228)	(0.06360)
D(UNE)	837.0289	107.1284	-0.001248	0.001157	186.4205	-1549.437	1764.912
	(651.799)	(50.1643)	(0.03387)	(0.00337)	(80.9428)	(568.319)	(691.385)

Date: 07/17/14 Time: 21:10
Sample (adjusted): 1981Q2 2013Q4
Included observations: 131 after adjustments
Trend assumption: Quadratic deterministic trend
Series: POROP EXCH GDP GEX INF INTR BOP UNE
Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.616876	337.3726	175.1715	0.0000
At most 1 *	0.400315	211.6918	139.2753	0.0000
At most 2 *	0.297292	144.7047	107.3466	0.0000
At most 3 *	0.250502	98.48608	79.34145	0.0009
At most 4 *	0.208959	60.71206	55.24578	0.0153
At most 5	0.147052	30.00497	35.01090	0.1555
At most 6	0.064112	9.168603	18.39771	0.5629
At most 7	0.003723	0.488601	3.841466	0.4846

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 *	0.616876	125.6809	55.72819	0.0000
At most 1 *	0.400315	66.98703	49.58633	0.0004
At most 2 *	0.297292	46.21866	43.41977	0.0242
At most 3 *	0.250502	37.77403	37.16359	0.0425
At most 4	0.208959	30.70709	30.81507	0.0515
At most 5	0.147052	20.83636	24.25202	0.1329
At most 6	0.064112	8.680002	17.14769	0.5292
At most 7	0.003723	0.488601	3.841466	0.4846

Max-eigenvalue test indicates 4 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 Cointegrating Coefficients (normalized by b'*S11*b=I):

POROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
0.085693	0.007802	3.66E-05	-1.71E-06	0.008239	-0.000228	-0.083839	1.86E-05
0.711227	0.019734	4.44E-06	-1.82E-06	0.064441	-0.219137	0.078870	-3.54E-05
-0.114616	0.004195	9.47E-06	-2.89E-06	-0.027546	0.589098	-0.856380	7.62E-05
-0.307202	0.007224	-4.90E-06	1.26E-06	0.070310	-0.093169	0.114472	3.22E-05
0.128576	-0.046692	-1.61E-05	2.97E-06	-0.002956	-0.396262	0.566693	9.31E-05
-0.007507	0.023624	-1.20E-05	2.23E-06	-0.013731	0.149303	0.274192	3.55E-05
-0.023878	-0.016889	4.02E-06	-1.25E-06	-0.016837	0.064109	0.040948	9.40E-06
0.005516	0.028852	2.69E-06	-4.26E-07	0.002562	-0.306768	0.287964	6.90E-06

Unrestricted Adjustment Coefficients (alpha):

D(POROP)	-0.501112	-1.872465	-0.083732	0.977960	-0.480879	0.047284	0.043241	0.042704
D(EXCH)	-0.692635	-0.750602	-1.181347	-0.329915	1.515058	-0.959268	0.670216	-0.025919
D(GDP)	-32935.83	41774.93	-25042.21	2355.857	23465.27	-12883.31	-33768.10	8878.599
D(GEX)	-552641.2	681282.2	-337491.7	25455.49	356494.0	-212330.5	-505667.7	145217.8
D(INF)	-0.629400	-1.107880	-0.959442	-2.134828	-0.218500	1.592269	0.243618	0.098547
D(INTR)	4.854238	-0.452667	-1.310287	-0.628205	0.487243	-0.429971	-0.501129	-0.016510
D(BOP)	-0.102550	-0.199713	0.084389	-0.164468	-0.027888	-0.206840	-0.063159	-0.012411
D(UNE)	-551.9291	1093.206	-3516.676	-108.3393	-2607.805	-1028.035	214.4529	43.95884

1 Cointegrating Equation(s): Log likelihood -6668.137

Normalized cointegrating coefficients (standard error in parentheses)

POROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.091052	0.000427	-2.00E-05	0.096145	-0.002662	-0.978366	0.000217
	(0.06164)	(4.1E-05)	(5.1E-06)	(0.08984)	(0.71683)	(1.02305)	(0.00012)

Adjustment coefficients (standard error in parentheses)

D(POROP)	-0.042942
	(0.03318)
D(EXCH)	-0.059354
	(0.04890)
D(GDP)	-2822.361
	(1953.49)

D(GEX)	-47357.33
	(30676.5)
D(INF)	-0.053935
	(0.05906)
D(INTR)	0.415973
	(0.04700)
D(BOP)	-0.008788
	(0.00698)
D(UNE)	-47.29630
	(81.0073)

2 Cointegrating Equation(s): Log likelihood -6634.644

Normalized cointegrating coefficients (standard error in parentheses)

POROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	-0.000178	5.09E-06	0.088178	-0.441985	0.588300	-0.000167
		(2.0E-05)	(2.5E-06)	(0.04465)	(0.35784)	(0.51275)	(5.9E-05)
0.000000	1.000000	0.006642	-0.000276	0.087497	4.824960	-17.20628	0.004210
		(0.00062)	(7.8E-05)	(1.39506)	(11.1811)	(16.0214)	(0.00183)

Adjustment coefficients (standard error in parentheses)

D(POROP)	-1.374688	-0.040861
	(0.24128)	(0.00715)
D(EXCH)	-0.593202	-0.020216
	(0.40511)	(0.01200)
D(GDP)	26889.08	567.3953
	(16042.5)	(475.210)
D(GEX)	437188.7	9132.286
	(251564.)	(7451.81)
D(INF)	-0.841889	-0.026774
	(0.48707)	(0.01443)
D(INTR)	0.094024	0.028942
	(0.39152)	(0.01160)
D(BOP)	-0.150829	-0.004741
	(0.05647)	(0.00167)
D(UNE)	730.2210	17.26666
	(672.468)	(19.9198)

3 Cointegrating Equation(s): Log likelihood -6611.535

Normalized cointegrating coefficients (standard error in parentheses)

POROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	0.000000	1.04E-05	0.169882	-2.819659	3.877093	-0.000348
			(2.6E-06)	(0.06706)	(0.51829)	(0.67808)	(8.8E-05)
0.000000	1.000000	0.000000	-0.000472	-2.960351	93.52035	-139.8895	0.010966
			(9.7E-05)	(2.52711)	(19.5302)	(25.5511)	(0.00333)
0.000000	0.000000	1.000000	0.029581	458.8701	-13353.57	18470.62	-1.017036
			(0.01785)	(463.727)	(3583.81)	(4688.66)	(0.61101)

Adjustment coefficients (standard error in parentheses)

D(POROP)	-1.365091	-0.041212	-2.74E-05
	(0.24427)	(0.00728)	(1.3E-05)
D(EXCH)	-0.457800	-0.025172	-3.98E-05
	(0.40083)	(0.01195)	(2.1E-05)

D(GDP)	29759.32	462.3427	-1.256104
	(16140.4)	(481.242)	(0.84612)
D(GEX)	475870.6	7716.501	-20.38104
	(253535.)	(7559.39)	(13.2909)
D(INF)	-0.731922	-0.030798	-3.70E-05
	(0.48812)	(0.01455)	(2.6E-05)
D(INTR)	0.244204	0.023446	0.000163
	(0.38445)	(0.01146)	(2.0E-05)
D(BOP)	-0.160501	-0.004387	-3.84E-06
	(0.05684)	(0.00169)	(3.0E-06)
D(UNE)	1133.288	2.514129	-0.048621
	(629.275)	(18.7625)	(0.03299)

4 Cointegrating Equation(s): Log likelihood -6592.648

Normalized cointegrating coefficients (standard error in parentheses)

POROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	0.000000	0.000000	-0.019489	-0.616116	0.758400	-0.000142
				(0.02595)	(0.16376)	(0.15498)	(3.5E-05)
0.000000	1.000000	0.000000	0.000000	5.668680	-6.887652	2.218808	0.001586
				(0.98406)	(6.21061)	(5.87773)	(0.00132)
0.000000	0.000000	1.000000	0.000000	-81.89913	-7061.146	9564.898	-0.429240
				(333.438)	(2104.40)	(1991.60)	(0.44790)
0.000000	0.000000	0.000000	1.000000	18281.23	-212721.7	301066.7	-19.87103
				(5315.45)	(33546.8)	(31748.8)	(7.14011)

Adjustment coefficients (standard error in parentheses)

D(POROP)	-1.665523	-0.034147	-3.22E-05	5.73E-06
	(0.25335)	(0.00733)	(1.2E-05)	(1.3E-06)
D(EXCH)	-0.356449	-0.027555	-3.82E-05	5.55E-06
	(0.43447)	(0.01258)	(2.1E-05)	(2.2E-06)
D(GDP)	29035.60	479.3608	-1.267654	0.055842
	(17526.8)	(507.338)	(0.85307)	(0.08940)
D(GEX)	468050.6	7900.385	-20.50584	0.716246
	(275321.)	(7969.56)	(13.4005)	(1.40439)
D(INF)	-0.076097	-0.046220	-2.65E-05	3.18E-06
	(0.50151)	(0.01452)	(2.4E-05)	(2.6E-06)
D(INTR)	0.437190	0.018908	0.000166	-4.50E-06
	(0.41443)	(0.01200)	(2.0E-05)	(2.1E-06)
D(BOP)	-0.109976	-0.005575	-3.03E-06	8.81E-08
	(0.06030)	(0.00175)	(2.9E-06)	(3.1E-07)
D(UNE)	1166.571	1.731514	-0.048090	0.008978
	(683.311)	(19.7795)	(0.03326)	(0.00349)

5 Cointegrating Equation(s): Log likelihood -6577.294

Normalized cointegrating coefficients (standard error in parentheses)

POROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	0.000000	0.000000	0.000000	-0.627428	0.742843	-0.000120
					(0.12894)	(0.13373)	(3.0E-05)
0.000000	1.000000	0.000000	0.000000	0.000000	-3.597488	6.743584	-0.004864
					(3.57208)	(3.70464)	(0.00084)
0.000000	0.000000	1.000000	0.000000	0.000000	-7108.681	9499.525	-0.336045
					(1854.63)	(1923.45)	(0.43714)

0.000000	0.000000	0.000000	1.000000	0.000000	-202111.0	315658.9	-40.67357
					(39212.0)	(40667.2)	(9.24238)
0.000000	0.000000	0.000000	0.000000	1.000000	-0.580411	-0.798206	0.001138
					(1.31386)	(1.36262)	(0.00031)

Adjustment coefficients (standard error in parentheses)

D(POROP)	-1.727352	-0.011694	-2.45E-05	4.30E-06	-0.052304
	(0.25369)	(0.01651)	(1.3E-05)	(1.6E-06)	(0.03167)
D(EXCH)	-0.161649	-0.098296	-6.26E-05	1.00E-05	-0.049210
	(0.42256)	(0.02751)	(2.2E-05)	(2.6E-06)	(0.05275)
D(GDP)	32052.67	-616.2700	-1.645024	0.125456	3206.770
	(17655.4)	(1149.28)	(0.91968)	(0.11048)	(2204.14)
D(GEX)	513887.3	-8744.887	-26.23901	1.773853	49382.13
	(277447.)	(18060.5)	(14.4523)	(1.73612)	(34637.1)
D(INF)	-0.104191	-0.036018	-2.30E-05	2.53E-06	-0.199603
	(0.50783)	(0.03306)	(2.6E-05)	(3.2E-06)	(0.06340)
D(INTR)	0.499838	-0.003842	0.000158	-3.06E-06	0.001308
	(0.41803)	(0.02721)	(2.2E-05)	(2.6E-06)	(0.05219)
D(BOP)	-0.113562	-0.004273	-2.58E-06	5.33E-09	-0.027521
	(0.06105)	(0.00397)	(3.2E-06)	(3.8E-07)	(0.00762)
D(UNE)	831.2692	123.4941	-0.006151	0.001242	162.8643
	(658.945)	(42.8942)	(0.03432)	(0.00412)	(82.2642)

	Log likelihood	
6 Cointegrating Equation(s):	-6566.876	

Normalized cointegrating coefficients (standard error in parentheses)

POROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.228648	0.000149
						(0.10973)	(4.5E-05)
0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	3.795341	-0.003322
						(1.49875)	(0.00062)
0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	3673.760	2.710698
						(1351.66)	(0.55519)
0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	150023.2	45.95015
						(27590.5)	(11.3326)
0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	-1.273870	0.001387
						(0.79088)	(0.00032)
0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	-0.819528	0.000429
						(0.19129)	(7.9E-05)

Adjustment coefficients (standard error in parentheses)

D(POROP)	-1.727707	-0.010577	-2.51E-05	4.41E-06	-0.052954	0.467612
	(0.25367)	(0.01814)	(1.4E-05)	(1.7E-06)	(0.03197)	(0.24264)
D(EXCH)	-0.154448	-0.120958	-5.11E-05	7.90E-06	-0.036038	-1.244131
	(0.41529)	(0.02969)	(2.3E-05)	(2.8E-06)	(0.05233)	(0.39723)
D(GDP)	32149.39	-920.6273	-1.490204	0.096666	3383.674	-35340.63
	(17625.0)	(1260.25)	(0.95562)	(0.12082)	(2221.03)	(16858.4)
D(GEX)	515481.3	-13761.01	-23.68741	1.299353	52297.69	-523321.9
	(276919.)	(19800.7)	(15.0145)	(1.89824)	(34896.3)	(264875.)
D(INF)	-0.116145	0.001598	-4.22E-05	6.09E-06	-0.221467	0.200931
	(0.49101)	(0.03511)	(2.7E-05)	(3.4E-06)	(0.06187)	(0.46965)
D(INTR)	0.503066	-0.014000	0.000164	-4.02E-06	0.007212	-0.872542
	(0.41658)	(0.02979)	(2.3E-05)	(2.9E-06)	(0.05250)	(0.39846)
D(BOP)	-0.112009	-0.009160	-9.65E-08	-4.57E-07	-0.024680	0.088994
	(0.05868)	(0.00420)	(3.2E-06)	(4.0E-07)	(0.00739)	(0.05613)
D(UNE)	838.9871	99.20760	0.006203	-0.001055	176.9806	-1421.121

	(653.629)	(46.7368)	(0.03544)	(0.00448)	(82.3678)	(625.199)

7 Cointegrating Equation(s):	Log likelihood	-6562.536

Normalized cointegrating coefficients (standard error in parentheses)

POROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000150
							(5.3E-05)
0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-0.003312
							(0.00077)
0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	2.721135
							(0.72447)
0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	46.37636
							(22.9208)
0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.001383
							(0.00038)
0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000426
							(0.00015)
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	-2.84E-06
							(0.00015)

Adjustment coefficients (standard error in parentheses)

D(POROP)	-1.728740	-0.011308	-2.49E-05	4.35E-06	-0.053682	0.470384	-0.179789
	(0.25376)	(0.01891)	(1.4E-05)	(1.8E-06)	(0.03241)	(0.24347)	(0.34188)
D(EXCH)	-0.170451	-0.132277	-4.84E-05	7.06E-06	-0.047322	-1.201164	1.595779
	(0.41187)	(0.03070)	(2.2E-05)	(2.9E-06)	(0.05260)	(0.39516)	(0.55488)
D(GDP)	32955.72	-350.3284	-1.625874	0.138755	3952.237	-37505.46	36153.78
	(17416.7)	(1298.14)	(0.94796)	(0.12239)	(2224.32)	(16710.3)	(23464.4)
D(GEX)	527555.8	-5220.948	-25.71902	1.929627	60811.75	-555739.6	515097.8
	(273960.)	(20419.4)	(14.9112)	(1.92519)	(34987.9)	(262848.)	(369089.)
D(INF)	-0.121962	-0.002516	-4.12E-05	5.78E-06	-0.225569	0.216549	0.865398
	(0.49083)	(0.03658)	(2.7E-05)	(3.4E-06)	(0.06268)	(0.47092)	(0.66126)
D(INTR)	0.515032	-0.005537	0.000161	-3.39E-06	0.015649	-0.904668	0.745218
	(0.41476)	(0.03091)	(2.3E-05)	(2.9E-06)	(0.05297)	(0.39794)	(0.55878)
D(BOP)	-0.110501	-0.008093	-3.50E-07	-3.78E-07	-0.023617	0.084945	-0.173354
	(0.05848)	(0.00436)	(3.2E-06)	(4.1E-07)	(0.00747)	(0.05611)	(0.07879)
D(UNE)	833.8663	95.58577	0.007065	-0.001323	173.3698	-1407.373	1380.780
	(653.688)	(48.7222)	(0.03558)	(0.00459)	(83.4837)	(627.175)	(880.673)

Date: 07/17/14 Time: 21:11
Sample (adjusted): 1981Q2 2013Q4
Included observations: 131 after adjustments
Trend assumption: Linear deterministic trend
Series: NEGROP EXCH GDP GEX INF INTR BOP UNE
Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.624927	316.6409	159.5297	0.0000
At most 1 *	0.338954	188.1779	125.6154	0.0000
At most 2 *	0.291375	133.9529	95.75366	0.0000
At most 3 *	0.272843	88.83265	69.81889	0.0007
At most 4	0.190124	47.09435	47.85613	0.0589
At most 5	0.084856	19.46987	29.79707	0.4595
At most 6	0.040593	7.853613	15.49471	0.4812
At most 7	0.018341	2.425027	3.841466	0.1194

Trace test indicates 4 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 *	0.624927	128.4630	52.36261	0.0000
At most 1 *	0.338954	54.22500	46.23142	0.0058
At most 2 *	0.291375	45.12022	40.07757	0.0124
At most 3 *	0.272843	41.73830	33.87687	0.0047
At most 4 *	0.190124	27.62448	27.58434	0.0494
At most 5	0.084856	11.61626	21.13162	0.5858
At most 6	0.040593	5.428587	14.26460	0.6870
At most 7	0.018341	2.425027	3.841466	0.1194

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 Cointegrating Coefficients (normalized by b'*S11*b=I):

NEGROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
-0.091961	0.004074	3.63E-05	-2.08E-06	0.003964	0.019780	-0.142713	2.33E-05
-0.362266	0.005224	-4.34E-06	7.29E-07	0.060483	-0.458185	0.550447	-3.53E-05
0.122977	0.011924	9.99E-07	-9.41E-07	0.055195	0.171214	-0.347164	5.66E-05
0.261087	0.000432	4.98E-07	1.06E-06	0.025131	-0.193765	0.225669	-6.45E-05
0.065655	-0.055435	-1.40E-05	2.73E-06	-0.015078	-0.362836	0.464469	7.92E-05
-0.065339	0.002645	4.57E-06	-2.82E-07	0.032054	-0.202296	-0.107109	-3.15E-05
-0.005709	0.025503	1.28E-06	-7.20E-07	-0.022474	-0.007732	-0.078784	-3.30E-06
-0.041685	0.009307	6.97E-06	-1.16E-06	0.011523	-0.347577	0.287507	-5.93E-06

Unrestricted Adjustment Coefficients (alpha):

D(NEGROP)	-0.646032	2.182262	-0.218096	-2.090706	-0.843871	0.472587	-0.058026	-0.069399
D(EXCH)	-0.437513	1.421972	-1.134762	0.007861	1.667684	-0.013994	-0.018912	0.309923
D(GDP)	-41111.64	17395.79	14249.19	26122.18	28393.97	18641.86	32050.48	-16471.55
D(GEX)	-669152.0	293284.5	247053.0	356471.6	435458.7	280655.8	531056.0	-247357.0
D(INF)	-0.705739	-0.810571	-2.568109	-0.398184	-0.498580	-1.128073	0.219272	-0.230716
D(INTR)	4.943492	-0.560686	-1.120114	1.513725	0.598038	0.421262	-0.180208	-0.199740
D(BOP)	-0.083546	-0.170670	-0.155006	-0.069790	0.029277	0.176072	0.000865	0.041435
D(UNE)	-787.4834	1855.022	-1354.654	3548.974	-1762.985	279.7569	343.0059	266.0723

1 Cointegrating Equation(s): Log likelihood -6744.933

Normalized cointegrating coefficients (standard error in parentheses)

NEGROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	-0.044299	-0.000395	2.26E-05	-0.043101	-0.215093	1.551894	-0.000253
	(0.05338)	(3.4E-05)	(3.4E-06)	(0.07928)	(0.59775)	(0.72676)	(0.00011)

Adjustment coefficients (standard error in parentheses)

D(NEGROP)	0.059410
	(0.05695)
D(EXCH)	0.040234
	(0.05146)
D(GDP)	3780.651
	(2160.49)
D(GEX)	61535.62
	(34188.4)
D(INF)	0.064900
	(0.06322)
D(INTR)	-0.454606
	(0.05543)
D(BOP)	0.007683
	(0.00755)
D(UNE)	72.41745
	(87.0983)

2 Cointegrating Equation(s): Log likelihood -6717.821

Normalized cointegrating coefficients (standard error in parentheses)

NEGROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	0.000208	-1.39E-05	-0.226733	1.978956	-3.001681	0.000266
		(2.6E-05)	(1.8E-06)	(0.06459)	(0.44915)	(0.49717)	(7.9E-05)
0.000000	1.000000	0.013620	-0.000823	-4.145267	49.52797	-102.7914	0.011724
		(0.00115)	(8.1E-05)	(2.85547)	(19.8558)	(21.9786)	(0.00349)

Adjustment coefficients (standard error in parentheses)

D(NEGROP)	-0.731150	0.008768
	(0.21616)	(0.00383)
D(EXCH)	-0.474898	0.005646
	(0.20207)	(0.00358)

D(GDP)	-2521.254	-76.60789
	(8756.02)	(155.192)
D(GEX)	-44711.38	-1193.923
	(138506.)	(2454.88)
D(INF)	0.358543	-0.007109
	(0.25510)	(0.00452)
D(INTR)	-0.251489	0.017210
	(0.22429)	(0.00398)
D(BOP)	0.069511	-0.001232
	(0.03000)	(0.00053)
D(UNE)	-599.5941	6.482207
	(346.924)	(6.14890)

3 Cointegrating Equation(s): Log likelihood -6695.261

Normalized cointegrating coefficients (standard error in parentheses)

NEGROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	0.000000	-2.09E-06	-0.079108	1.240609	-1.611648	0.000137
			(5.5E-07)	(0.03374)	(0.23408)	(0.24880)	(4.0E-05)
0.000000	1.000000	0.000000	-5.26E-05	5.503979	1.267039	-11.93402	0.003277
			(1.8E-05)	(1.09178)	(7.57469)	(8.05121)	(0.00131)
0.000000	0.000000	1.000000	-0.056575	-708.4627	3543.393	-6670.889	0.620202
			(0.00377)	(232.789)	(1615.07)	(1716.68)	(0.27942)

Adjustment coefficients (standard error in parentheses)

D(NEGROP)	-0.757970	0.006167	-3.32E-05
	(0.22739)	(0.00788)	(2.1E-05)
D(EXCH)	-0.614447	-0.007886	-2.32E-05
	(0.20784)	(0.00721)	(1.9E-05)
D(GDP)	-768.9372	93.30489	-1.554526
	(9200.21)	(318.957)	(0.85567)
D(GEX)	-14329.65	1752.031	-25.33108
	(145476.)	(5043.43)	(13.5300)
D(INF)	0.042725	-0.037732	-2.47E-05
	(0.24818)	(0.00860)	(2.3E-05)
D(INTR)	-0.389237	0.003853	0.000181
	(0.23184)	(0.00804)	(2.2E-05)
D(BOP)	0.050449	-0.003080	-2.45E-06
	(0.03097)	(0.00107)	(2.9E-06)
D(UNE)	-766.1848	-9.671203	-0.038005
	(361.188)	(12.5218)	(0.03359)

4 Cointegrating Equation(s): Log likelihood -6674.391

Normalized cointegrating coefficients (standard error in parentheses)

NEGROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	0.000000	0.000000	-0.023973	0.585474	-0.786499	8.59E-06
				(0.02845)	(0.17677)	(0.17052)	(2.4E-05)
0.000000	1.000000	0.000000	0.000000	6.888101	-15.17960	8.780699	4.76E-05
				(1.12283)	(6.97717)	(6.73036)	(0.00095)
0.000000	0.000000	1.000000	0.000000	781.1051	-14156.19	15621.93	-2.854669
				(597.174)	(3710.80)	(3579.53)	(0.50569)
0.000000	0.000000	0.000000	1.000000	26329.21	-312853.2	394042.0	-61.42091
				(10177.5)	(63242.5)	(61005.3)	(8.61839)

Adjustment coefficients (standard error in parentheses)

D(NEGROP)	-1.303827	0.005264	-3.42E-05	9.13E-07
	(0.25382)	(0.00734)	(2.0E-05)	(1.4E-06)
D(EXCH)	-0.612395	-0.007882	-2.32E-05	3.02E-06
	(0.24944)	(0.00721)	(1.9E-05)	(1.4E-06)
D(GDP)	6051.230	104.5845	-1.541519	0.112458
	(10970.2)	(317.057)	(0.85022)	(0.06086)
D(GEX)	78740.52	1905.956	-25.15358	1.750453
	(173751.)	(5021.72)	(13.4663)	(0.96390)
D(INF)	-0.061236	-0.037904	-2.49E-05	2.87E-06
	(0.29724)	(0.00859)	(2.3E-05)	(1.6E-06)
D(INTR)	0.005977	0.004507	0.000182	-8.01E-06
	(0.26861)	(0.00776)	(2.1E-05)	(1.5E-06)
D(BOP)	0.032228	-0.003110	-2.48E-06	1.21E-07
	(0.03701)	(0.00107)	(2.9E-06)	(2.1E-07)
D(UNE)	160.4069	-8.138748	-0.036238	0.008041
	(398.678)	(11.5225)	(0.03090)	(0.00221)

	Log likelihood	
5 Cointegrating Equation(s):		-6660.579

Normalized cointegrating coefficients (standard error in parentheses)

NEGROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	0.000000	0.000000	0.000000	0.539829	-0.775294	2.49E-05
					(0.16798)	(0.17528)	(2.5E-05)
0.000000	1.000000	0.000000	0.000000	0.000000	-2.064507	5.561324	-0.004646
					(3.37150)	(3.51796)	(0.00050)
0.000000	0.000000	1.000000	0.000000	0.000000	-12668.95	15256.85	-3.386922
					(3614.53)	(3771.54)	(0.53292)
0.000000	0.000000	0.000000	1.000000	0.000000	-262721.8	381736.2	-79.36190
					(64044.5)	(66826.5)	(9.44267)
0.000000	0.000000	0.000000	0.000000	1.000000	-1.904022	0.467382	0.000681
					(1.10204)	(1.14991)	(0.00016)

Adjustment coefficients (standard error in parentheses)

D(NEGROP)	-1.359232	0.052044	-2.24E-05	-1.39E-06	0.077575
	(0.25299)	(0.03029)	(2.1E-05)	(2.0E-06)	(0.04620)
D(EXCH)	-0.502903	-0.100330	-4.65E-05	7.58E-06	-0.003310
	(0.23855)	(0.02857)	(2.0E-05)	(1.9E-06)	(0.04356)
D(GDP)	7915.445	-1469.430	-1.938015	0.190094	1904.045
	(10990.1)	(1316.04)	(0.90298)	(0.08729)	(2006.89)
D(GEX)	107330.7	-22233.62	-31.23437	2.941101	31115.39
	(174151.)	(20854.2)	(14.3088)	(1.38320)	(31801.7)
D(INF)	-0.093970	-0.010266	-1.79E-05	1.50E-06	-0.196060
	(0.29912)	(0.03582)	(2.5E-05)	(2.4E-06)	(0.05462)
D(INTR)	0.045242	-0.028645	0.000173	-6.37E-06	-0.047120
	(0.26964)	(0.03229)	(2.2E-05)	(2.1E-06)	(0.04924)
D(BOP)	0.034150	-0.004733	-2.89E-06	2.01E-07	-0.021405
	(0.03734)	(0.00447)	(3.1E-06)	(3.0E-07)	(0.00682)
D(UNE)	44.65753	89.59203	-0.011619	0.003220	150.0768
	(393.362)	(47.1041)	(0.03232)	(0.00312)	(71.8316)

	Log	
6 Cointegrating Equation(s):	likelihood	-6654.771

Normalized cointegrating coefficients (standard error in parentheses)

NEGROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-1.465956	-0.000189
						(0.44740)	(0.00012)
0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	8.202674	-0.003827
						(2.42005)	(0.00062)
0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	31465.63	1.638746
						(10378.1)	(2.67106)
0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	717864.9	24.85766
						(213907.)	(55.0544)
0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	2.903406	0.001437
						(1.75777)	(0.00045)
0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	1.279409	0.000397
						(0.81118)	(0.00021)

Adjustment coefficients (standard error in parentheses)

D(NEGROP)	-1.390110	0.053294	-2.02E-05	-1.53E-06	0.092724	-0.434310
	(0.25431)	(0.03020)	(2.1E-05)	(2.0E-06)	(0.04903)	(0.35442)
D(EXCH)	-0.501988	-0.100367	-4.65E-05	7.59E-06	-0.003758	-1.458256
	(0.24078)	(0.02860)	(2.0E-05)	(1.9E-06)	(0.04642)	(0.33556)
D(GDP)	6697.408	-1420.128	-1.852771	0.184830	2501.588	-25479.12
	(11055.3)	(1313.00)	(0.90604)	(0.08724)	(2131.37)	(15407.3)
D(GEX)	88992.98	-21491.37	-29.95101	2.861847	40111.48	-389163.0
	(175244.)	(20813.0)	(14.3621)	(1.38281)	(33785.4)	(244229.)
D(INF)	-0.020263	-0.013249	-2.31E-05	1.82E-06	-0.232219	0.403998
	(0.29685)	(0.03526)	(2.4E-05)	(2.3E-06)	(0.05723)	(0.41370)
D(INTR)	0.017717	-0.027531	0.000175	-6.49E-06	-0.033617	-0.432615
	(0.27138)	(0.03223)	(2.2E-05)	(2.1E-06)	(0.05232)	(0.37822)
D(BOP)	0.022646	-0.004268	-2.09E-06	1.51E-07	-0.015761	0.017288
	(0.03669)	(0.00436)	(3.0E-06)	(2.9E-07)	(0.00707)	(0.05114)
D(UNE)	26.37856	90.33190	-0.010340	0.003141	159.0440	-1202.040
	(396.803)	(47.1267)	(0.03252)	(0.00313)	(76.5002)	(553.006)

	Log	
7 Cointegrating Equation(s):	likelihood	-6652.057

Normalized cointegrating coefficients (standard error in parentheses)

NEGROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000640
							(0.00023)
0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-0.008466
							(0.00159)
0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	-16.15661
							(4.99939)
0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	-381.1301
							(115.937)
0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	-0.000205
							(0.00042)
0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	-0.000327
							(0.00019)
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000566
							(0.00020)

Adjustment coefficients (standard error in parentheses)

D(NEGROP)	-1.389779	0.051814	-2.03E-05	-1.49E-06	0.094028	-0.433861	0.459325
	(0.25431)	(0.03307)	(2.1E-05)	(2.0E-06)	(0.05044)	(0.35442)	(0.45095)
D(EXCH)	-0.501880	-0.100849	-4.66E-05	7.60E-06	-0.003333	-1.458109	2.018457
	(0.24079)	(0.03131)	(2.0E-05)	(1.9E-06)	(0.04776)	(0.33558)	(0.42698)
D(GDP)	6514.442	-602.7518	-1.811719	0.161758	1781.279	-25726.93	25057.11
	(10944.6)	(1423.29)	(0.89738)	(0.08789)	(2170.91)	(15253.0)	(19407.4)
D(GEX)	85961.35	-7947.965	-29.27079	2.479554	28176.42	-393269.0	381968.3
	(173324.)	(22539.9)	(14.2112)	(1.39193)	(34379.5)	(241553.)	(307344.)
D(INF)	-0.021515	-0.007657	-2.28E-05	1.66E-06	-0.237147	0.402303	0.328217
	(0.29667)	(0.03858)	(2.4E-05)	(2.4E-06)	(0.05885)	(0.41346)	(0.52607)
D(INTR)	0.018746	-0.032127	0.000175	-6.36E-06	-0.029567	-0.431221	-0.036818
	(0.27126)	(0.03528)	(2.2E-05)	(2.2E-06)	(0.05381)	(0.37804)	(0.48101)
D(BOP)	0.022641	-0.004246	-2.09E-06	1.50E-07	-0.015780	0.017282	-0.049288
	(0.03670)	(0.00477)	(3.0E-06)	(2.9E-07)	(0.00728)	(0.05114)	(0.06507)
D(UNE)	24.42045	99.07950	-0.009901	0.002894	151.3353	-1204.692	1528.816
	(396.477)	(51.5598)	(0.03251)	(0.00318)	(78.6427)	(552.549)	(703.046)

Date: 07/17/14 Time: 21:13
Sample (adjusted): 1981Q2 2013Q4
Included observations: 131 after adjustments
Trend assumption: Quadratic deterministic trend
Series: NEGROP EXCH GDP GEX INF INTR BOP UNE
Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.630406	324.0644	175.1715	0.0000
At most 1 *	0.317574	193.6735	139.2753	0.0000
At most 2 *	0.292744	143.6181	107.3466	0.0000
At most 3 *	0.265403	98.24457	79.34145	0.0010
At most 4 *	0.191755	57.83984	55.24578	0.0291
At most 5	0.151065	29.95122	35.01090	0.1572
At most 6	0.058019	8.496999	18.39771	0.6318
At most 7	0.005080	0.667146	3.841466	0.4140

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 *	0.630406	130.3909	55.72819	0.0000
At most 1 *	0.317574	50.05534	49.58633	0.0447
At most 2 *	0.292744	45.37357	43.41977	0.0303
At most 3 *	0.265403	40.40473	37.16359	0.0205
At most 4	0.191755	27.88863	30.81507	0.1094
At most 5	0.151065	21.45422	24.25202	0.1124
At most 6	0.058019	7.829852	17.14769	0.6217
At most 7	0.005080	0.667146	3.841466	0.4140

Max-eigenvalue test indicates 4 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 Cointegrating Coefficients (normalized by b'*S11*b=I):

NEGROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
-0.092407	0.006385	3.47E-05	-1.57E-06	0.005881	-0.018500	-0.049525	2.72E-05
-0.454086	0.003769	-1.44E-06	2.30E-07	0.038327	-0.396519	0.485631	-3.46E-05
-0.047974	0.008613	5.19E-06	-2.28E-06	0.033100	0.283270	-0.545403	6.79E-05
-0.082014	-0.016288	3.13E-06	-1.47E-06	-0.082217	0.304512	-0.389574	3.17E-05
-0.001340	-0.044428	-1.97E-05	3.95E-06	3.11E-05	-0.410144	0.691306	9.52E-05
-0.062399	0.031010	-8.80E-06	1.42E-06	-0.009757	0.215341	0.153078	2.47E-05
0.064686	-0.011886	4.15E-06	-1.24E-06	-0.019811	0.031963	0.067821	1.08E-05
-0.080045	0.031806	6.55E-07	1.06E-07	0.009167	-0.391791	0.395290	2.44E-06

Unrestricted Adjustment Coefficients (alpha):

D(NEGROP)	-0.757110	2.777843	1.132649	0.781654	-0.553970	0.301219	-0.432952	-0.038591
D(EXCH)	-0.591196	1.399411	-0.846124	0.449843	1.258997	-1.101210	0.471291	-0.023097
D(GDP)	-45285.91	-6485.731	-3719.832	-17501.11	18570.10	-18372.84	-26570.25	12962.69
D(GEX)	-744919.9	-76893.40	-520.3492	-233157.3	268642.2	-295542.4	-396093.8	210630.4
D(INF)	-0.489618	0.022733	-2.193268	1.502652	-0.138702	1.554155	0.320477	0.119934
D(INTR)	5.065980	-0.619879	-1.781670	-0.467816	0.410007	-0.535555	-0.417520	-0.023507
D(BOP)	-0.091946	-0.067615	-0.054980	0.222065	-0.070766	-0.204149	-0.057528	-0.017378
D(UNE)	-991.3937	937.8313	-2671.150	-2337.764	-2357.279	-915.1991	265.3494	80.96910

1 Cointegrating Equation(s): Log likelihood -6736.013

Normalized cointegrating coefficients (standard error in parentheses)

NEGROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	-0.069092	-0.000375	1.69E-05	-0.063639	0.200197	0.535942	-0.000294
	(0.05547)	(3.5E-05)	(4.6E-06)	(0.08060)	(0.64800)	(0.92222)	(0.00011)

Adjustment coefficients (standard error in parentheses)

D(NEGROP)	0.069963
	(0.05740)
D(EXCH)	0.054631
	(0.05149)
D(GDP)	4184.749
	(2146.85)
D(GEX)	68836.04
	(33927.9)
D(INF)	0.045244
	(0.06381)
D(INTR)	-0.468134
	(0.05484)
D(BOP)	0.008496
	(0.00751)
D(UNE)	91.61202
	(87.1247)

2 Cointegrating Equation(s): Log likelihood -6710.986

Normalized cointegrating coefficients (standard error in parentheses)

NEGROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	5.49E-05	-2.89E-06	-0.087239	0.965109	-1.288644	0.000127
		(1.6E-05)	(2.0E-06)	(0.03604)	(0.29091)	(0.41589)	(4.8E-05)
0.000000	1.000000	0.006227	-0.000287	-0.341583	11.07093	-26.40808	0.006096
		(0.00059)	(7.6E-05)	(1.37325)	(11.0835)	(15.8453)	(0.00181)

Adjustment coefficients (standard error in parentheses)

D(NEGROP)	-1.191416	0.005635
	(0.25612)	(0.00410)
D(EXCH)	-0.580822	0.001499
	(0.24958)	(0.00399)
D(GDP)	7129.826	-313.5751
	(10761.4)	(172.173)
D(GEX)	103752.2	-5045.803
	(170099.)	(2721.44)

D(INF)	0.034922	-0.003040
	(0.31998)	(0.00512)
D(INTR)	-0.186655	0.030008
	(0.27345)	(0.00437)
D(BOP)	0.039200	-0.000842
	(0.03752)	(0.00060)
D(UNE)	-334.2436	-2.795266
	(434.645)	(6.95397)

3 Cointegrating Equation(s):	Log likelihood	-6688.299

Normalized cointegrating coefficients (standard error in parentheses)

NEGROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	0.000000	-2.83E-06	-0.049095	1.245557	-1.743381	0.000153
			(1.4E-06)	(0.03573)	(0.27913)	(0.36472)	(4.7E-05)
0.000000	1.000000	0.000000	-0.000280	3.988611	42.90770	-78.03029	0.009021
			(7.6E-05)	(1.98548)	(15.5100)	(20.2660)	(0.00263)
0.000000	0.000000	1.000000	-0.001072	-695.3871	-5112.675	8290.025	-0.469721
			(0.01521)	(395.087)	(3086.30)	(4032.70)	(0.52416)

Adjustment coefficients (standard error in parentheses)

D(NEGROP)	-1.245754	0.015390	-2.44E-05
	(0.25180)	(0.00614)	(1.9E-05)
D(EXCH)	-0.540230	-0.005788	-2.69E-05
	(0.24767)	(0.00604)	(1.9E-05)
D(GDP)	7308.281	-345.6134	-1.580849
	(10817.4)	(263.878)	(0.81511)
D(GEX)	103777.2	-5050.285	-25.73189
	(171008.)	(4171.51)	(12.8856)
D(INF)	0.140142	-0.021931	-2.84E-05
	(0.30431)	(0.00742)	(2.3E-05)
D(INTR)	-0.101181	0.014663	0.000167
	(0.26153)	(0.00638)	(2.0E-05)
D(BOP)	0.041837	-0.001315	-3.38E-06
	(0.03763)	(0.00092)	(2.8E-06)
D(UNE)	-206.0975	-25.80141	-0.049603
	(418.103)	(10.1991)	(0.03150)

4 Cointegrating Equation(s):	Log likelihood	-6668.096

Normalized cointegrating coefficients (standard error in parentheses)

NEGROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	0.000000	0.000000	-0.040470	0.739238	-0.917478	6.56E-05
				(0.02912)	(0.18428)	(0.17519)	(3.9E-05)
0.000000	1.000000	0.000000	0.000000	4.842983	-7.248046	3.783166	0.000405
				(0.79701)	(5.04348)	(4.79476)	(0.00108)
0.000000	0.000000	1.000000	0.000000	-692.1205	-5304.443	8602.835	-0.502661
				(389.013)	(2461.68)	(2340.29)	(0.52615)
0.000000	0.000000	0.000000	1.000000	3047.076	-178877.9	291783.6	-30.72618
				(5947.24)	(37634.3)	(35778.4)	(8.04381)

Adjustment coefficients (standard error in parentheses)

D(NEGROP)	-1.309860	0.002659	-2.19E-05	-1.92E-06
	(0.25287)	(0.01062)	(1.9E-05)	(1.7E-06)

D(EXCH)	-0.577123	-0.013115	-2.55E-05	2.52E-06
	(0.25054)	(0.01052)	(1.9E-05)	(1.7E-06)
D(GDP)	8743.609	-60.56384	-1.635578	0.103713
	(10951.2)	(459.787)	(0.81591)	(0.07283)
D(GEX)	122899.2	-1252.732	-26.46100	1.493581
	(173272.)	(7274.82)	(12.9095)	(1.15239)
D(INF)	0.016904	-0.046405	-2.37E-05	3.57E-06
	(0.30036)	(0.01261)	(2.2E-05)	(2.0E-06)
D(INTR)	-0.062814	0.022282	0.000166	-3.31E-06
	(0.26459)	(0.01111)	(2.0E-05)	(1.8E-06)
D(BOP)	0.023625	-0.004932	-2.68E-06	-7.33E-08
	(0.03668)	(0.00154)	(2.7E-06)	(2.4E-07)
D(UNE)	-14.36921	12.27495	-0.056913	0.011317
	(409.255)	(17.1825)	(0.03049)	(0.00272)

5 Cointegrating Equation(s): Log likelihood -6654.152

Normalized cointegrating coefficients (standard error in parentheses)

NEGROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	0.000000	0.000000	0.000000	0.711867	-0.944493	0.000114
					(0.18424)	(0.19106)	(4.3E-05)
0.000000	1.000000	0.000000	0.000000	0.000000	-3.972703	7.015901	-0.005343
					(3.87656)	(4.02018)	(0.00091)
0.000000	0.000000	1.000000	0.000000	0.000000	-5772.529	8140.838	0.318910
					(1852.74)	(1921.38)	(0.43586)
0.000000	0.000000	0.000000	1.000000	0.000000	-176817.2	293817.5	-34.34317
					(36300.6)	(37645.4)	(8.53985)
0.000000	0.000000	0.000000	0.000000	1.000000	-0.676307	-0.667509	0.001187
					(1.32058)	(1.36950)	(0.00031)

Adjustment coefficients (standard error in parentheses)

D(NEGROP)	-1.309118	0.027271	-1.10E-05	-4.11E-06	0.075222
	(0.25145)	(0.02587)	(2.1E-05)	(2.7E-06)	(0.05142)
D(EXCH)	-0.578810	-0.069050	-5.03E-05	7.50E-06	-0.014794
	(0.24305)	(0.02500)	(2.1E-05)	(2.6E-06)	(0.04971)
D(GDP)	8718.727	-885.5980	-2.000962	0.177151	801.4505
	(10914.5)	(1122.87)	(0.93132)	(0.11660)	(2232.14)
D(GEX)	122539.3	-13187.99	-31.74679	2.555964	11832.90
	(172787.)	(17776.0)	(14.7436)	(1.84586)	(35336.7)
D(INF)	0.017090	-0.040243	-2.10E-05	3.02E-06	-0.198153
	(0.30028)	(0.03089)	(2.6E-05)	(3.2E-06)	(0.06141)
D(INTR)	-0.063364	0.004067	0.000158	-1.69E-06	-0.014464
	(0.26385)	(0.02714)	(2.3E-05)	(2.8E-06)	(0.05396)
D(BOP)	0.023720	-0.001788	-1.29E-06	-3.53E-07	-0.023212
	(0.03652)	(0.00376)	(3.1E-06)	(3.9E-07)	(0.00747)
D(UNE)	-11.21068	117.0044	-0.010531	0.001995	133.8299
	(393.114)	(40.4429)	(0.03354)	(0.00420)	(80.3960)

6 Cointegrating Equation(s): Log likelihood -6643.425

Normalized cointegrating coefficients (standard error in parentheses)

NEGROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE

1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-0.358090	-0.000208
						(0.14446)	(5.9E-05)
0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	3.743374	-0.003547
						(1.56662)	(0.00064)
0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	3385.699	2.929789
						(1368.59)	(0.56275)
0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	148163.8	45.63012
						(26801.8)	(11.0206)
0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	-1.224619	0.001493
						(0.81216)	(0.00033)
0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	-0.823753	0.000452
						(0.19958)	(8.2E-05)

Adjustment coefficients (standard error in parentheses)

D(NEGROP)	-1.327913	0.036612	-1.37E-05	-3.68E-06	0.072283	-0.236522
	(0.25320)	(0.03062)	(2.2E-05)	(2.8E-06)	(0.05160)	(0.39182)
D(EXCH)	-0.510096	-0.103199	-4.06E-05	5.94E-06	-0.004049	-1.400161
	(0.23922)	(0.02893)	(2.1E-05)	(2.6E-06)	(0.04875)	(0.37018)
D(GDP)	9865.167	-1455.344	-1.839260	0.151124	980.7089	-14546.36
	(10972.7)	(1327.06)	(0.95005)	(0.12069)	(2236.04)	(16979.4)
D(GEX)	140980.7	-22352.83	-29.14569	2.137301	14716.42	-200700.4
	(173688.)	(21006.2)	(15.0385)	(1.91047)	(35394.7)	(268770.)
D(INF)	-0.079887	0.007952	-3.46E-05	5.22E-06	-0.213316	0.227894
	(0.29328)	(0.03547)	(2.5E-05)	(3.2E-06)	(0.05976)	(0.45382)
D(INTR)	-0.029946	-0.012541	0.000163	-2.45E-06	-0.009239	-0.778562
	(0.26485)	(0.03203)	(2.3E-05)	(2.9E-06)	(0.05397)	(0.40984)
D(BOP)	0.036458	-0.008119	5.06E-07	-6.42E-07	-0.021220	0.065621
	(0.03547)	(0.00429)	(3.1E-06)	(3.9E-07)	(0.00723)	(0.05488)
D(UNE)	45.89649	88.62388	-0.002477	0.000698	142.7593	-1052.317
	(394.007)	(47.6520)	(0.03411)	(0.00433)	(80.2918)	(609.697)

7 Cointegrating Equation(s):	Log likelihood	-6639.510

Normalized cointegrating coefficients (standard error in parentheses)

NEGROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-0.000160
							(7.5E-05)
0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-0.004055
							(0.00088)
0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	2.470046
							(0.70402)
0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	25.51104
							(23.4396)
0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.001659
							(0.00041)
0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000564
							(0.00017)
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000136
							(0.00016)

Adjustment coefficients (standard error in parentheses)

D(NEGROP)	-1.355919	0.041758	-1.55E-05	-3.14E-06	0.080860	-0.250361	0.098025
	(0.25463)	(0.03116)	(2.2E-05)	(2.9E-06)	(0.05248)	(0.39082)	(0.57773)
D(EXCH)	-0.479610	-0.108800	-3.86E-05	5.35E-06	-0.013386	-1.385097	1.728854
	(0.24030)	(0.02940)	(2.1E-05)	(2.7E-06)	(0.04952)	(0.36882)	(0.54520)

D(GDP)	8146.435	-1139.537	-1.949403	0.184133	1507.103	-15395.63	16163.01
	(10995.8)	(1345.46)	(0.94816)	(0.12316)	(2266.06)	(16876.7)	(24948.0)
D(GEX)	115358.9	-17644.97	-30.78762	2.629383	22563.59	-213360.9	204275.4
	(174193.)	(21314.5)	(15.0205)	(1.95112)	(35898.5)	(267358.)	(395221.)
D(INF)	-0.059157	0.004143	-3.33E-05	4.82E-06	-0.219665	0.238137	0.809865
	(0.29554)	(0.03616)	(2.5E-05)	(3.3E-06)	(0.06091)	(0.45360)	(0.67054)
D(INTR)	-0.056953	-0.007578	0.000161	-1.93E-06	-0.000967	-0.791907	0.775194
	(0.26649)	(0.03261)	(2.3E-05)	(3.0E-06)	(0.05492)	(0.40902)	(0.60463)
D(BOP)	0.032737	-0.007435	2.68E-07	-5.71E-07	-0.020080	0.063783	-0.168880
	(0.03568)	(0.00437)	(3.1E-06)	(4.0E-07)	(0.00735)	(0.05476)	(0.08095)
D(UNE)	63.06096	85.47001	-0.001377	0.000369	137.5023	-1043.836	1120.421
	(397.398)	(48.6262)	(0.03427)	(0.00445)	(81.8975)	(609.940)	(901.643)

Date: 07/17/14 Time: 21:17
Sample (adjusted): 1981Q2 2013Q4
Included observations: 131 after adjustments
Trend assumption: Linear deterministic trend
Series: NETROP EXCH GDP GEX INF INTR BOP UNE
Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.628051	320.4279	159.5297	0.0000
At most 1 *	0.356564	190.8691	125.6154	0.0000
At most 2 *	0.311444	133.1069	95.75366	0.0000
At most 3 *	0.233105	84.22312	69.81889	0.0023
At most 4 *	0.210460	49.45507	47.85613	0.0351
At most 5	0.093307	18.49918	29.79707	0.5294
At most 6	0.034338	5.667514	15.49471	0.7344
At most 7	0.008288	1.090230	3.841466	0.2964

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 *	0.628051	129.5588	52.36261	0.0000
At most 1 *	0.356564	57.76216	46.23142	0.0020
At most 2 *	0.311444	48.88380	40.07757	0.0040
At most 3 *	0.233105	34.76805	33.87687	0.0391
At most 4 *	0.210460	30.95589	27.58434	0.0177
At most 5	0.093307	12.83167	21.13162	0.4678
At most 6	0.034338	4.577285	14.26460	0.7940
At most 7	0.008288	1.090230	3.841466	0.2964

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 Cointegrating Coefficients (normalized by b'*S11*b=I):

NETROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
0.068494	0.003414	3.57E-05	-1.98E-06	0.004967	0.032997	-0.155288	1.64E-05
0.502673	0.004328	-6.41E-06	5.57E-07	0.072452	-0.409415	0.437897	-4.74E-05
0.081726	0.024487	7.05E-06	-2.21E-06	0.040224	0.357307	-0.565196	5.49E-05
-0.611768	0.001567	-1.07E-06	1.10E-06	0.029756	-0.098456	0.119280	-3.46E-06
0.022374	0.050980	1.38E-05	-2.28E-06	0.006615	0.282221	-0.351715	-0.000101
0.011733	0.000756	4.66E-06	-2.19E-07	0.032068	-0.205213	-0.109442	-3.01E-05
-0.054977	0.021906	-5.04E-07	-3.56E-07	-0.023955	0.064475	-0.142495	1.34E-06
-0.062306	-0.014783	-6.66E-06	1.39E-06	-0.006601	0.301502	-0.223520	8.06E-07

Unrestricted Adjustment Coefficients (alpha):

D(NETROP)	-0.366799	-0.797208	-0.307312	1.397627	0.022780	-0.121799	0.055233	0.063882
D(EXCH)	-0.220101	0.725295	-1.722677	0.036746	-1.571491	-0.141594	-0.107689	-0.267456
D(GDP)	-29748.82	50188.39	-2616.987	-4205.457	-19036.74	21231.77	30438.80	7775.285
D(GEX)	-505644.8	768076.9	5165.928	-65126.04	-298607.8	309879.3	499453.1	111365.4
D(INF)	-0.612751	-1.048452	-2.008380	-1.364897	0.784446	-1.186736	0.187690	0.158476
D(INTR)	5.314299	0.496624	-1.564798	-0.474779	-0.242961	0.634068	-0.058096	0.142811
D(BOP)	-0.091051	-0.231890	-0.118453	-0.064326	-0.006711	0.181990	-0.000245	-0.026432
D(UNE)	-388.4166	3043.457	-2188.236	885.2779	2718.982	371.2775	158.4320	-193.2812

1 Cointegrating Equation(s): Log likelihood -6676.101

Normalized cointegrating coefficients (standard error in parentheses)

NETROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.049844	0.000521	-2.89E-05	0.072520	0.481752	-2.267174	0.000240
	(0.07126)	(4.6E-05)	(4.6E-06)	(0.10559)	(0.80318)	(0.98074)	(0.00014)

Adjustment coefficients (standard error in parentheses)

D(NETROP)	-0.025124
	(0.02337)
D(EXCH)	-0.015076
	(0.03931)
D(GDP)	-2037.614
	(1531.83)
D(GEX)	-34633.60
	(24129.4)
D(INF)	-0.041970
	(0.04733)
D(INTR)	0.363997
	(0.04019)
D(BOP)	-0.006236
	(0.00564)
D(UNE)	-26.60418
	(64.7355)

2 Cointegrating Equation(s): Log likelihood -6647.220

Normalized cointegrating coefficients (standard error in parentheses)

NETROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	-0.000124	7.38E-06	0.159085	-1.085113	1.526379	-0.000164
		(1.5E-05)	(1.1E-06)	(0.03679)	(0.25735)	(0.28543)	(4.5E-05)
0.000000	1.000000	0.012950	-0.000728	-1.736709	31.43518	-76.10802	0.008104
		(0.00104)	(7.4E-05)	(2.58100)	(18.0544)	(20.0244)	(0.00315)

Adjustment coefficients (standard error in parentheses)

D(NETROP)	-0.425858	-0.004702
	(0.16812)	(0.00183)
D(EXCH)	0.349511	0.002387
	(0.28878)	(0.00314)
D(GDP)	23190.75	115.6368
	(11047.5)	(120.035)
D(GEX)	351458.1	1597.717
	(174287.)	(1893.70)
D(INF)	-0.568998	-0.006629
	(0.34640)	(0.00376)
D(INTR)	0.613637	0.020292
	(0.29657)	(0.00322)
D(BOP)	-0.122801	-0.001314
	(0.04004)	(0.00044)
D(UNE)	1503.260	11.84510
	(453.128)	(4.92342)

3 Cointegrating Equation(s): Log likelihood -6622.778

Normalized cointegrating coefficients (standard error in parentheses)

NETROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	0.000000	1.15E-06	0.130188	-0.950979	1.040111	-0.000110
			(4.1E-07)	(0.02554)	(0.17774)	(0.18802)	(3.1E-05)
0.000000	1.000000	0.000000	-7.97E-05	1.275131	17.45478	-25.42594	0.002486
			(9.7E-06)	(0.59951)	(4.17152)	(4.41288)	(0.00072)
0.000000	0.000000	1.000000	-0.050083	-232.5692	1079.544	-3913.585	0.433790
			(0.00337)	(208.224)	(1448.87)	(1532.70)	(0.24948)

Adjustment coefficients (standard error in parentheses)

D(NETROP)	-0.450974	-0.012227	-1.02E-05
	(0.16953)	(0.00828)	(1.2E-05)
D(EXCH)	0.208724	-0.039796	-2.47E-05
	(0.27835)	(0.01360)	(2.0E-05)
D(GDP)	22976.87	51.55475	-1.402403
	(11189.0)	(546.535)	(0.80463)
D(GEX)	351880.3	1724.215	-22.94179
	(176533.)	(8622.86)	(12.6949)
D(INF)	-0.733135	-0.055808	-2.93E-05
	(0.33485)	(0.01636)	(2.4E-05)
D(INTR)	0.485752	-0.018025	0.000176
	(0.28908)	(0.01412)	(2.1E-05)
D(BOP)	-0.132482	-0.004215	-2.60E-06
	(0.04008)	(0.00196)	(2.9E-06)
D(UNE)	1324.425	-41.73813	-0.048814
	(444.543)	(21.7139)	(0.03197)

4 Cointegrating
Equation(s): Log likelihood -6605.394

Normalized cointegrating coefficients (standard error in parentheses)

NETROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	0.000000	0.000000	0.064200	-0.515950	0.552849	-6.44E-05
				(0.01817)	(0.11309)	(0.10877)	(1.5E-05)
0.000000	1.000000	0.000000	0.000000	5.829778	-12.57205	8.206251	-0.000670
				(0.96541)	(6.00740)	(5.77777)	(0.00082)
0.000000	0.000000	1.000000	0.000000	2628.832	-17784.44	17215.43	-1.549286
				(631.013)	(3926.55)	(3776.46)	(0.53568)
0.000000	0.000000	0.000000	1.000000	57133.74	-376658.1	421884.0	-39.59618
				(11916.4)	(74151.4)	(71316.9)	(10.1161)

Adjustment coefficients (standard error in parentheses)

D(NETROP)	-1.305997	-0.010038	-1.16E-05	2.50E-06
	(0.23795)	(0.00749)	(1.1E-05)	(9.6E-07)
D(EXCH)	0.186244	-0.039738	-2.47E-05	4.69E-06
	(0.43277)	(0.01362)	(2.0E-05)	(1.7E-06)
D(GDP)	25549.64	44.96651	-1.397924	0.088048
	(17393.3)	(547.493)	(0.80481)	(0.06996)
D(GEX)	391722.3	1622.189	-22.87243	1.346471
	(274422.)	(8638.04)	(12.6978)	(1.10379)
D(INF)	0.101865	-0.057947	-2.79E-05	3.57E-06
	(0.50871)	(0.01601)	(2.4E-05)	(2.0E-06)
D(INTR)	0.776207	-0.018768	0.000176	-7.31E-06
	(0.44781)	(0.01410)	(2.1E-05)	(1.8E-06)
D(BOP)	-0.093129	-0.004316	-2.53E-06	2.43E-07
	(0.06210)	(0.00195)	(2.9E-06)	(2.5E-07)
D(UNE)	782.8406	-40.35126	-0.049757	0.008273
	(687.430)	(21.6384)	(0.03181)	(0.00277)

5 Cointegrating
Equation(s): Log likelihood -6589.916

Normalized cointegrating coefficients (standard error in parentheses)

NETROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	0.000000	0.000000	0.000000	-0.411477	0.533620	-0.000108
					(0.12900)	(0.13458)	(1.9E-05)
0.000000	1.000000	0.000000	0.000000	0.000000	-3.085218	6.460141	-0.004610
					(3.37188)	(3.51766)	(0.00050)
0.000000	0.000000	1.000000	0.000000	0.000000	-13506.53	16428.05	-3.325620
					(3402.55)	(3549.66)	(0.50378)
0.000000	0.000000	0.000000	1.000000	0.000000	-283684.0	404771.6	-78.20215
					(62543.2)	(65247.1)	(9.26011)
0.000000	0.000000	0.000000	0.000000	1.000000	-1.627306	0.299516	0.000676
					(1.11736)	(1.16566)	(0.00017)

Adjustment coefficients (standard error in parentheses)

D(NETROP)	-1.305487	-0.008877	-1.13E-05	2.44E-06	-0.030204
	(0.23804)	(0.01693)	(1.2E-05)	(1.2E-06)	(0.02634)
D(EXCH)	0.151084	-0.119853	-4.65E-05	8.27E-06	-0.027139
	(0.41373)	(0.02943)	(2.0E-05)	(2.0E-06)	(0.04578)
D(GDP)	25123.72	-925.5271	-1.661528	0.131432	3132.141

	(17331.4)	(1232.66)	(0.85602)	(0.08543)	(1917.70)
D(GEX)	385041.4	-13600.85	-27.00728	2.026984	49431.54
	(273458.)	(19449.1)	(13.5064)	(1.34790)	(30257.7)
D(INF)	0.119416	-0.017956	-1.70E-05	1.78E-06	-0.195215
	(0.50491)	(0.03591)	(2.5E-05)	(2.5E-06)	(0.05587)
D(INTR)	0.770771	-0.031155	0.000173	-6.76E-06	-0.016299
	(0.44755)	(0.03183)	(2.2E-05)	(2.2E-06)	(0.04952)
D(BOP)	-0.093279	-0.004658	-2.62E-06	2.58E-07	-0.023976
	(0.06212)	(0.00442)	(3.1E-06)	(3.1E-07)	(0.00687)
D(UNE)	843.6741	98.26256	-0.012107	0.002077	174.8827
	(651.340)	(46.3253)	(0.03217)	(0.00321)	(72.0699)

6 Cointegrating Equation(s): Log likelihood -6583.501

Normalized cointegrating coefficients (standard error in parentheses)

NETROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.869080	3.01E-05
						(0.25764)	(6.7E-05)
0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	8.975389	-0.003576
						(2.55184)	(0.00066)
0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	27439.35	1.201429
						(8524.68)	(2.20619)
0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	636047.2	16.88162
						(177507.)	(45.9388)
0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	1.626189	0.001221
						(1.29442)	(0.00033)
0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.815258	0.000335
						(0.62204)	(0.00016)

Adjustment coefficients (standard error in parentheses)

D(NETROP)	-1.306916	-0.008969	-1.19E-05	2.47E-06	-0.034110	0.098300
	(0.23786)	(0.01692)	(1.2E-05)	(1.2E-06)	(0.02799)	(0.19464)
D(EXCH)	0.149423	-0.119960	-4.71E-05	8.30E-06	-0.031679	-1.337802
	(0.41362)	(0.02942)	(2.1E-05)	(2.0E-06)	(0.04868)	(0.33845)
D(GDP)	25372.83	-909.4745	-1.562645	0.126790	3812.992	-31780.15
	(17247.4)	(1226.66)	(0.85769)	(0.08514)	(2029.77)	(14113.3)
D(GEX)	388677.3	-13366.56	-25.56407	1.959231	59368.62	-470754.2
	(272328.)	(19368.4)	(13.5425)	(1.34425)	(32049.1)	(222842.)
D(INF)	0.105492	-0.018853	-2.25E-05	2.04E-06	-0.233271	0.290728
	(0.49570)	(0.03525)	(2.5E-05)	(2.4E-06)	(0.05834)	(0.40562)
D(INTR)	0.778211	-0.030675	0.000176	-6.90E-06	0.004034	-0.739025
	(0.44463)	(0.03162)	(2.2E-05)	(2.2E-06)	(0.05233)	(0.36384)
D(BOP)	-0.091144	-0.004520	-1.78E-06	2.18E-07	-0.018140	0.016703
	(0.06035)	(0.00429)	(3.0E-06)	(3.0E-07)	(0.00710)	(0.04938)
D(UNE)	848.0304	98.54327	-0.010378	0.001996	186.7887	-1436.727
	(650.713)	(46.2798)	(0.03236)	(0.00321)	(76.5796)	(532.468)

7 Cointegrating Equation(s): Log likelihood -6581.212

Normalized cointegrating coefficients (standard error in parentheses)

NETROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.001316

							(0.00056)
0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.009706
							(0.00567)
0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	41.80425
							(17.7803)
0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	958.0597
							(410.751)
0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.003627
							(0.00116)
0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.001542
							(0.00057)
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	-0.001480
							(0.00063)

Adjustment coefficients (standard error in parentheses)

D(NETROP)	-1.309953	-0.007759	-1.19E-05	2.45E-06	-0.035433	0.101861	0.045712
	(0.23838)	(0.01813)	(1.2E-05)	(1.2E-06)	(0.02888)	(0.19555)	(0.24990)
D(EXCH)	0.155343	-0.122319	-4.71E-05	8.34E-06	-0.029100	-1.344745	1.913375
	(0.41450)	(0.03152)	(2.1E-05)	(2.0E-06)	(0.05022)	(0.34002)	(0.43453)
D(GDP)	23699.41	-242.6773	-1.577986	0.115950	3083.834	-29817.61	27608.94
	(17109.9)	(1301.02)	(0.84891)	(0.08460)	(2072.95)	(14035.4)	(17936.9)
D(GEX)	361219.0	-2425.460	-25.81580	1.781363	47404.28	-438552.0	404112.5
	(269931.)	(20525.3)	(13.3927)	(1.33468)	(32703.5)	(221427.)	(282977.)
D(INF)	0.095173	-0.014741	-2.26E-05	1.98E-06	-0.237767	0.302830	0.435594
	(0.49663)	(0.03776)	(2.5E-05)	(2.5E-06)	(0.06017)	(0.40739)	(0.52064)
D(INTR)	0.781405	-0.031948	0.000176	-6.88E-06	0.005426	-0.742771	0.244348
	(0.44566)	(0.03389)	(2.2E-05)	(2.2E-06)	(0.05399)	(0.36558)	(0.46720)
D(BOP)	-0.091131	-0.004526	-1.78E-06	2.18E-07	-0.018134	0.016688	-0.045651
	(0.06049)	(0.00460)	(3.0E-06)	(3.0E-07)	(0.00733)	(0.04962)	(0.06341)
D(UNE)	839.3203	102.0139	-0.010458	0.001939	182.9934	-1426.512	1715.901
	(652.123)	(49.5870)	(0.03236)	(0.00322)	(79.0080)	(534.944)	(683.642)

Date: 07/17/14 Time: 21:19
Sample (adjusted): 1981Q2 2013Q4
Included observations: 131 after adjustments
Trend assumption: Quadratic deterministic trend
Series: NETROP EXCH GDP GEX INF INTR BOP UNE
Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.630995	329.5230	175.1715	0.0000
At most 1 *	0.337806	198.9232	139.2753	0.0000
At most 2 *	0.317779	144.9255	107.3466	0.0000
At most 3 *	0.224713	94.83094	79.34145	0.0022
At most 4 *	0.212511	61.48863	55.24578	0.0128
At most 5	0.148327	30.19188	35.01090	0.1496
At most 6	0.065076	9.159451	18.39771	0.5638
At most 7	0.002626	0.344523	3.841466	0.5572

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 *	0.630995	130.5998	55.72819	0.0000
At most 1 *	0.337806	53.99769	49.58633	0.0164
At most 2 *	0.317779	50.09460	43.41977	0.0082
At most 3	0.224713	33.34231	37.16359	0.1291
At most 4 *	0.212511	31.29675	30.81507	0.0436
At most 5	0.148327	21.03243	24.25202	0.1261
At most 6	0.065076	8.814928	17.14769	0.5149
At most 7	0.002626	0.344523	3.841466	0.5572

Max-eigenvalue test indicates 3 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 Cointegrating Coefficients (normalized by b'*S11*b=I):

NETROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
0.069564	0.005461	3.40E-05	-1.46E-06	0.006657	-0.007428	-0.060101	2.05E-05
0.514518	0.001178	-1.13E-05	2.17E-06	0.059539	-0.569527	0.774742	-5.48E-05
0.304025	0.023832	8.13E-06	-2.55E-06	0.061448	0.220218	-0.466738	2.41E-05
-0.518507	0.015479	6.72E-07	9.91E-07	0.045256	-0.110082	0.156593	-2.65E-05
0.116358	0.040069	1.74E-05	-3.34E-06	-0.011057	0.321485	-0.510152	-0.000109
0.008703	-0.028728	9.54E-06	-1.82E-06	0.014428	-0.192886	-0.198636	-2.85E-05
-0.034506	0.017127	-3.29E-06	1.25E-06	0.016412	-0.062156	-0.049827	-1.01E-05
-0.028432	-0.028253	-2.58E-06	5.35E-07	-0.003220	0.304969	-0.276069	-6.73E-06

Unrestricted Adjustment Coefficients (alpha):

D(NETROP)	-0.337885	-0.733877	-0.711937	1.268616	-0.275454	-0.178711	0.028619	-0.028308
D(EXCH)	-0.365749	0.875321	-1.379073	-0.467850	-1.059235	1.147763	-0.713794	0.020007
D(GDP)	-34171.86	39002.05	10875.53	-9092.756	-13871.09	12842.30	30120.63	-8149.131
D(GEX)	-585764.0	556047.8	208969.0	-154796.1	-203380.6	212429.3	444957.8	-133357.4
D(INF)	-0.369275	0.222076	-2.256429	-1.178492	0.809856	-1.592307	-0.314484	-0.075434
D(INTR)	5.389670	1.174067	-1.175376	-0.395912	-0.088934	0.423634	0.547423	0.016209
D(BOP)	-0.091542	-0.186195	-0.155358	-0.093307	0.070086	0.200089	0.072272	0.010522
D(UNE)	-647.7050	3006.472	-819.5747	1483.792	2907.823	903.5556	-165.8229	-33.35995

1 Cointegrating Equation(s): Log likelihood -6667.216

Normalized cointegrating coefficients (standard error in parentheses)

NETROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.078500	0.000489	-2.10E-05	0.095696	-0.106786	-0.863969	0.000295
	(0.07379)	(4.7E-05)	(6.1E-06)	(0.10692)	(0.86327)	(1.23029)	(0.00015)

Adjustment coefficients (standard error in parentheses)

D(NETROP)	-0.023505
	(0.02388)
D(EXCH)	-0.025443
	(0.03981)
D(GDP)	-2377.133
	(1541.97)
D(GEX)	-40748.11
	(24256.5)
D(INF)	-0.025688
	(0.04831)
D(INTR)	0.374927
	(0.04020)
D(BOP)	-0.006368
	(0.00567)
D(UNE)	-45.05697
	(65.4777)

2 Cointegrating Equation(s): Log likelihood -6640.217

Normalized cointegrating coefficients (standard error in parentheses)

NETROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	-3.74E-05	4.98E-06	0.116320	-1.136966	1.576968	-0.000118
		(1.2E-05)	(1.5E-06)	(0.02654)	(0.21463)	(0.30718)	(3.5E-05)
0.000000	1.000000	0.006711	-0.000331	-0.262736	13.12335	-31.09485	0.005261
		(0.00061)	(7.8E-05)	(1.39731)	(11.3004)	(16.1732)	(0.00184)

Adjustment coefficients (standard error in parentheses)

D(NETROP)	-0.401097	-0.002710
	(0.17390)	(0.00187)
D(EXCH)	0.424925	-0.000966
	(0.29352)	(0.00316)
D(GDP)	17690.12	-140.6512
	(11321.6)	(121.817)
D(GEX)	245348.4	-2543.568
	(178628.)	(1921.98)
D(INF)	0.088574	-0.001755
	(0.36036)	(0.00388)
D(INTR)	0.979006	0.030815
	(0.29354)	(0.00316)
D(BOP)	-0.102169	-0.000719
	(0.04115)	(0.00044)
D(UNE)	1501.826	0.005332
	(462.003)	(4.97101)

3 Cointegrating Equation(s): Log likelihood -6615.170

Normalized cointegrating coefficients (standard error in parentheses)

NETROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE

1.000000	0.000000	0.000000	3.96E-06	0.107718	-1.204286	1.631522	-0.000101
			(1.0E-06)	(0.02700)	(0.20937)	(0.27181)	(3.6E-05)
0.000000	1.000000	0.000000	-0.000148	1.282733	25.21807	-40.89587	0.002145
			(2.9E-05)	(0.74948)	(5.81208)	(7.54511)	(0.00099)
0.000000	0.000000	1.000000	-0.027282	-230.3057	-1802.355	1460.548	0.464327
			(0.00924)	(242.908)	(1883.70)	(2445.37)	(0.32110)

Adjustment coefficients (standard error in parentheses)

D(NETROP)	-0.617544	-0.019677	-8.99E-06
	(0.19672)	(0.00800)	(1.2E-05)
D(EXCH)	0.005652	-0.033832	-3.36E-05
	(0.32943)	(0.01340)	(2.0E-05)
D(GDP)	20996.55	118.5341	-1.516219
	(13102.8)	(533.073)	(0.80109)
D(GEX)	308880.2	2436.577	-24.53468
	(206601.)	(8405.31)	(12.6313)
D(INF)	-0.597437	-0.055530	-3.34E-05
	(0.39393)	(0.01603)	(2.4E-05)
D(INTR)	0.621662	0.002803	0.000161
	(0.33242)	(0.01352)	(2.0E-05)
D(BOP)	-0.149402	-0.004422	-2.27E-06
	(0.04672)	(0.00190)	(2.9E-06)
D(UNE)	1252.655	-19.52675	-0.062719
	(533.012)	(21.6850)	(0.03259)

4 Cointegrating Equation(s): Log likelihood -6598.499

Normalized cointegrating coefficients (standard error in parentheses)

NETROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	0.000000	0.000000	0.047597	-0.374438	0.424329	-1.81E-05
				(0.01810)	(0.11507)	(0.10889)	(2.4E-05)
0.000000	1.000000	0.000000	0.000000	3.537058	-5.898031	4.369175	-0.000969
				(0.59161)	(3.76043)	(3.55820)	(0.00080)
0.000000	0.000000	1.000000	0.000000	184.2034	-7523.760	9783.561	-0.108281
				(311.630)	(1980.80)	(1874.28)	(0.42079)
0.000000	0.000000	0.000000	1.000000	15193.76	-209717.2	305078.6	-20.98886
				(5193.28)	(33009.9)	(31234.6)	(7.01241)

Adjustment coefficients (standard error in parentheses)

D(NETROP)	-1.275330	-3.97E-05	-8.14E-06	1.98E-06
	(0.23846)	(0.00870)	(1.1E-05)	(1.1E-06)
D(EXCH)	0.248236	-0.041074	-3.39E-05	5.49E-06
	(0.43323)	(0.01580)	(2.0E-05)	(2.1E-06)
D(GDP)	25711.20	-22.21282	-1.522326	0.097848
	(17281.4)	(630.141)	(0.80049)	(0.08245)
D(GEX)	389143.0	40.48553	-24.63865	1.376619
	(272446.)	(9934.36)	(12.6200)	(1.29982)
D(INF)	0.013619	-0.073772	-3.42E-05	5.62E-06
	(0.51118)	(0.01864)	(2.4E-05)	(2.4E-06)
D(INTR)	0.826945	-0.003325	0.000160	-2.73E-06
	(0.43766)	(0.01596)	(2.0E-05)	(2.1E-06)
D(BOP)	-0.101021	-0.005866	-2.34E-06	3.44E-08
	(0.06121)	(0.00223)	(2.8E-06)	(2.9E-07)

D(UNE)	483.2994	3.440898	-0.061723	0.011036
	(693.276)	(25.2793)	(0.03211)	(0.00331)

5 Cointegrating Equation(s): Log likelihood -6582.850

Normalized cointegrating coefficients (standard error in parentheses)

NETROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	0.000000	0.000000	0.000000	-0.361029	0.473788	-7.67E-05
					(0.12538)	(0.12979)	(2.9E-05)
0.000000	1.000000	0.000000	0.000000	0.000000	-4.901575	8.044652	-0.005323
					(3.92130)	(4.05936)	(0.00092)
0.000000	0.000000	1.000000	0.000000	0.000000	-7471.867	9974.973	-0.335055
					(1861.97)	(1927.53)	(0.43729)
0.000000	0.000000	0.000000	1.000000	0.000000	-205436.8	320867.0	-39.69392
					(38179.5)	(39523.7)	(8.96653)
0.000000	0.000000	0.000000	0.000000	1.000000	-0.281719	-1.039134	0.001231
					(1.36320)	(1.41120)	(0.00032)

Adjustment coefficients (standard error in parentheses)

D(NETROP)	-1.307381	-0.011077	-1.29E-05	2.90E-06	-0.029233
	(0.23995)	(0.01478)	(1.2E-05)	(1.5E-06)	(0.02919)
D(EXCH)	0.124985	-0.083516	-5.23E-05	9.03E-06	-0.044521
	(0.42916)	(0.02643)	(2.2E-05)	(2.7E-06)	(0.05221)
D(GDP)	24097.18	-578.0118	-1.763625	0.144218	2504.821
	(17428.8)	(1073.42)	(0.88359)	(0.10971)	(2120.14)
D(GEX)	365477.9	-8108.748	-28.17663	2.056504	37291.28
	(274850.)	(16927.7)	(13.9340)	(1.73015)	(33434.2)
D(INF)	0.107852	-0.041322	-2.01E-05	2.91E-06	-0.190176
	(0.51236)	(0.03156)	(2.6E-05)	(3.2E-06)	(0.06233)
D(INTR)	0.816597	-0.006888	0.000159	-2.43E-06	0.016624
	(0.44227)	(0.02724)	(2.2E-05)	(2.8E-06)	(0.05380)
D(BOP)	-0.092866	-0.003058	-1.12E-06	-2.00E-07	-0.026239
	(0.06160)	(0.00379)	(3.1E-06)	(3.9E-07)	(0.00749)
D(UNE)	821.6493	119.9541	-0.011139	0.001315	159.3297
	(658.931)	(40.5829)	(0.03341)	(0.00415)	(80.1559)

6 Cointegrating Equation(s): Log likelihood -6572.334

Normalized cointegrating coefficients (standard error in parentheses)

NETROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.168439	7.69E-05
						(0.08222)	(3.4E-05)
0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	3.899023	-0.003238
						(1.49768)	(0.00062)
0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	3655.455	2.843652
						(1385.86)	(0.56931)
0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	147113.7	47.70370
						(27578.9)	(11.3295)
0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	-1.277405	0.001351
						(0.77766)	(0.00032)
0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	-0.845775	0.000425

						(0.18903)	(7.8E-05)

Adjustment coefficients (standard error in parentheses)

D(NETROP)	-1.308937	-0.005943	-1.46E-05	3.22E-06	-0.031812	0.069956
	(0.23951)	(0.01706)	(1.2E-05)	(1.6E-06)	(0.02945)	(0.21630)
D(EXCH)	0.134973	-0.116490	-4.14E-05	6.95E-06	-0.027961	-1.309912
	(0.41876)	(0.02983)	(2.2E-05)	(2.8E-06)	(0.05149)	(0.37817)
D(GDP)	24208.95	-946.9513	-1.641144	0.120852	2690.112	-25499.40
	(17398.1)	(1239.22)	(0.90587)	(0.11639)	(2139.25)	(15711.8)
D(GEX)	367326.6	-14211.51	-26.15063	1.670009	40356.26	-355632.5
	(274314.)	(19538.8)	(14.2828)	(1.83519)	(33729.3)	(247726.)
D(INF)	0.093995	0.004423	-3.53E-05	5.81E-06	-0.213150	0.076582
	(0.49550)	(0.03529)	(2.6E-05)	(3.3E-06)	(0.06093)	(0.44748)
D(INTR)	0.820284	-0.019059	0.000163	-3.21E-06	0.022736	-1.034260
	(0.44093)	(0.03141)	(2.3E-05)	(2.9E-06)	(0.05422)	(0.39819)
D(BOP)	-0.091125	-0.008806	7.92E-07	-5.64E-07	-0.023352	0.066719
	(0.05938)	(0.00423)	(3.1E-06)	(4.0E-07)	(0.00730)	(0.05362)
D(UNE)	829.5126	93.99640	-0.002521	-0.000329	172.3664	-1290.740
	(654.798)	(46.6398)	(0.03409)	(0.00438)	(80.5132)	(591.332)

7 Cointegrating Equation(s): Log likelihood -6567.927

Normalized cointegrating coefficients (standard error in parentheses)

NETROP	EXCH	GDP	GEX	INF	INTR	BOP	UNE
1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	7.80E-05
							(4.1E-05)
0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-0.003212
							(0.00077)
0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	2.868476
							(0.73483)
0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	48.70270
							(22.6465)
0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.001342
							(0.00037)
0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000420
							(0.00015)
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	-6.79E-06
							(0.00015)

Adjustment coefficients (standard error in parentheses)

D(NETROP)	-1.309924	-0.005453	-1.47E-05	3.26E-06	-0.031342	0.068177	0.157282
	(0.23972)	(0.01781)	(1.3E-05)	(1.6E-06)	(0.02985)	(0.21708)	(0.31971)
D(EXCH)	0.159604	-0.128715	-3.90E-05	6.06E-06	-0.039675	-1.265545	1.618483
	(0.41504)	(0.03083)	(2.2E-05)	(2.8E-06)	(0.05169)	(0.37584)	(0.55352)
D(GDP)	23169.59	-431.0847	-1.740177	0.158403	3184.454	-27371.59	28794.98
	(17238.0)	(1280.54)	(0.89948)	(0.11828)	(2146.68)	(15609.9)	(22989.7)
D(GEX)	351972.8	-6590.858	-27.61360	2.224725	47658.93	-383289.5	383612.6
	(272132.)	(20215.4)	(14.1998)	(1.86727)	(33889.0)	(246429.)	(362932.)
D(INF)	0.104847	-0.000963	-3.43E-05	5.42E-06	-0.218311	0.096129	0.981672
	(0.49529)	(0.03679)	(2.6E-05)	(3.4E-06)	(0.06168)	(0.44851)	(0.66055)
D(INTR)	0.801394	-0.009683	0.000161	-2.52E-06	0.031721	-1.068286	1.006213
	(0.43905)	(0.03262)	(2.3E-05)	(3.0E-06)	(0.05468)	(0.39758)	(0.58554)
D(BOP)	-0.093619	-0.007568	5.54E-07	-4.74E-07	-0.022166	0.062227	-0.159952

	(0.05914)	(0.00439)	(3.1E-06)	(4.1E-07)	(0.00736)	(0.05355)	(0.07887)
D(UNE)	835.2346	91.15640	-0.001976	-0.000535	169.6449	-1280.433	1328.397
	(655.262)	(48.6765)	(0.03419)	(0.00450)	(81.6009)	(593.374)	(873.898)

Vector Autoregression Estimates
Date: 07/17/14 Time: 21:21
Sample (adjusted): 1980Q3 2013Q4
Included observations: 134 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	ROP	GEX	GDP	INF	INTR	UNE	EXCH	BOP
ROP(-1)	1.100961	20661.97	2074.047	-0.021070	-0.196999	5.014164	-0.239163	-0.008290
	(0.08937)	(46079.5)	(3198.27)	(0.08488)	(0.38350)	(111.715)	(0.06933)	(0.01253)
	[12.3198]	[0.44840]	[0.64849]	[-0.24823]	[-0.51369]	[0.04488]	[-3.44965]	[-0.66165]
ROP(-2)	-0.254860	29096.86	937.2941	0.008019	0.216875	31.81755	0.198997	-0.011852
	(0.08833)	(45547.4)	(3161.34)	(0.08390)	(0.37907)	(110.425)	(0.06853)	(0.01238)
	[-2.88520]	[0.63883]	[0.29649]	[0.09558]	[0.57212]	[0.28814]	[2.90384]	[-0.95697]
GEX(-1)	3.92E-07	1.019196	0.042356	2.87E-08	1.51E-05	-0.001602	1.11E-07	8.64E-08
	(5.1E-07)	(0.26349)	(0.01829)	(4.9E-07)	(2.2E-06)	(0.00064)	(4.0E-07)	(7.2E-08)
	[0.76714]	[3.86805]	[2.31604]	[0.05907]	[6.86401]	[-2.50787]	[0.27950]	[1.20581]
GEX(-2)	-1.50E-07	0.020663	-0.012121	-5.16E-08	-1.95E-05	0.001184	1.16E-08	-5.09E-08
	(4.2E-07)	(0.21522)	(0.01494)	(4.0E-07)	(1.8E-06)	(0.00052)	(3.2E-07)	(5.9E-08)
	[-0.35877]	[0.09601]	[-0.81147]	[-0.13013]	[-10.9026]	[2.26983]	[0.03576]	[-0.86945]
GDP(-1)	-4.58E-06	3.594417	0.980693	6.97E-07	-0.000229	0.022357	-2.37E-06	-9.01E-07
	(7.4E-06)	(3.80874)	(0.26436)	(7.0E-06)	(3.2E-05)	(0.00923)	(5.7E-06)	(1.0E-06)
	[-0.61992]	[0.94373]	[3.70975]	[0.09935]	[-7.22219]	[2.42114]	[-0.41289]	[-0.86968]
GDP(-2)	3.85E-06	-5.063507	-0.151649	-4.04E-07	0.000324	-0.020821	1.45E-06	8.25E-07
	(6.9E-06)	(3.56170)	(0.24721)	(6.6E-06)	(3.0E-05)	(0.00863)	(5.4E-06)	(9.7E-07)
	[0.55679]	[-1.42165]	[-0.61344]	[-0.06158]	[10.9144]	[-2.41122]	[0.27121]	[0.85173]
INF(-1)	0.042097	3897.147	-223.6190	0.966965	-0.072987	149.8203	-0.001796	0.003765
	(0.09866)	(50872.8)	(3530.97)	(0.09371)	(0.42339)	(123.336)	(0.07654)	(0.01383)
	[0.42668]	[0.07661]	[-0.06333]	[10.3183]	[-0.17239]	[1.21473]	[-0.02347]	[0.27221]
INF(-2)	-0.010255	22986.81	2059.655	-0.133576	0.058316	-59.39085	-0.049697	-0.003550
	(0.09852)	(50801.8)	(3526.03)	(0.09358)	(0.42280)	(123.164)	(0.07643)	(0.01381)
	[-0.10409]	[0.45248]	[0.58413]	[-1.42736]	[0.13793]	[-0.48221]	[-0.65019]	[-0.25703]
INTR(-1)	0.273753	-27704.27	4233.507	-0.447924	1.869603	938.4666	-0.488474	-0.127128
	(0.51469)	(265388.)	(18420.0)	(0.48888)	(2.20871)	(643.407)	(0.39929)	(0.07216)
	[0.53188]	[-0.10439]	[0.22983]	[-0.91623]	[0.84647]	[1.45859]	[-1.22335]	[-1.76175]
INTR(-2)	-0.174604	-208878.0	-22547.51	0.960863	-0.843253	-1634.420	0.440742	0.142794
	(0.52221)	(269265.)	(18689.0)	(0.49602)	(2.24097)	(652.805)	(0.40513)	(0.07321)
	[-0.33436]	[-0.77574]	[-1.20646]	[1.93715]	[-0.37629]	[-2.50369]	[1.08792]	[1.95036]
UNE(-1)	3.26E-05	-6.697207	-1.456971	-4.66E-05	-0.000392	0.352259	7.54E-05	1.27E-05
	(6.8E-05)	(35.0648)	(2.43377)	(6.5E-05)	(0.00029)	(0.08501)	(5.3E-05)	(9.5E-06)
	[0.47908]	[-0.19100]	[-0.59865]	[-0.72206]	[-1.34401]	[4.14369]	[1.42840]	[1.33237]

UNE(-2)	-8.66E-06	-7.528417	0.380826	1.58E-05	0.000523	0.258242	-2.89E-05	-3.53E-06
	(6.5E-05)	(33.5454)	(2.32831)	(6.2E-05)	(0.00028)	(0.08133)	(5.0E-05)	(9.1E-06)
	[-0.13317]	[-0.22442]	[0.16356]	[0.25551]	[1.87402]	[3.17535]	[-0.57320]	[-0.38706]
EXCH(-1)	0.110276	40221.50	1604.782	-0.035011	-0.170518	-127.4917	1.021961	-0.013522
	(0.11642)	(60027.5)	(4166.37)	(0.11058)	(0.49958)	(145.531)	(0.09032)	(0.01632)
	[0.94726]	[0.67005]	[0.38517]	[-0.31662]	[-0.34132]	[-0.87605]	[11.3155]	[-0.82848]
EXCH(-2)	-0.079867	-30975.73	-1427.882	0.034674	0.161897	224.2713	-0.025204	0.011496
	(0.11743)	(60548.9)	(4202.56)	(0.11154)	(0.50392)	(146.795)	(0.09110)	(0.01646)
	[-0.68014]	[-0.51158]	[-0.33977]	[0.31087]	[0.32127]	[1.52779]	[-0.27666]	[0.69825]
BOP(-1)	-0.267347	343291.8	17262.96	0.444816	0.282337	-568.6597	0.905824	1.510383
	(0.66882)	(344865.)	(23936.3)	(0.63528)	(2.87016)	(836.089)	(0.51887)	(0.09377)
	[-0.39973]	[0.99544]	[0.72121]	[0.70019]	[0.09837]	[-0.68014]	[1.74576]	[16.1073]
BOP(-2)	-0.454616	-16105.01	6933.926	-0.772525	-0.265148	1416.952	-0.863052	-0.676169
	(0.68639)	(353925.)	(24565.1)	(0.65197)	(2.94557)	(858.056)	(0.53250)	(0.09623)
	[-0.66232]	[-0.04550]	[0.28227]	[-1.18490]	[-0.09002]	[1.65135]	[-1.62075]	[-7.02633]
C	12.10874	-3954424.	-238283.2	3.457937	-9.858365	3236.625	2.727272	2.710193
	(4.77400)	(2461620)	(170855.)	(4.53460)	(20.4870)	(5967.95)	(3.70366)	(0.66932)
	[2.53639]	[-1.60643]	[-1.39465]	[0.76257]	[-0.48120]	[0.54233]	[0.73637]	[4.04915]
R-squared	0.936914	0.954037	0.986411	0.819145	0.758847	0.781419	0.991513	0.942826
Adj. R-squared	0.928286	0.947751	0.984553	0.794413	0.725868	0.751527	0.990352	0.935008
Sum sq. resids	7193.275	1.91E+15	9.21E+12	6489.915	132470.3	1.12E+10	4329.359	141.3947
S.E. equation	7.840981	4043045.	280618.3	7.447775	33.64854	9801.950	6.083015	1.099319
F-statistic	108.5999	151.7814	530.8172	33.12054	23.01051	26.14184	854.2948	120.5873
Log likelihood	-457.0029	-2219.524	-1862.045	-450.1088	-652.1881	-1412.553	-422.9852	-193.7367
Akaike AIC	7.074670	33.38096	28.04544	6.971773	9.987882	21.33662	6.566943	3.145324
Schwarz SC	7.442307	33.74860	28.41308	7.339410	10.35552	21.70425	6.934580	3.512960
Mean dependent	52.59164	5321280.	620269.4	20.88888	17.35724	39550.64	64.19052	12.87663
S.D. dependent	29.27989	17687625	2257843.	16.42589	64.26679	19664.05	61.93095	4.312139

Determinant resid covariance (dof adj.)	2.01E+39
Determinant resid covariance	6.80E+38
Log likelihood	-7511.944
Akaike information criterion	114.1484
Schwarz criterion	117.0895

VAR Lag Order Selection Criteria
Endogenous variables: ROP GEX GDP INF INTR UNE EXCH BOP
Exogenous variables: C
Date: 07/17/14 Time: 21:24
Sample: 1980Q1 2013Q4
Included observations: 131

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-8571.285	NA	1.06e+47	130.9814	131.1570	131.0528
1	-7465.447	2059.728	1.31e+40	115.0755	116.6558	115.7177

2	-7348.944	202.7686	5.94e+39	114.2740	117.2589	115.4869
3	-7035.231	507.6879	1.35e+38	110.4615	114.8512	112.2452
4	-6880.817	231.0328	3.56e+37	109.0812	114.8755	111.4356
5	-6671.634	287.4268*	4.23e+36*	106.8646*	114.0636*	109.7899*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

VAR Lag Order Selection Criteria
Endogenous variables: POROP GEX GDP INF INTR UNE EXCH BOP
Exogenous variables: C
Date: 07/17/14 Time: 21:25
Sample: 1980Q1 2013Q4
Included observations: 131

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-8378.340	NA	5.56e+45	128.0357	128.2113	128.1071
1	-7374.704	1869.367	3.28e+39	113.6901	115.2704	114.3323
2	-7268.153	185.4486	1.73e+39	113.0405	116.0254	114.2534
3	-6944.415	523.9120	3.37e+37	109.0750	113.4646	110.8587
4	-6785.481	237.7934	8.32e+36	107.6257	113.4200	109.9801
5	-6574.140	290.3921*	9.55e+35*	105.3762*	112.5752*	108.3015*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

VAR Lag Order Selection Criteria
Endogenous variables: NEGROP GEX GDP INF INTR UNE
Exogenous variables: C
Date: 07/17/14 Time: 21:28
Sample: 1980Q1 2013Q4
Included observations: 127

Lag	LogL	LR	FPE
0	-8184.527	NA	1.48e+46
1	-7215.429	1800.843	9.59e+39
2	-7113.037	177.3730	5.30e+39
3	-6808.908	488.5217	1.24e+38
4	-6643.780	244.4414	2.67e+37
5	-6429.379	290.3702	2.75e+36
6	-6358.471	87.09888	2.85e+36
7	-6154.220	225.1594	3.88e+35
8	-5964.349	185.3856	7.23e+34
9	-5796.398	142.8244*	2.15e+34*

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

VAR Lag Order Selection Criteria
Endogenous variables: NETROP GEX GDP INF INTR UNE
Exogenous variables: C
Date: 07/17/14 Time: 21:31
Sample: 1980Q1 2013Q4
Included observations: 131

Lag	LogL	LR	FPE
0	-8363.522	NA	4.44e+45
1	-7360.566	1868.101	2.64e+39
2	-7255.814	182.3164	1.43e+39
3	-6934.331	520.2617	2.89e+37
4	-6787.067	220.3343	8.52e+36
5	-6580.667	283.6035*	1.06e+36*

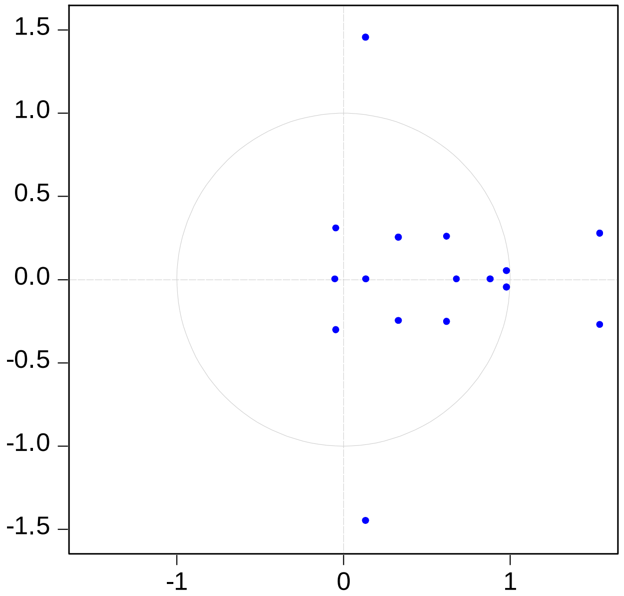
* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% lev
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Roots of Characteristic Polynomial
Endogenous variables: ROP GEX GDP INF INTR UNE
EXCH BOP
Exogenous variables: C
Lag specification: 1 2
Date: 07/17/14 Time: 21:38

Root	Modulus
1.543564 - 0.274473i	1.567777
1.543564 + 0.274473i	1.567777
0.137154 - 1.452062i	1.458525
0.137154 + 1.452062i	1.458525
0.982243 - 0.048362i	0.983433
0.982243 + 0.048362i	0.983433
0.885177	0.885177
0.683698	0.683698
0.623367 - 0.255974i	0.673877
0.623367 + 0.255974i	0.673877
0.334249 - 0.250262i	0.417557
0.334249 + 0.250262i	0.417557
-0.040181 - 0.304992i	0.307628
-0.040181 + 0.304992i	0.307628
0.138826	0.138826
-0.046473	0.046473

Warning: At least one root outside the unit circle.
VAR does not satisfy the stability condition.

Inverse Roots of AR Characteristic Polynomial

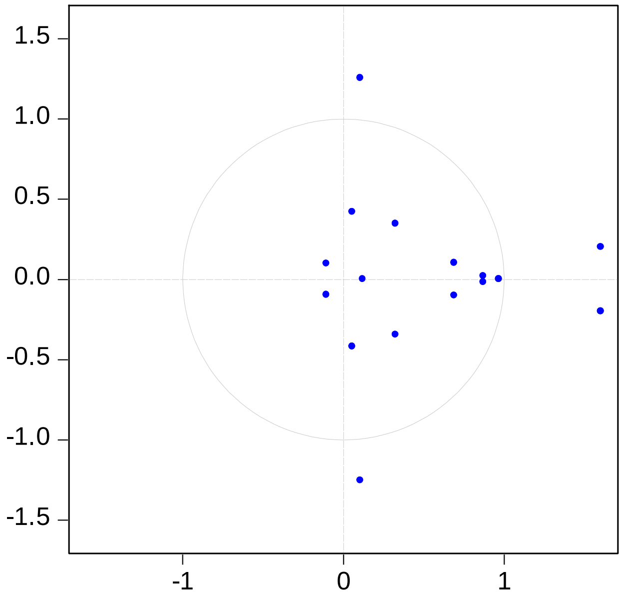


Roots of Characteristic Polynomial
Endogenous variables: POROP GEX GDP INF INTR UNE EXCH BOP
Exogenous variables: C
Lag specification: 1 2
Date: 07/17/14 Time: 21:40

Root	Modulus
1.604046 - 0.199665i	1.616425
1.604046 + 0.199665i	1.616425
0.107010 - 1.255075i	1.259628
0.107010 + 1.255075i	1.259628
0.968830	0.968830
0.872026 - 0.019235i	0.872238
0.872026 + 0.019235i	0.872238
0.691763 - 0.101685i	0.699197
0.691763 + 0.101685i	0.699197
0.326403 - 0.345935i	0.475616
0.326403 + 0.345935i	0.475616
0.057053 - 0.418821i	0.422689
0.057053 + 0.418821i	0.422689
-0.103750 - 0.097423i	0.142321
-0.103750 + 0.097423i	0.142321
0.121980	0.121980

Warning: At least one root outside the unit circle.
VAR does not satisfy the stability condition.

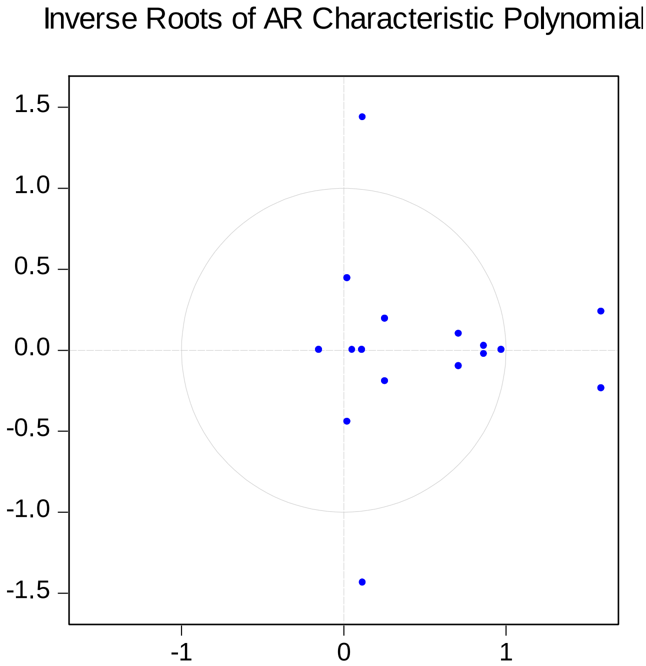
Inverse Roots of AR Characteristic Polynomial



Roots of Characteristic Polynomial
Endogenous variables: NEGROP GEX GDP INF INTR UNE EXCH BOP
Exogenous variables: C
Lag specification: 1 2
Date: 07/17/14 Time: 21:41

Root	Modulus
1.589242 - 0.235776i	1.606636
1.589242 + 0.235776i	1.606636
0.118679 - 1.436674i	1.441567
0.118679 + 1.436674i	1.441567
0.973205	0.973205
0.866840 - 0.025092i	0.867203
0.866840 + 0.025092i	0.867203
0.710623 - 0.099655i	0.717577
0.710623 + 0.099655i	0.717577
0.024495 - 0.443218i	0.443895
0.024495 + 0.443218i	0.443895
0.256264 - 0.192689i	0.320625
0.256264 + 0.192689i	0.320625
-0.150630	0.150630
0.115048	0.115048
0.055576	0.055576

Warning: At least one root outside the unit circle.
VAR does not satisfy the stability condition.

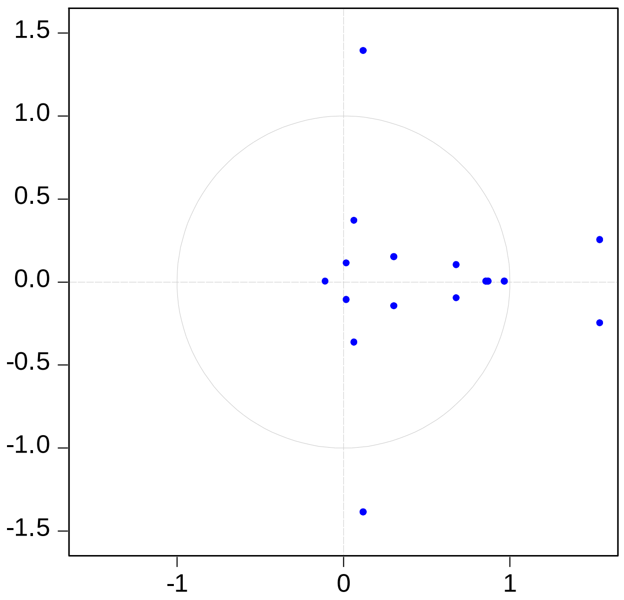


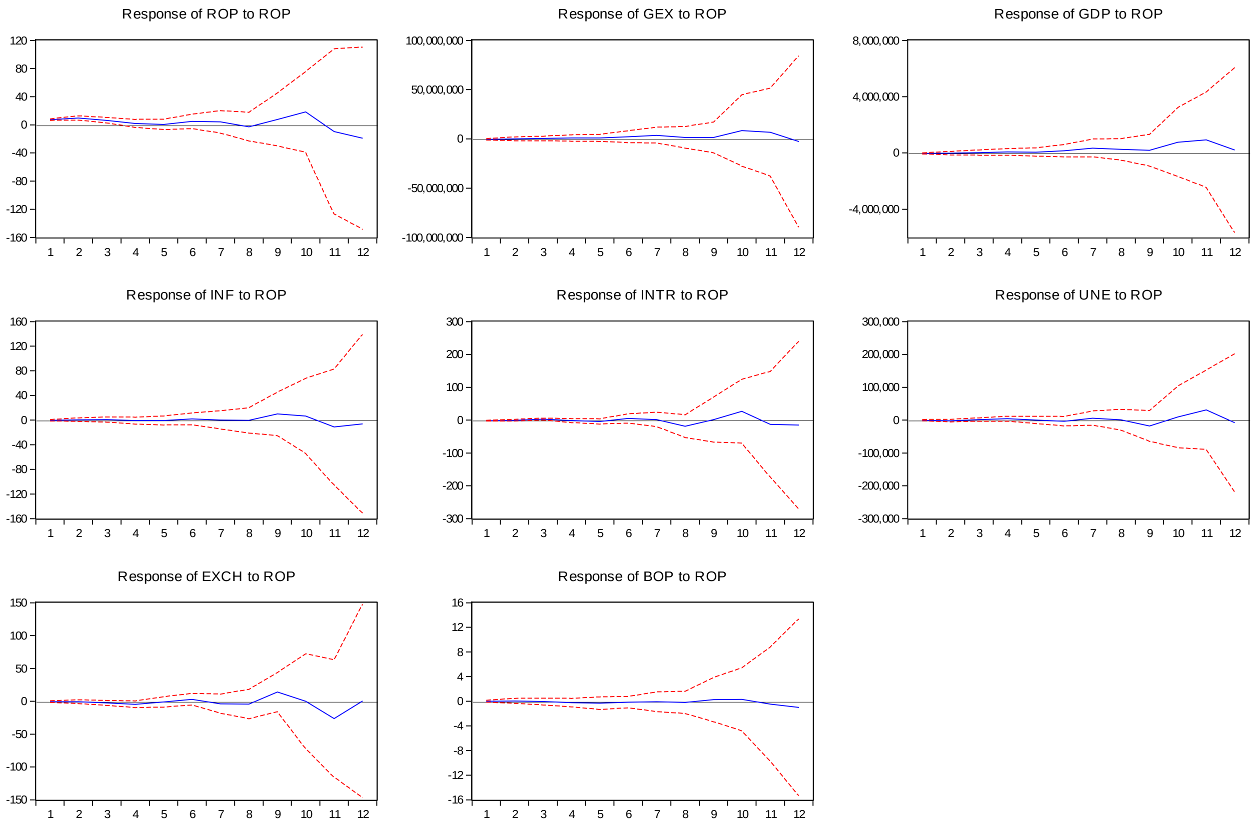
Roots of Characteristic Polynomial
Endogenous variables: NETROP GEX GDP INF INTR UNE EXCH BOP
Exogenous variables: C
Lag specification: 1 2
Date: 07/17/14 Time: 21:37

Root	Modulus
1.544520 - 0.251253i	1.564822
1.544520 + 0.251253i	1.564822
0.122668 - 1.388934i	1.394341
0.122668 + 1.388934i	1.394341
0.969802	0.969802
0.872433	0.872433
0.859931	0.859931
0.682254 - 0.100730i	0.689650
0.682254 + 0.100730i	0.689650
0.067542 - 0.366906i	0.373071
0.067542 + 0.366906i	0.373071
0.306163 - 0.148190i	0.340141
0.306163 + 0.148190i	0.340141
0.021646 - 0.109085i	0.111212
0.021646 + 0.109085i	0.111212
-0.104753	0.104753

Warning: At least one root outside the unit circle.
VAR does not satisfy the stability condition.

Inverse Roots of AR Characteristic Polynomial





Variance Decomposition of ROP:									
Period	S.E.	ROP	BOP	EXCH	GDP	GEX	INF	INTR	UNE
1	7.323106	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	12.24506	97.41116	0.007010	0.011379	0.316293	1.074387	0.060070	1.088884	0.030814
3	14.03902	94.65539	0.012557	0.133255	0.353358	1.088227	0.046525	3.406191	0.304495
4	15.02748	84.21257	0.026002	0.305111	2.697908	8.910229	0.160199	3.167735	0.520249
5	15.40710	80.25970	0.024872	0.426945	3.762230	9.869041	0.424910	4.734920	0.497379
6	18.27705	64.06981	0.681042	0.887422	2.752189	24.33827	1.106872	5.796988	0.367409
7	19.14916	62.94090	0.800846	0.818645	4.568393	22.19160	1.618275	6.401028	0.660310
8	21.24205	52.81363	1.180999	0.670353	7.417700	28.39208	1.451852	7.448111	0.625281
9	36.90323	21.87388	0.391419	1.271851	49.90540	22.98637	0.518604	2.718917	0.333550
10	90.59725	7.707188	0.161338	0.547205	85.76281	4.760185	0.091313	0.905911	0.064054
11	122.0520	4.839614	0.362926	0.389808	82.94250	9.478908	0.050483	1.859160	0.076603
12	138.2171	5.674392	1.466889	0.648899	78.04543	8.128854	0.043570	5.930853	0.061108

Variance Decomposition of BOP:									
Period	S.E.	ROP	BOP	EXCH	GDP	GEX	INF	INTR	UNE
1	0.885157	0.006000	99.99400	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	1.466194	0.147489	94.16923	0.071090	0.568899	1.839791	0.182197	1.497976	1.523324
3	2.004167	0.159861	91.41913	0.954609	2.220090	1.029241	0.338385	0.845672	3.033014
4	2.557403	0.903698	87.98282	1.275566	3.290216	0.780326	0.489807	0.574996	4.702574
5	2.851623	1.983904	80.33179	2.642223	6.973414	0.652221	0.753722	0.794867	5.867857
6	3.059986	1.992244	73.33133	4.162481	12.60427	0.726159	0.820881	0.735470	5.627163
7	3.244240	1.854995	66.36189	4.777919	17.90185	1.468912	0.793242	1.818531	5.022657
8	3.398919	2.012025	60.72747	5.528404	22.44885	1.343965	0.722687	2.383183	4.833412
9	4.313388	1.636697	37.90453	3.441278	48.18641	1.500641	0.732108	3.126396	3.471936
10	6.577159	0.915565	16.30242	1.636922	75.93853	0.821486	0.590511	1.988620	1.805946
11	8.698062	0.786538	9.424068	1.090180	81.60855	3.264525	0.591047	1.877082	1.358006
12	11.11275	1.272169	6.251675	1.025582	84.14761	2.482253	0.602847	3.128128	1.089733

Variance Decomposition of EXCH:									
Period	S.E.	ROP	BOP	EXCH	GDP	GEX	INF	INTR	UNE
1	6.013852	0.904118	3.514724	95.58116	0.000000	0.000000	0.000000	0.000000	0.000000
2	10.00249	0.915105	2.883072	67.13104	1.342041	15.37365	0.120792	12.23129	0.003015
3	11.39919	6.215001	5.513694	64.83198	1.047132	12.21313	0.098603	9.421504	0.658957
4	13.25228	16.57917	8.171138	56.13910	0.785311	9.850210	0.076817	7.697607	0.700651
5	16.45238	11.18264	6.967002	44.29482	0.980273	29.78665	0.056896	5.273361	1.458350
6	19.25323	10.53000	5.586181	35.42633	0.721403	37.47486	0.049717	9.035413	1.176089
7	20.28988	13.04772	6.602889	33.21594	2.503832	35.24300	0.119375	8.187778	1.079462
8	22.21552	14.72406	6.821097	29.76773	2.116343	37.58761	0.367448	6.838036	1.777670
9	71.89148	5.157037	0.655232	3.820556	76.29012	11.65403	0.062907	2.116393	0.243721
10	104.9692	2.419039	0.399816	2.008476	87.69458	6.300844	0.054117	1.005864	0.117260
11	118.0116	6.923875	0.813403	1.782499	74.32536	10.97010	0.094119	4.995487	0.095163
12	144.8199	4.597921	1.935611	1.995851	75.21485	11.78984	0.127992	4.271870	0.066067

Variance Decomposition of GDP:									
Period	S.E.	ROP	BOP	EXCH	GDP	GEX	INF	INTR	UNE
1	260328.0	1.618005	0.002737	0.349001	98.03026	0.000000	0.000000	0.000000	0.000000
2	513297.4	0.555509	0.189286	0.330876	98.83875	0.083991	0.000540	5.10E-05	0.001001
3	722923.0	0.384586	0.759134	0.375704	95.57403	1.847064	0.001855	1.050728	0.006902
4	923610.6	0.779131	1.805717	0.448644	91.99018	2.115258	0.013145	2.765219	0.082701
5	1167389.	0.775455	3.041139	0.664277	90.92288	1.345290	0.019624	3.143989	0.087343
6	1508220.	1.545544	3.245213	0.716061	85.12555	3.795525	0.050204	5.461471	0.060433
7	1939908.	4.087209	2.999998	0.806893	73.80579	7.955545	0.100239	10.18999	0.054334

8	2334303.	3.991355	3.425424	1.160419	72.89530	6.159409	0.149078	12.08345	0.135562
9	2721370.	3.451595	3.974879	1.195922	71.91443	6.342969	0.188985	12.80103	0.130186
10	3171207.	8.380195	3.847645	0.894486	54.39258	15.57760	0.226257	16.54906	0.132168
11	4697917.	7.820108	1.964820	0.423372	69.75169	8.703431	0.159114	10.97636	0.201106
12	7214349.	3.404558	0.840181	0.298454	86.56788	3.972979	0.082513	4.665314	0.168118

Variance Decomposition of GEX:

Period	S.E.	ROP	BOP	EXCH	GDP	GEX	INF	INTR	UNE
1	4107621.	1.466499	0.008622	0.222243	97.97921	0.323425	0.000000	0.000000	0.000000
2	6696315.	0.555242	0.268672	0.233283	98.47742	0.460783	0.000739	8.33E-05	0.003775
3	8357364.	0.595455	1.086612	0.296763	94.06255	2.569650	0.001748	1.376307	0.010914
4	9998488.	1.167336	2.381636	0.348355	90.17765	2.669008	0.018735	3.054852	0.182426
5	11493413	1.588065	4.099173	0.586353	87.97118	2.022560	0.027933	3.531629	0.173107
6	13902868	3.348579	4.045083	0.634901	75.83486	7.822362	0.092095	8.103492	0.118626
7	17303838	6.693656	3.329907	0.775970	62.58475	12.09947	0.171904	14.19137	0.152968
8	19525643	5.878241	3.839207	1.290002	63.68586	9.507353	0.236693	15.16654	0.396110
9	21273046	5.404718	4.353358	1.211347	59.34583	12.28964	0.303825	16.71658	0.374706
10	31410836	9.873173	2.209051	0.635665	56.74073	17.28259	0.196956	12.84973	0.212106
11	57992642	4.288482	0.648672	0.289403	85.18431	5.070886	0.073512	4.264241	0.180489
12	91575209	1.802504	0.448615	0.371655	92.22106	2.822537	0.030364	2.198766	0.104493

Variance Decomposition of INF:

Period	S.E.	ROP	BOP	EXCH	GDP	GEX	INF	INTR	UNE
1	7.177661	0.360411	6.932388	0.035903	0.512440	0.230961	91.92790	0.000000	0.000000
2	10.20082	0.366849	5.248103	0.034975	0.659688	6.374895	80.71405	6.565066	0.036374
3	11.64316	0.565184	4.085268	0.493156	0.587563	5.288688	79.80569	8.873997	0.300454
4	12.72879	1.003749	4.774553	1.798873	1.828235	6.038357	75.60762	8.274133	0.674483
5	13.33779	1.134108	4.383696	1.698172	2.374634	7.504407	74.56403	7.545910	0.795041
6	14.03257	2.962427	3.960394	1.603093	3.594322	9.179423	70.10238	7.041052	1.556909
7	15.13465	2.556397	4.064918	1.414925	7.095908	12.73600	61.64642	7.754444	2.730991
8	15.76704	2.447843	4.551947	1.333554	7.699032	11.73649	57.49108	11.55890	3.181149
9	46.34834	5.061692	0.776235	0.783567	80.59272	4.385972	6.653277	1.355122	0.391411
10	95.48086	1.668277	0.183628	0.419670	94.06301	1.563217	1.568169	0.417684	0.116348
11	130.3250	1.649815	0.284313	0.407102	89.09072	4.810985	0.846467	2.843009	0.067587
12	169.7176	1.097908	1.031784	0.624893	89.73928	2.868131	0.515524	4.066912	0.055570

Variance Decomposition of INTR:

Period	S.E.	ROP	BOP	EXCH	GDP	GEX	INF	INTR	UNE
1	6.436841	8.767060	3.622347	0.050629	1.016254	36.76370	0.010125	49.76988	0.000000
2	6.928365	7.842073	4.468706	0.976863	2.685278	34.47153	0.013430	48.74407	0.798045
3	8.585101	15.66320	3.018405	1.155965	5.065530	42.19916	0.049809	31.98299	0.864930
4	11.89516	10.13242	3.066694	1.020549	2.641810	61.40963	0.026508	21.13122	0.571167
5	13.60656	18.50620	2.836788	0.874900	4.194911	50.03021	0.053192	22.58610	0.917702
6	18.54131	16.84439	1.744465	0.664287	9.073419	56.82417	0.030042	14.01856	0.800658
7	20.38985	14.66257	1.448429	1.212063	7.509828	62.26664	0.030093	11.62471	1.245670
8	75.32297	7.425808	0.135276	0.528734	80.31832	9.440251	0.003971	2.055254	0.092384
9	121.3131	2.881796	0.166597	0.271036	88.33095	7.382042	0.003695	0.890388	0.073499
10	139.5029	5.901118	0.831896	0.351286	77.91011	10.14155	0.004309	4.802577	0.057155
11	196.4076	3.399396	1.815498	0.737190	83.18227	7.794945	0.008108	3.010587	0.052009
12	325.3376	1.451492	1.674703	0.560195	92.22843	2.844572	0.003806	1.151155	0.085650

Variance Decomposition of UNE:

Period	S.E.	ROP	BOP	EXCH	GDP	GEX	INF	INTR	UNE
1	9781.302	0.140564	0.133984	0.047167	0.612071	0.348336	0.164660	1.186031	97.36719
2	12279.02	2.419860	0.800269	0.469332	0.568910	10.51861	1.463108	17.11524	66.64467

3	13379.88	3.142225	0.830512	0.474674	1.855678	17.79623	1.232588	14.89898	59.76911
4	15243.86	10.17152	0.712031	0.365716	1.430420	22.80371	1.686832	14.74523	48.08454
5	16716.87	8.466531	1.194857	1.346540	1.212559	29.46506	1.451782	16.87006	39.99261
6	17397.54	12.13194	1.108231	1.246904	3.152939	27.49710	1.577420	16.15315	37.13232
7	22917.00	13.02210	0.672991	0.762218	1.955269	40.27057	0.934826	20.94799	21.43404
8	24760.78	11.26674	0.767394	0.982127	7.256704	39.89890	0.939388	20.00785	18.88090
9	85452.45	5.455876	0.193055	0.415411	85.45548	4.926435	0.083572	1.884422	1.585749
10	111141.3	3.901686	0.506385	0.246044	82.53394	10.09949	0.051189	1.683236	0.978028
11	127209.5	9.028092	1.196768	0.190068	67.37126	13.95671	0.064082	7.442353	0.750668
12	134362.4	8.439426	2.525777	0.266030	60.78033	20.09873	0.088543	7.084198	0.716962

Cholesky Ordering: ROP BOP EXCH GDP GEX INF INTR UNE

Period	S.E.	ROP	EXCH
1	7.216886	0.271345	99.72866
2	11.36483	5.516808	94.48319
3	12.58989	8.395481	91.60452
4	13.18242	8.660693	91.33931
5	13.67429	9.054260	90.94574
6	14.09580	9.525375	90.47463
7	14.57266	9.809006	90.19099
8	15.09653	10.19315	89.80685
9	15.53634	10.67929	89.32071
10	15.89659	11.12304	88.87696
11	16.22320	11.54056	88.45944
12	16.52861	11.95829	88.04171

Cholesky Ordering: ROP EXCH

Period	S.E.	ROP	UNE
1	7.343697	0.248340	99.75166
2	11.94550	0.564194	99.43581
3	13.53385	2.294457	97.70554
4	14.53784	3.453233	96.54677
5	15.46261	5.103047	94.89695
6	16.32047	5.883261	94.11674
7	17.34712	6.011016	93.98898
8	18.49737	6.173093	93.82691
9	19.60184	6.350369	93.64963
10	20.64712	6.525732	93.47427

Cholesky Ordering: ROP UNE

Period	S.E.	ROP	GDP
1	7.401061	0.034270	99.96573
2	12.33910	0.433687	99.56631
3	14.23023	0.762899	99.23710
4	15.40050	1.274628	98.72537
5	16.41419	2.538723	97.46128
6	17.17637	4.100041	95.89996
7	17.93041	5.357085	94.64291
8	18.87871	6.528169	93.47183
9	19.91308	7.909564	92.09044
10	20.88591	9.519380	90.48062

Cholesky Ordering: ROP GDP

Period	S.E.	ROP	GEX
1	7.454471	0.014553	99.98545
2	12.33034	0.349959	99.65004
3	14.20536	0.542582	99.45742
4	15.35310	1.206685	98.79332
5	16.34839	3.103765	96.89624
6	17.11317	5.061204	94.93880
7	17.90979	6.578664	93.42134
8	18.86321	8.073743	91.92626
9	19.78447	9.596701	90.40330
10	20.65113	11.05086	88.94914
11	21.54964	12.50871	87.49129
12	22.46265	13.98599	86.01401

Cholesky Ordering: ROP GEX

Period	S.E.	ROP	BOP
1	7.571459	0.489412	99.51059
2	12.45626	0.183359	99.81664
3	14.38951	0.246876	99.75312
4	15.58421	0.618551	99.38145
5	16.63427	1.725404	98.27460
6	17.52897	3.209490	96.79051
7	18.43696	4.810109	95.18989
8	19.38576	6.395179	93.60482
9	20.26348	7.617373	92.38263
10	21.04982	8.582459	91.41754
11	21.77406	9.405281	90.59472
12	22.43552	10.09620	89.90380

Cholesky Ordering: ROP BOP

Period	S.E.	ROP	INF
1	7.459411	0.395648	99.60435
2	12.31516	0.994898	99.00510
3	14.31786	0.993479	99.00652
4	15.60001	1.208572	98.79143
5	16.63668	2.421553	97.57845
6	17.50626	3.672935	96.32706
7	18.37885	4.407015	95.59298
8	19.28746	4.986012	95.01399
9	20.07417	5.519594	94.48041
10	20.75283	5.970914	94.02909
11	21.39891	6.392071	93.60793
12	22.01457	6.791807	93.20819

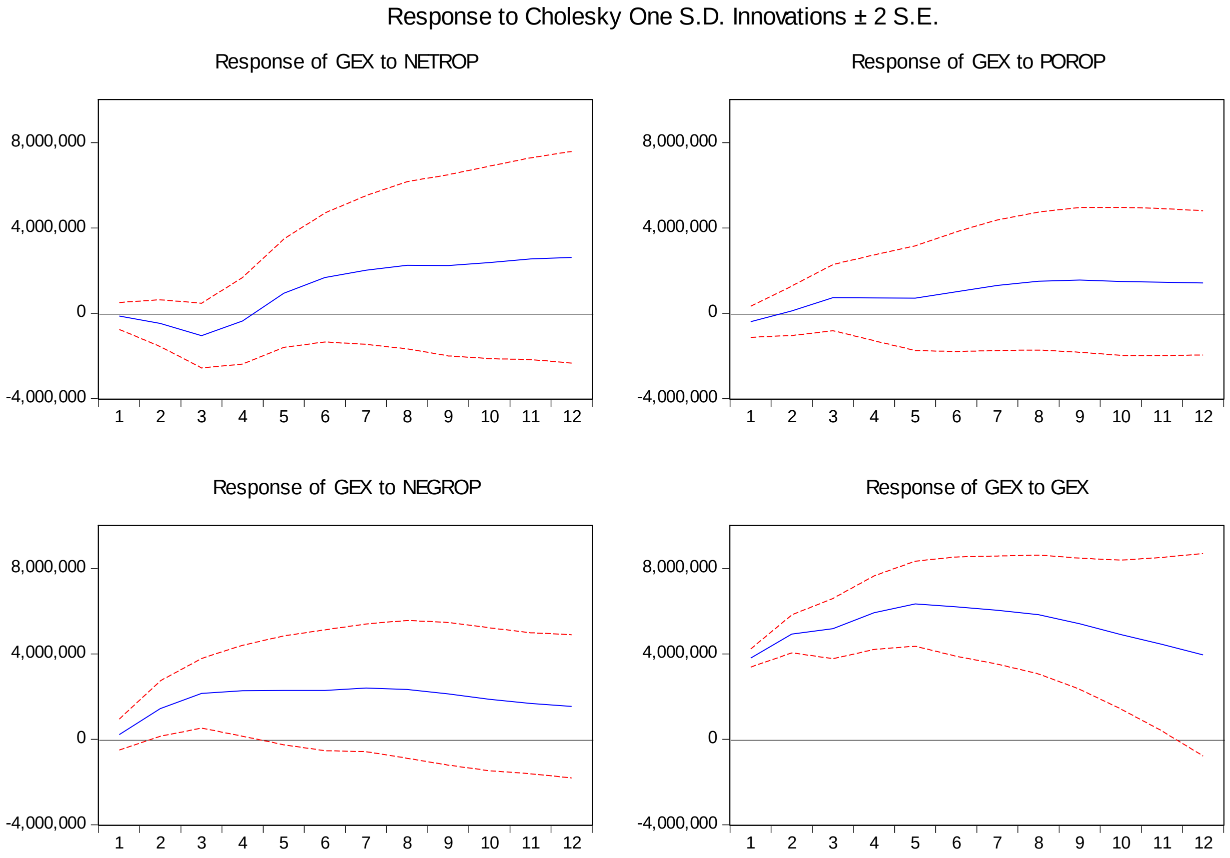
Cholesky Ordering: ROP INF

Period	S.E.	ROP	INTR
1	7.560297	0.472821	99.52718
2	13.69830	0.437633	99.56237
3	57.66166	0.493174	99.50683
4	245.6794	0.507432	99.49257
5	858.6862	0.516262	99.48374
6	2952.270	0.521617	99.47838
7	10192.32	0.522907	99.47709
8	35107.03	0.523168	99.47683
9	120798.6	0.523291	99.47671
10	415609.7	0.523332	99.47667
11	1429850.	0.523341	99.47666
12	4919108.	0.523344	99.47666

Cholesky Ordering: ROP INTR

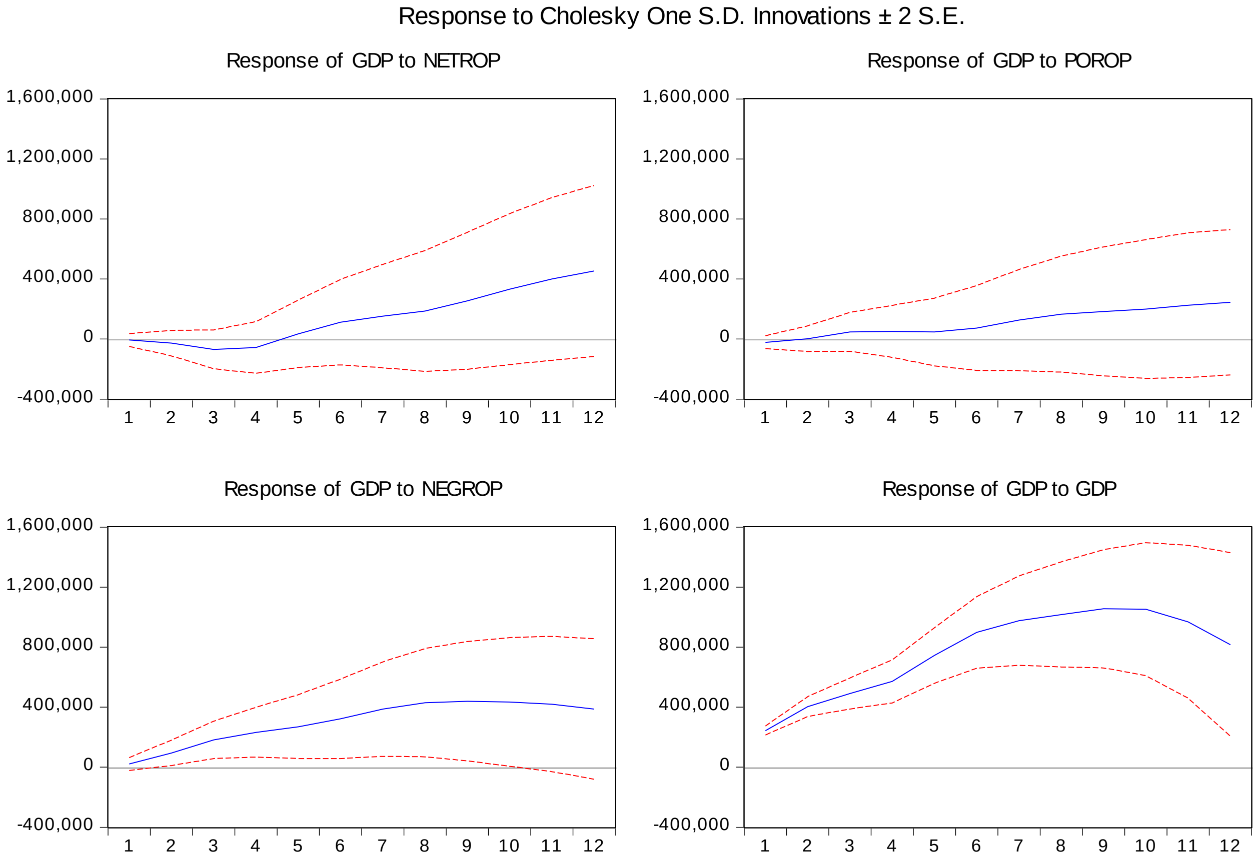
Period	S.E.	NETROP	POROP	NEGROP	GEX
1	3.378371	0.113699	1.103403	0.340747	98.44215
		(1.16628)	(2.08930)	(1.73439)	(2.87790)
2	3.718276	0.580455	0.420246	5.109828	93.88947
		(2.03746)	(1.71780)	(4.17977)	(4.43067)
3	3.813772	1.802194	0.947157	9.053278	88.19737
		(3.40065)	(3.36345)	(5.70754)	(6.58289)
4	3.839097	1.273485	1.059586	10.31862	87.34831
		(3.00817)	(4.34183)	(6.59395)	(7.77905)
5	3.900359	1.449766	1.057104	10.57065	86.92248
		(2.31065)	(5.02662)	(7.13772)	(8.38206)
6	3.929097	2.449815	1.298454	10.67691	85.57482
		(2.91409)	(5.65741)	(7.49221)	(9.00537)
7	3.964737	3.577607	1.718022	10.92947	83.77491
		(4.10183)	(6.29734)	(7.85369)	(9.61857)
8	3.973884	4.684896	2.197242	11.03152	82.08635
		(5.29780)	(6.89869)	(8.14354)	(10.1435)
9	4.004458	5.576269	2.634972	11.02846	80.76029
		(6.26278)	(7.45011)	(8.38348)	(10.6131)
10	4.017487	6.539728	2.972077	10.92147	79.56672
		(7.24315)	(7.90823)	(8.55338)	(11.0631)
11	4.018419	7.619500	3.258319	10.78250	78.33968
		(8.24425)	(8.24047)	(8.71916)	(11.4600)
12	4.022124	8.714757	3.518773	10.66413	77.10234
		(9.23954)	(8.47244)	(8.89449)	(11.7938)

Cholesky Ordering: NETROP POROP NEGROP GEX
Standard Errors: Monte Carlo (100 repetitions)



Period	S.E.	NETROP	POROP	NEGROP	GDP
1	3.373032	0.073064	0.766161	0.752482	98.40829
2	3.701594	0.351306	0.200846	4.025470	95.42238
3	3.797289	1.087009	0.515829	8.228192	90.16897
4	3.822221	0.980844	0.584097	10.70511	87.72995
5	3.891482	0.653208	0.485945	11.05662	87.80422
6	3.922918	0.921557	0.518968	11.09526	87.46421
7	3.961791	1.277304	0.795461	11.72794	86.19930
8	3.970531	1.655567	1.147874	12.42710	84.76946
9	4.004453	2.314745	1.429283	12.71564	83.54033
10	4.024435	3.314876	1.675644	12.77411	82.23537
11	4.027328	4.598632	1.990811	12.85525	80.55531
12	4.054536	6.140011	2.369697	12.95932	78.53097

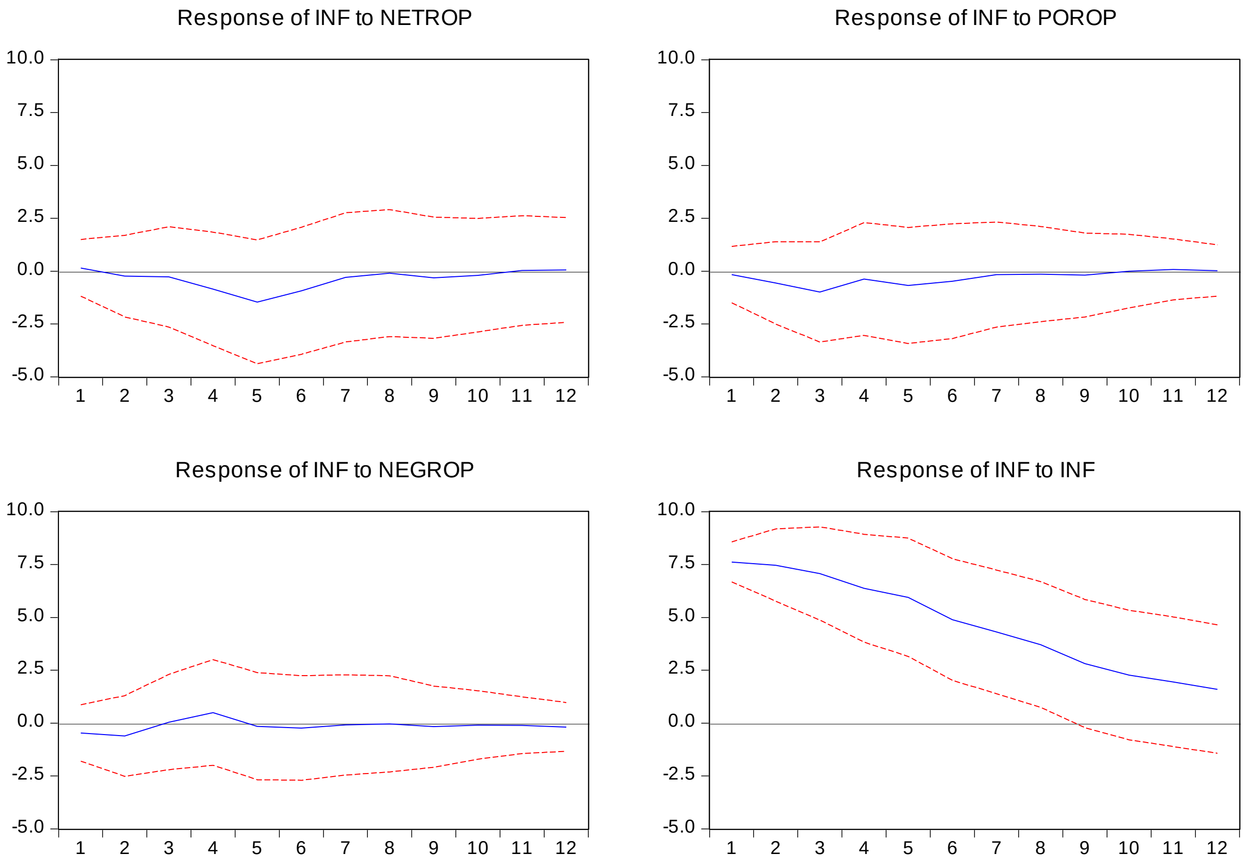
Cholesky Ordering: NETROP POROP NEGROP GDP



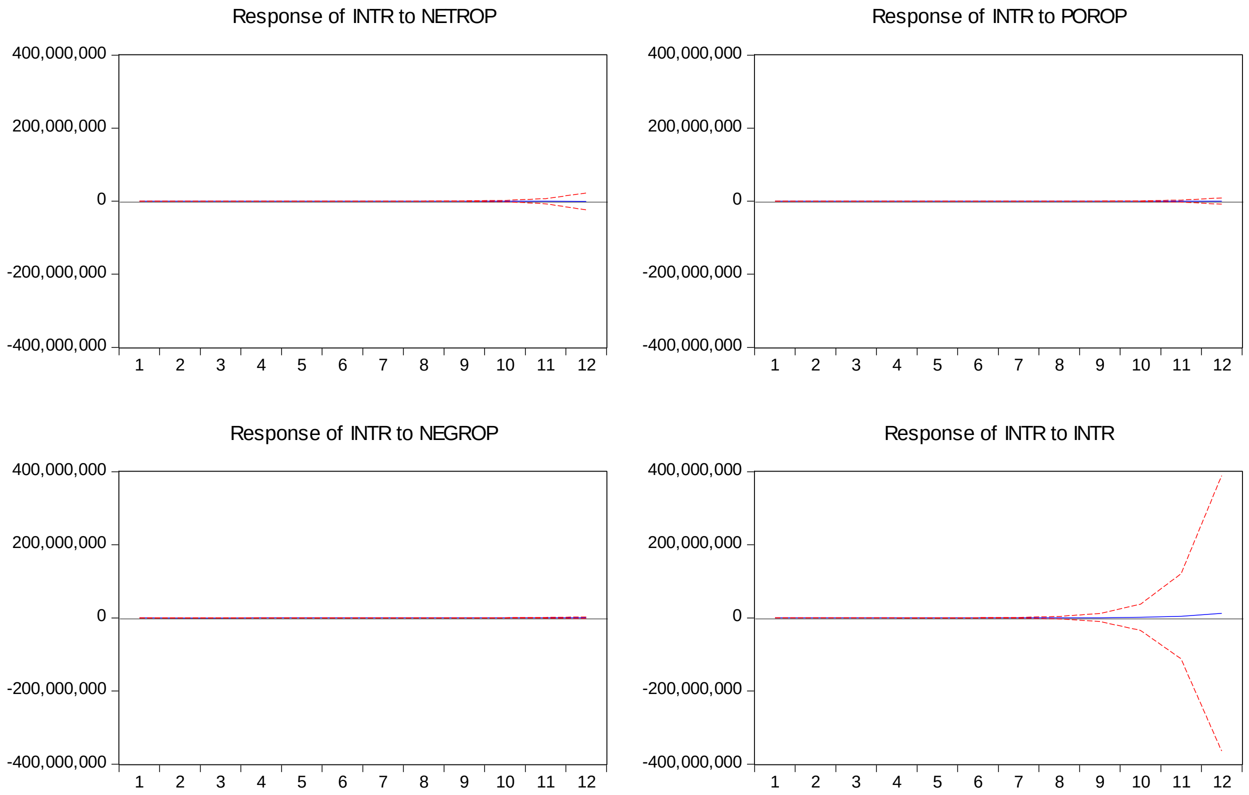
Period	S.E.	NETROP	POROP	NEGROP	INF
1	3.394968	0.038904	0.050634	0.371282	99.53918
2	3.699524	0.071234	0.301020	0.517409	99.11034
3	3.785091	0.095874	0.798362	0.359422	98.74634
4	3.842959	0.422113	0.705056	0.405497	98.46733
5	3.900217	1.227337	0.785713	0.352349	97.63460
6	3.926793	1.434981	0.797200	0.341276	97.42654
7	3.955692	1.373389	0.755097	0.322000	97.54951
8	3.967120	1.314160	0.727619	0.307923	97.65030
9	4.004225	1.312978	0.720743	0.309372	97.65691
10	4.011941	1.304115	0.708924	0.307211	97.67975
11	4.015488	1.288818	0.702363	0.307216	97.70160
12	4.017216	1.279221	0.696872	0.315618	97.70829

Cholesky Ordering: NETROP POROP NEGROP INF

Response to Cholesky One S.D. Innovations ± 2 S.E.

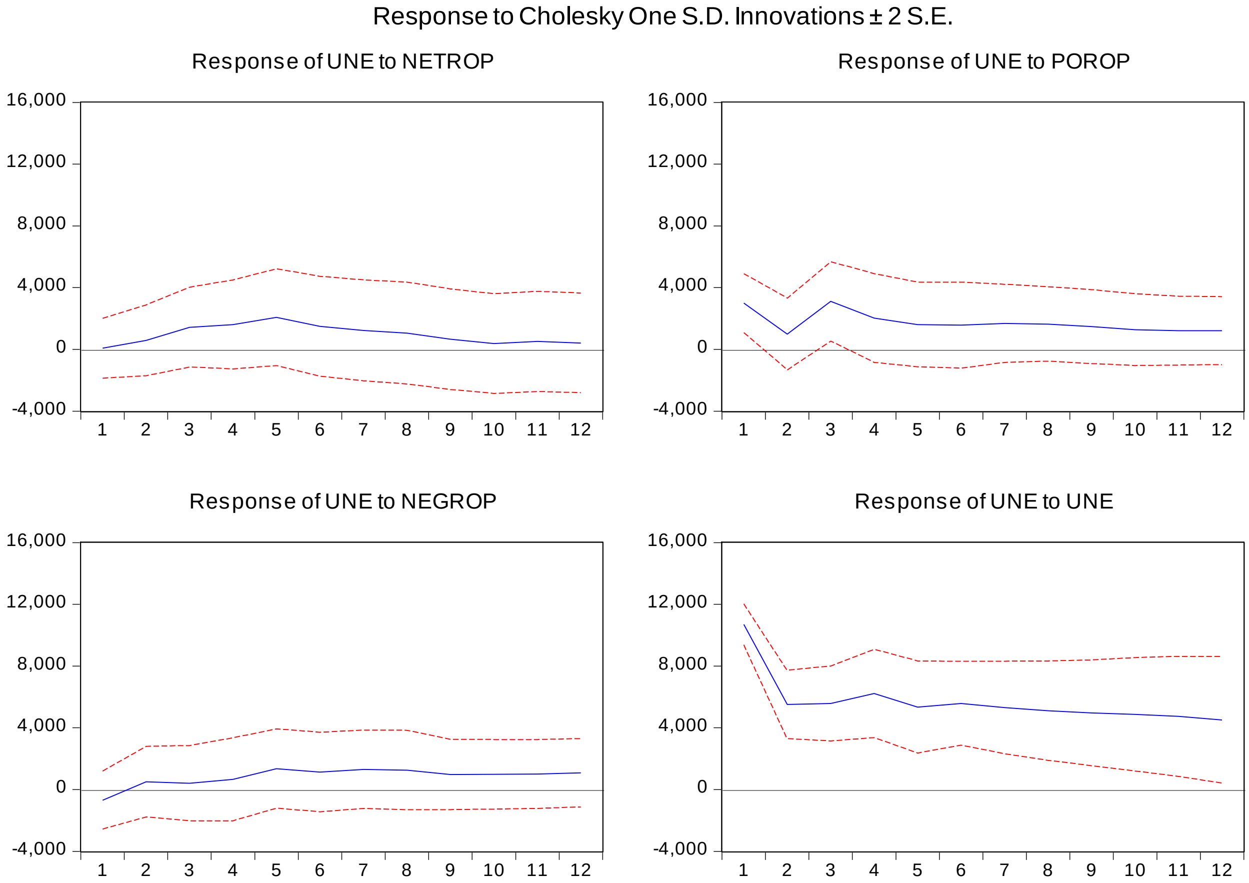


Response to Cholesky One S.D. Innovations ± 2 S.E.



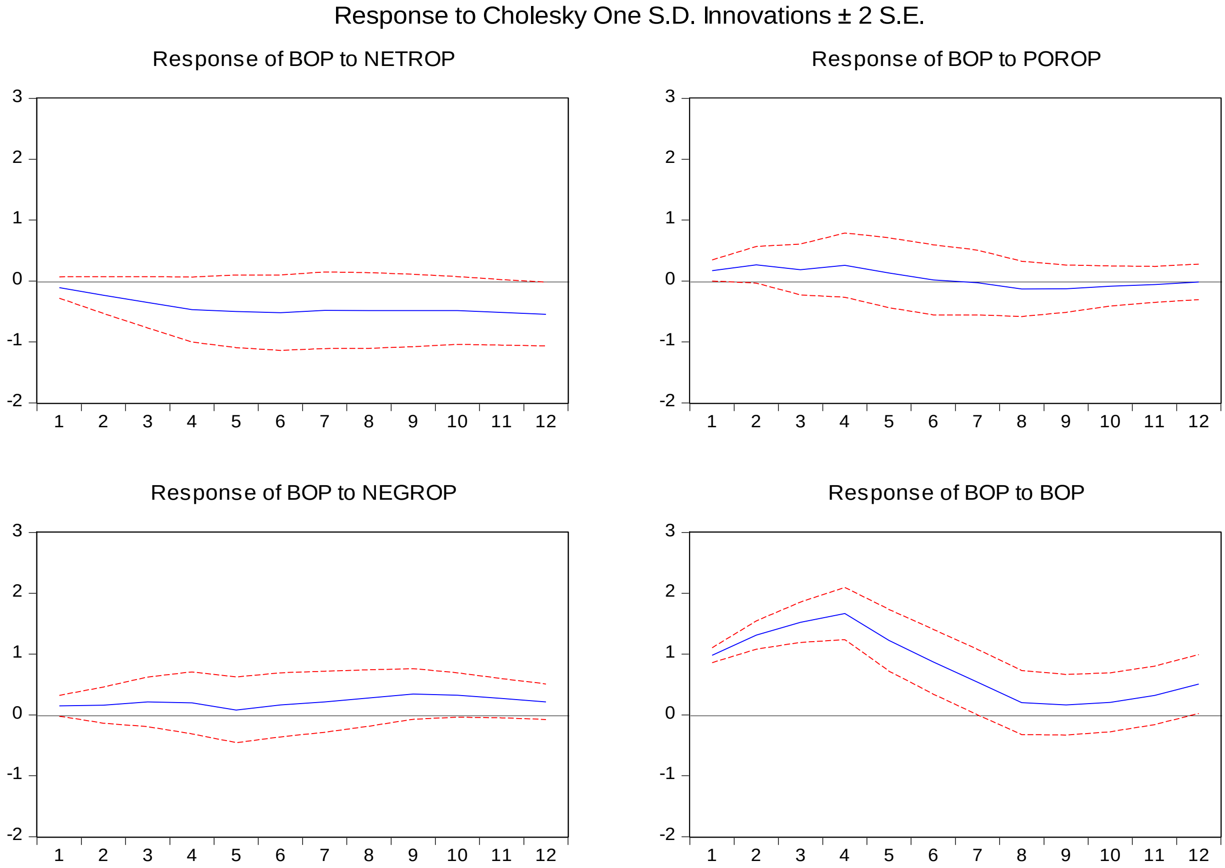
Period	S.E.	NETROP	POROP	NEGROP	INTR
1	3.375639	0.235464	0.055852	0.027941	99.68074
2	3.728519	0.263095	0.052310	0.010762	99.67383
3	23.71079	0.324846	0.046028	0.001410	99.62772
4	88.82834	0.389741	0.045964	0.000472	99.56382
5	260.0707	0.401677	0.049849	0.000294	99.54818
6	768.4227	0.405686	0.051429	0.000293	99.54259
7	2256.655	0.409834	0.051728	0.000334	99.53810
8	6556.333	0.411849	0.051929	0.000347	99.53588
9	19001.79	0.412479	0.052061	0.000350	99.53511
10	55016.76	0.412801	0.052106	0.000353	99.53474
11	159177.2	0.412973	0.052125	0.000355	99.53455
12	460391.5	0.413045	0.052136	0.000355	99.53446

Cholesky Ordering: NETROP POROP NEGROP INTR



Period	S.E.	NETROP	POROP	NEGROP	UNE
1	3.409102	0.003972	7.221943	0.379034	92.39505
2	3.702588	0.217495	6.365126	0.466237	92.95114
3	3.759324	1.204074	9.831742	0.451043	88.51314
4	3.788163	2.031814	9.669256	0.544093	87.75484
5	3.837174	3.292705	9.301331	1.121143	86.28482
6	3.869828	3.610942	8.985863	1.392571	86.01062
7	3.896431	3.686017	8.914723	1.742742	85.65652
8	3.914227	3.670362	8.881612	2.009068	85.43896
9	3.974531	3.522411	8.799781	2.102714	85.57509
10	3.983793	3.341770	8.637884	2.196088	85.82426
11	3.991876	3.217036	8.484937	2.292027	86.00600
12	4.000534	3.099285	8.382869	2.422309	86.09554

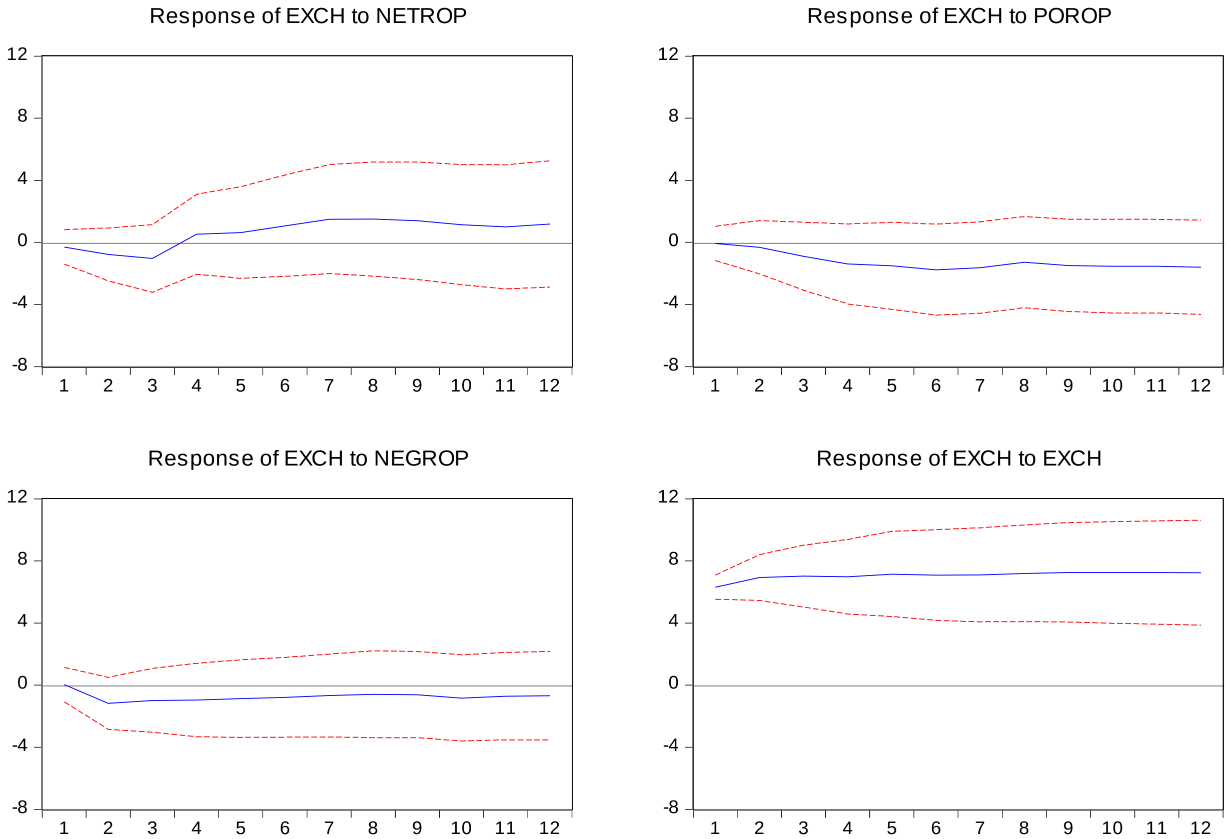
Cholesky Ordering: NETROP POROP NEGROP UNE



Period	S.E.	NETROP	POROP	NEGROP	BOP
1	3.399802	1.150126	2.876915	2.177608	93.79535
2	3.731795	2.268246	3.454412	1.654804	92.62254
3	3.806496	3.479824	2.492057	1.732371	92.29575
4	3.829211	4.820739	2.376166	1.558184	91.24491
5	3.876811	6.408989	2.139541	1.354659	90.09681
6	3.925759	8.195678	1.943038	1.466052	88.39523
7	3.951376	9.737927	1.856307	1.786575	86.61919
8	3.960589	11.36218	1.939352	2.356868	84.34159
9	3.998550	12.85602	2.003839	3.218879	81.92126
10	4.010098	14.27726	1.997590	3.932852	79.79230
11	4.012635	15.76299	1.956299	4.352080	77.92863
12	4.013838	17.19874	1.874675	4.494733	76.43186

Cholesky Ordering: NETROP POROP NEGROP BOP

Response to Cholesky One S.D. Innovations ± 2 S.E.



Period	S.E.	NETROP	POROP	NEGROP	EXCH
1	3.356339	0.217992	0.010765	0.001942	99.76930
2	3.583675	0.768237	0.116427	1.538490	97.57685
3	3.612479	1.244964	0.635706	1.654629	96.46470
4	3.654738	1.051028	1.468361	1.694570	95.78604
5	3.721947	0.983977	2.071067	1.627434	95.31752
6	3.749815	1.178791	2.718004	1.540103	94.56310
7	3.760713	1.617848	3.036001	1.427389	93.91876
8	3.775104	1.942690	3.020753	1.318589	93.71797
9	3.819437	2.115942	3.123768	1.240533	93.51976
10	3.827848	2.131866	3.232164	1.237701	93.39827
11	3.832395	2.094506	3.325958	1.204477	93.37506
12	3.839766	2.126024	3.432924	1.172106	93.26895

Cholesky Ordering: NETROP POROP NEGROP EXCH

APPENDIX B

Dependent Variable: GDP
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 07/28/14 Time: 00:04
Sample: 1980Q1 2013Q4
Included observations: 136
Convergence achieved after 149 iterations
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(6) + C(7)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(8)
*RESID(-1)/@SQRT(GARCH(-1)) + C(9)*LOG(GARCH(-1))

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-112901.8	15629.45	-7.223660	0.0000
ROP	5987.636	526.7118	11.36796	0.0000
POROP	-368.8461	3431.026	-0.107503	0.9144
NEGROP	-1235.763	1395.159	-0.885751	0.3758
NETROP	-8095.629	3808.555	-2.125643	0.0335
		Variance Equation		
C(6)	-0.620048	1.035999	-0.598502	0.5495
C(7)	1.965541	0.442166	4.445254	0.0000
C(8)	-0.613588	0.363256	-1.689136	0.0912
C(9)	0.970480	0.047999	20.21890	0.0000

R-squared	0.033655	Mean dependent var	611264.5
Adjusted R-squared	0.004149	S.D. dependent var	2242277.
S.E. of regression	2237621.	Akaike info criterion	26.47790
Sum squared resid	6.56E+14	Schwarz criterion	26.67065
Log likelihood	-1791.497	Hannan-Quinn criter.	26.55623
Durbin-Watson stat	0.040056		

Dependent Variable: GEX
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 07/28/14 Time: 00:05
Sample: 1980Q1 2013Q4
Included observations: 136
Convergence achieved after 329 iterations
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(6) + C(7)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(8)
*RESID(-1)/@SQRT(GARCH(-1)) + C(9)*LOG(GARCH(-1))

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-2513273.	87811.52	-28.62122	0.0000
ROP	87675.17	1941.768	45.15225	0.0000
POROP	-11724.75	24849.49	-0.471831	0.6370
NEGROP	-37264.17	16558.29	-2.250484	0.0244
NETROP	-97887.80	23098.90	-4.237769	0.0000
		Variance Equation		
C(6)	-0.876167	1.232421	-0.710932	0.4771
C(7)	2.837139	0.318168	8.917106	0.0000
C(8)	-1.260657	0.245269	-5.139890	0.0000
C(9)	0.971108	0.043988	22.07667	0.0000

R-squared	0.096718	Mean dependent var	5243267.
Adjusted R-squared	0.069136	S.D. dependent var	17567812
S.E. of regression	16949649	Akaike info criterion	31.71129
Sum squared resid	3.76E+16	Schwarz criterion	31.90404

Log likelihood	-2147.368	Hannan-Quinn criter.	31.78962
Durbin-Watson stat	0.068883		

Dependent Variable: EXCH
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 07/28/14 Time: 00:06
Sample: 1980Q1 2013Q4
Included observations: 136
Failure to improve Likelihood after 29 iterations
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(6) + C(7)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(8)
*RESID(-1)/@SQRT(GARCH(-1)) + C(9)*LOG(GARCH(-1))

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.134927	4.485569	0.030080	0.9760
ROP	0.757120	0.148407	5.101659	0.0000
POROP	0.441394	1.157608	0.381298	0.7030
NEGROP	-0.214432	0.366569	-0.584972	0.5586
NETROP	-0.999173	1.414860	-0.706200	0.4801
		Variance Equation		
C(6)	-0.440599	0.778524	-0.565941	0.5714
C(7)	1.633033	0.534348	3.056124	0.0022
C(8)	0.299137	0.353319	0.846647	0.3972
C(9)	0.855373	0.134280	6.370057	0.0000

R-squared	0.000686	Mean dependent var	63.25471
Adjusted R-squared	-0.029827	S.D. dependent var	61.94942
S.E. of regression	62.86652	Akaike info criterion	10.12900
Sum squared resid	517738.2	Schwarz criterion	10.32175
Log likelihood	-679.7719	Hannan-Quinn criter.	10.20733
Durbin-Watson stat	0.019888		

Dependent Variable: INF
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 07/28/14 Time: 00:07
Sample: 1980Q1 2013Q4
Included observations: 136
Failure to improve Likelihood after 40 iterations
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(6) + C(7)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(8)
*RESID(-1)/@SQRT(GARCH(-1)) + C(9)*LOG(GARCH(-1))

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	18.60750	1.384657	13.43835	0.0000
ROP	-0.051921	0.014667	-3.539912	0.0004
POROP	-0.105463	0.046553	-2.265414	0.0235
NEGROP	0.015418	0.045844	0.336317	0.7366
NETROP	0.159318	0.122644	1.299023	0.1939
		Variance Equation		
C(6)	-0.397906	0.260612	-1.526812	0.1268
C(7)	0.817562	0.398674	2.050702	0.0403
C(8)	0.020247	0.172128	0.117626	0.9064
C(9)	0.932796	0.043199	21.59295	0.0000

R-squared	-0.044703	Mean dependent var	20.72434
Adjusted R-squared	-0.076602	S.D. dependent var	16.35987
S.E. of regression	16.97491	Akaike info criterion	7.148380
Sum squared resid	37747.35	Schwarz criterion	7.341130
Log likelihood	-477.0899	Hannan-Quinn criter.	7.226709
Durbin-Watson stat	0.194415		

Dependent Variable: INTR
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 07/28/14 Time: 00:07
Sample: 1980Q1 2013Q4
Included observations: 136
Convergence achieved after 123 iterations
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(6) + C(7)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(8)
*RESID(-1)/@SQRT(GARCH(-1)) + C(9)*LOG(GARCH(-1))

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	12.11676	0.861717	14.06118	0.0000
ROP	-0.004328	0.012303	-0.351798	0.7250
POROP	-0.190928	0.156500	-1.219982	0.2225
NEGROP	-0.015757	0.030254	-0.520833	0.6025
NETROP	-0.263087	0.154169	-1.706479	0.0879
		Variance Equation		
C(6)	3.701210	0.424760	8.713658	0.0000
C(7)	1.964725	0.398808	4.926498	0.0000
C(8)	-0.819044	0.228740	-3.580676	0.0003
C(9)	-0.316505	0.102718	-3.081302	0.0021

R-squared	-0.009456	Mean dependent var	17.18419
Adjusted R-squared	-0.040279	S.D. dependent var	63.80481
S.E. of regression	65.07713	Akaike info criterion	6.614815
Sum squared resid	554789.2	Schwarz criterion	6.807564
Log likelihood	-440.8074	Hannan-Quinn criter.	6.693144
Durbin-Watson stat	1.003582		

Dependent Variable: BOP
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 07/28/14 Time: 00:08
Sample: 1980Q1 2013Q4
Included observations: 136
Convergence achieved after 48 iterations
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(6) + C(7)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(8)
*RESID(-1)/@SQRT(GARCH(-1)) + C(9)*LOG(GARCH(-1))

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	15.91623	0.105970	150.1959	0.0000
ROP	-0.093831	0.002369	-39.60188	0.0000
POROP	-0.006981	0.032177	-0.216970	0.8282
NEGROP	0.090394	0.018172	4.974268	0.0000
NETROP	0.130419	0.028478	4.579682	0.0000
		Variance Equation		
C(6)	-1.847671	0.355032	-5.204234	0.0000

C(7)	2.434367	0.427033	5.700650	0.0000
C(8)	0.377345	0.339291	1.112157	0.2661
C(9)	0.723757	0.112889	6.411195	0.0000

R-squared	0.212467	Mean dependent var	12.77918
Adjusted R-squared	0.188420	S.D. dependent var	4.354374
S.E. of regression	3.922757	Akaike info criterion	4.267665
Sum squared resid	2015.831	Schwarz criterion	4.460414
Log likelihood	-281.2012	Hannan-Quinn criter.	4.345993
Durbin-Watson stat	0.153888		

Dependent Variable: UNE
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 07/28/14 Time: 00:08
Sample: 1980Q1 2013Q4
Included observations: 136
Convergence achieved after 27 iterations
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(6) + C(7)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(8)
*RESID(-1)/@SQRT(GARCH(-1)) + C(9)*LOG(GARCH(-1))

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	24372.10	2970.029	8.206015	0.0000
ROP	282.6027	52.73271	5.359154	0.0000
POROP	865.1284	662.4343	1.305984	0.1916
NEGROP	-187.2651	153.2474	-1.221979	0.2217
NETROP	-1061.438	762.4607	-1.392122	0.1639
		Variance Equation		
C(6)	5.001628	4.732234	1.056928	0.2905
C(7)	0.778456	0.388708	2.002673	0.0452
C(8)	-0.038518	0.153059	-0.251651	0.8013
C(9)	0.707202	0.254500	2.778790	0.0055

R-squared	0.207815	Mean dependent var	39912.45
Adjusted R-squared	0.183626	S.D. dependent var	19742.89
S.E. of regression	17838.38	Akaike info criterion	22.27509
Sum squared resid	4.17E+10	Schwarz criterion	22.46784
Log likelihood	-1505.706	Hannan-Quinn criter.	22.35342
Durbin-Watson stat	0.440248		

APPENDIX C

Dependent Variable: UNE
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 07/18/14 Time: 06:24
Sample: 1980Q1 2013Q4
Included observations: 136
Convergence achieved after 71 iterations
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(5) + C(6)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(7)
*RESID(-1)/@SQRT(GARCH(-1)) + C(8)*LOG(GARCH(-1))

Variable	Coefficient	Std. Error	z-Statistic	Prob.
ROP	605.2015	28.63962	21.13162	0.0000
NETROP	-2047.370	1148.818	-1.782154	0.0747
POROP	1538.833	989.5828	1.555032	0.1199
NEGROP	-569.0964	279.5253	-2.035939	0.0418
		Variance Equation		
C(5)	4.809203	3.880744	1.239248	0.2153
C(6)	0.582598	0.309201	1.884204	0.0595
C(7)	0.026041	0.167932	0.155068	0.8768
C(8)	0.730251	0.204334	3.573809	0.0004

R-squared	-0.109629	Mean dependent var	39912.45
Adjusted R-squared	-0.134848	S.D. dependent var	19742.89
S.E. of regression	21031.95	Akaike info criterion	22.61824
Sum squared resid	5.84E+10	Schwarz criterion	22.78958
Log likelihood	-1530.041	Hannan-Quinn criter.	22.68787
Durbin-Watson stat	0.348971		

Dependent Variable: INF
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 07/18/14 Time: 06:25
Sample: 1980Q1 2013Q4
Included observations: 136
Convergence achieved after 17 iterations
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(5) + C(6)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(7)
*RESID(-1)/@SQRT(GARCH(-1)) + C(8)*LOG(GARCH(-1))

Variable	Coefficient	Std. Error	z-Statistic	Prob.
ROP	0.188235	0.012734	14.78193	0.0000
NETROP	-0.043611	0.624656	-0.069816	0.9443
POROP	0.174678	0.589239	0.296446	0.7669
NEGROP	-0.235819	0.119558	-1.972422	0.0486
		Variance Equation		
C(5)	0.979043	0.440896	2.220575	0.0264
C(6)	1.209080	0.374669	3.227061	0.0013
C(7)	0.364390	0.285758	1.275173	0.2022
C(8)	0.575681	0.125946	4.570853	0.0000

R-squared	-0.717488	Mean dependent var	20.72434
Adjusted R-squared	-0.756521	S.D. dependent var	16.35987
S.E. of regression	21.68236	Akaike info criterion	7.787457
Sum squared resid	62056.49	Schwarz criterion	7.958790
Log likelihood	-521.5471	Hannan-Quinn criter.	7.857082
Durbin-Watson stat	0.125477		

Dependent Variable: GDP
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 07/18/14 Time: 06:25
Sample: 1980Q1 2013Q4
Included observations: 136
Convergence achieved after 101 iterations
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(5) + C(6)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(7)
*RESID(-1)/@SQRT(GARCH(-1)) + C(8)*LOG(GARCH(-1))

Variable	Coefficient	Std. Error	z-Statistic	Prob.
ROP	3521.644	81.79084	43.05670	0.0000
NETROP	-14202.43	1421.615	-9.990348	0.0000
POROP	2242.401	888.2275	2.524580	0.0116
NEGROP	8386.609	839.0766	9.995046	0.0000
		Variance Equation		
C(5)	0.545092	0.725139	0.751707	0.4522
C(6)	2.365570	0.200800	11.78074	0.0000
C(7)	-0.949300	0.161838	-5.865736	0.0000
C(8)	0.909018	0.033732	26.94849	0.0000

R-squared	0.002022	Mean dependent var	611264.5
Adjusted R-squared	-0.020659	S.D. dependent var	2242277.
S.E. of regression	2265320.	Akaike info criterion	26.55867
Sum squared resid	6.77E+14	Schwarz criterion	26.73001
Log likelihood	-1797.990	Hannan-Quinn criter.	26.62830
Durbin-Watson stat	0.040204		

Dependent Variable: GEX
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 07/18/14 Time: 06:26
Sample: 1980Q1 2013Q4
Included observations: 136
Convergence achieved after 57 iterations
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(5) + C(6)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(7)
*RESID(-1)/@SQRT(GARCH(-1)) + C(8)*LOG(GARCH(-1))

Variable	Coefficient	Std. Error	z-Statistic	Prob.
ROP	49056.67	871.0282	56.32041	0.0000
NETROP	-126834.1	34881.76	-3.636115	0.0003
POROP	11646.13	30073.68	0.387253	0.6986
NEGROP	119090.9	12902.09	9.230361	0.0000
		Variance Equation		
C(5)	2.566953	2.507493	1.023713	0.3060
C(6)	2.511397	0.312046	8.048176	0.0000
C(7)	-0.229415	0.247101	-0.928429	0.3532
C(8)	0.833243	0.089686	9.290640	0.0000

R-squared	0.049801	Mean dependent var	5243267.
Adjusted R-squared	0.028206	S.D. dependent var	17567812
S.E. of regression	17318282	Akaike info criterion	31.58066
Sum squared resid	3.96E+16	Schwarz criterion	31.75199
Log likelihood	-2139.485	Hannan-Quinn criter.	31.65028
Durbin-Watson stat	0.069435		

Dependent Variable: INTR
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 07/18/14 Time: 06:26
Sample: 1980Q1 2013Q4
Included observations: 136
Convergence achieved after 112 iterations
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(5) + C(6)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(7)
*RESID(-1)/@SQRT(GARCH(-1)) + C(8)*LOG(GARCH(-1))

Variable	Coefficient	Std. Error	z-Statistic	Prob.
ROP	0.154056	0.007202	21.39018	0.0000
NETROP	-0.665493	0.258008	-2.579349	0.0099
POROP	-0.003291	0.230407	-0.014283	0.9886
NEGROP	-0.125936	0.085964	-1.464985	0.1429
Variance Equation				
C(5)	4.228444	0.779459	5.424846	0.0000
C(6)	2.122598	0.445091	4.768911	0.0000
C(7)	-1.021945	0.315507	-3.239059	0.0012
C(8)	-0.236179	0.127314	-1.855098	0.0636

R-squared	-0.008524	Mean dependent var	17.18419
Adjusted R-squared	-0.031445	S.D. dependent var	63.80481
S.E. of regression	64.80023	Akaike info criterion	7.435480
Sum squared resid	554277.2	Schwarz criterion	7.606812
Log likelihood	-497.6126	Hannan-Quinn criter.	7.505105
Durbin-Watson stat	1.004653		

Dependent Variable: EXCH
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 07/18/14 Time: 06:27
Sample: 1980Q1 2013Q4
Included observations: 136
Failure to improve Likelihood after 65 iterations
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(5) + C(6)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(7)
*RESID(-1)/@SQRT(GARCH(-1)) + C(8)*LOG(GARCH(-1))

Variable	Coefficient	Std. Error	z-Statistic	Prob.
ROP	0.658426	0.054189	12.15047	0.0000
NETROP	-0.415076	2.025369	-0.204938	0.8376
POROP	1.316526	1.598345	0.823681	0.4101
NEGROP	-1.822062	0.214042	-8.512641	0.0000
Variance Equation				
C(5)	-0.268069	0.590278	-0.454139	0.6497
C(6)	1.380151	0.477613	2.889686	0.0039
C(7)	0.187037	0.257467	0.726447	0.4676
C(8)	0.870619	0.121901	7.142012	0.0000

R-squared	0.028094	Mean dependent var	63.25471
Adjusted R-squared	0.006005	S.D. dependent var	61.94942
S.E. of regression	61.76313	Akaike info criterion	10.28921
Sum squared resid	503538.2	Schwarz criterion	10.46054
Log likelihood	-691.6661	Hannan-Quinn criter.	10.35883
Durbin-Watson stat	0.064741		

Dependent Variable: BOP
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 07/18/14 Time: 06:29
Sample: 1980Q1 2013Q4
Included observations: 136
Convergence achieved after 84 iterations
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(5) + C(6)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(7)
*RESID(-1)/@SQRT(GARCH(-1)) + C(8)*LOG(GARCH(-1))

Variable	Coefficient	Std. Error	z-Statistic	Prob.
ROP	0.112599	0.001363	82.59690	0.0000
NETROP	-0.210587	0.066455	-3.168857	0.0015
POROP	0.083151	0.062750	1.325128	0.1851
NEGROP	-0.057328	0.039986	-1.433704	0.1517
		Variance Equation		
C(5)	-2.180100	0.948460	-2.298569	0.0215
C(6)	2.763970	0.933072	2.962227	0.0031
C(7)	0.007575	0.534498	0.014173	0.9887
C(8)	0.865150	0.213838	4.045818	0.0001

R-squared	-3.952937	Mean dependent var	12.77918
Adjusted R-squared	-4.065504	S.D. dependent var	4.354374
S.E. of regression	9.800247	Akaike info criterion	6.409975
Sum squared resid	12677.92	Schwarz criterion	6.581308
Log likelihood	-427.8783	Hannan-Quinn criter.	6.479601
Durbin-Watson stat	0.023540		

Principal Components Analysis
Date: 07/19/14 Time: 07:57
Sample: 1980Q1 2013Q4
Included observations: 136
Computed using: Ordinary correlations
Extracting 8 of 8 possible components

Eigenvalues: (Sum = 8, Average = 1)

Number	Value	Difference	Proportion	Cumulative Value	Cumulative Proportion
1	3.450263	1.878294	0.4313	3.450263	0.4313
2	1.571969	0.530024	0.1965	5.022232	0.6278
3	1.041945	0.251403	0.1302	6.064177	0.7580
4	0.790542	0.159016	0.0988	6.854718	0.8568
5	0.631526	0.350441	0.0789	7.486244	0.9358
6	0.281085	0.066154	0.0351	7.767329	0.9709
7	0.214931	0.197190	0.0269	7.982260	0.9978
8	0.017740	---	0.0022	8.000000	1.0000

Eigenvectors (loadings):

Variable	PC 1	PC 2	PC 3	PC 4	PC 5	PC 6	PC 7	PC 8
ROP	0.388734	-0.386919	-0.239271	0.271853	0.070554	0.141063	0.736059	-0.036957
EXCH	0.368937	-0.046998	0.580258	0.002336	0.299928	0.630999	-0.184185	-0.054138
BOP	-0.135660	0.660255	0.353554	-0.143505	-0.209940	0.075472	0.591754	-0.011068
GDP	0.458843	0.288995	-0.236606	0.049694	-0.321055	0.006120	-0.191851	-0.712441
GEX	0.466040	0.230383	-0.153875	0.141652	-0.416497	0.092923	-0.170652	0.689029
INF	-0.209365	0.383546	-0.142433	0.808688	0.346067	0.089391	-0.083508	-0.008245
INTR	0.225263	0.355910	-0.444829	-0.457907	0.633261	0.023717	0.032979	0.111190
UNE	0.414802	0.042128	0.428053	0.138947	0.252314	-0.747677	0.011444	0.028565

Ordinary correlations:

	ROP	EXCH	BOP	GDP	GEX	INF	INTR	UNE
ROP	1.000000							
EXCH	0.388536	1.000000						
BOP	-0.615258	-0.057766	1.000000					
GDP	0.465363	0.368318	0.010816	1.000000				
GEX	0.511425	0.427130	-0.016425	0.968897	1.000000			
INF	-0.299026	-0.294747	0.297260	-0.156793	-0.170081	1.000000		
INTR	0.132448	0.113404	0.072758	0.478861	0.345354	-0.036474	1.000000	
UNE	0.437255	0.698657	-0.056368	0.522477	0.543207	-0.212788	0.193324	1.000000

Principal Components Analysis
Date: 07/19/14 Time: 08:02
Sample: 1980Q1 2013Q4
Included observations: 136
Computed using: Ordinary correlations
Extracting 8 of 8 possible components

Eigenvalues: (Sum = 8, Average = 1)

Number	Value	Difference	Proportion	Cumulative Value	Cumulative Proportion
1	3.066104	1.545572	0.3833	3.066104	0.3833
2	1.520532	0.434476	0.1901	4.586635	0.5733
3	1.086055	0.285657	0.1358	5.672691	0.7091
4	0.800398	0.113197	0.1000	6.473089	0.8091
5	0.687202	0.137764	0.0859	7.160291	0.8950
6	0.549437	0.277312	0.0687	7.709728	0.9637
7	0.272125	0.253979	0.0340	7.981854	0.9977
8	0.018146	---	0.0023	8.000000	1.0000

Eigenvectors (loadings):

Variable	PC 1	PC 2	PC 3	PC 4	PC 5	PC 6	PC 7	PC 8
POROP	0.120136	-0.487887	0.452377	0.534954	0.187147	0.457778	-0.109961	-0.006060
EXCH	0.410679	-0.321011	0.305427	-0.171956	-0.104554	-0.343521	0.687990	-0.056323
UNE	0.455149	-0.154596	0.222497	-0.241031	0.055037	-0.412334	-0.698341	0.024678
GEX	0.498832	0.238797	-0.117494	-0.158824	0.182670	0.383992	0.101378	0.681188
GDP	0.496861	0.307207	-0.142304	-0.032029	0.136025	0.314931	0.020843	-0.720665
INF	-0.203537	0.412398	0.458413	-0.012812	0.721405	-0.213864	0.109350	-0.008611
INTR	0.264607	0.358719	-0.099127	0.764665	-0.175917	-0.403174	0.025700	0.112289
BOP	-0.051005	0.429962	0.631301	-0.122603	-0.589723	0.217933	-0.059735	0.011109

Ordinary correlations:

	POROP	EXCH	UNE	GEX	GDP	INF	INTR	BOP
POROP	1.000000							
EXCH	0.345416	1.000000						
UNE	0.212712	0.698657	1.000000					
GEX	-0.002171	0.427130	0.543207	1.000000				
GDP	-0.032350	0.368318	0.522477	0.968897	1.000000			
INF	-0.125458	-0.294747	-0.212788	-0.170081	-0.156793	1.000000		
INTR	-0.014749	0.113404	0.193324	0.345354	0.478861	-0.036474	1.000000	
BOP	-0.099329	-0.057766	-0.056368	-0.016425	0.010816	0.297260	0.072758	1.000000

Principal Components Analysis
Date: 07/19/14 Time: 08:04
Sample: 1980Q1 2013Q4
Included observations: 136
Computed using: Ordinary correlations
Extracting 8 of 8 possible components

Eigenvalues: (Sum = 8, Average = 1)

Number	Value	Difference	Proportion	Cumulative Value	Cumulative Proportion
1	3.037135	1.623861	0.3796	3.037135	0.3796
2	1.413274	0.415941	0.1767	4.450409	0.5563
3	0.997333	0.065548	0.1247	5.447741	0.6810
4	0.931785	0.229638	0.1165	6.379526	0.7974
5	0.702147	0.079953	0.0878	7.081673	0.8852
6	0.622194	0.344232	0.0778	7.703867	0.9630
7	0.277961	0.259789	0.0347	7.981828	0.9977
8	0.018172	---	0.0023	8.000000	1.0000

Eigenvectors (loadings):

Variable	PC 1	PC 2	PC 3	PC 4	PC 5	PC 6	PC 7	PC 8
NEGROP	0.011827	0.319685	0.555602	-0.764931	-0.004720	0.053521	-0.030916	0.002153
EXCH	0.399169	-0.243317	0.453351	0.226897	-0.152934	0.267634	0.652665	-0.058853
UNE	0.451561	-0.135312	0.325498	0.235451	0.040923	0.272820	-0.734633	0.024623
GEX	0.510273	0.158469	-0.131004	-0.049493	0.322075	-0.331707	0.128160	0.681696
GDP	0.510260	0.221707	-0.218406	-0.081179	0.224021	-0.256313	0.043179	-0.720030
INTR	0.273692	0.339036	-0.474584	-0.158915	-0.516705	0.529013	0.016009	0.112105
INF	-0.197631	0.541074	0.068824	0.298000	0.581437	0.473081	0.112650	-0.008672
BOP	-0.043676	0.581649	0.291548	0.429957	-0.464697	-0.414355	-0.046384	0.011376

Ordinary correlations:

	NEGROP	EXCH	UNE	GEX	GDP	INTR	INF	BOP
NEGROP	1.000000							
EXCH	-0.002294	1.000000						
UNE	-0.017104	0.698657	1.000000					
GEX	0.039422	0.427130	0.543207	1.000000				
GDP	0.045657	0.368318	0.522477	0.968897	1.000000			
INTR	0.032495	0.113404	0.193324	0.345354	0.478861	1.000000		
INF	0.075956	-0.294747	-0.212788	-0.170081	-0.156793	-0.036474	1.000000	
BOP	0.104463	-0.057766	-0.056368	-0.016425	0.010816	0.072758	0.297260	1.000000

Principal Components Analysis
Date: 07/19/14 Time: 08:05
Sample: 1980Q1 2013Q4
Included observations: 136
Computed using: Ordinary correlations
Extracting 8 of 8 possible components

Eigenvalues: (Sum = 8, Average = 1)

Number	Value	Difference	Proportion	Cumulative Value	Cumulative Proportion
1	3.053489	1.534275	0.3817	3.053489	0.3817
2	1.519213	0.457092	0.1899	4.572702	0.5716
3	1.062121	0.246117	0.1328	5.634823	0.7044
4	0.816005	0.129999	0.1020	6.450828	0.8064
5	0.686005	0.107900	0.0858	7.136833	0.8921
6	0.578106	0.311221	0.0723	7.714939	0.9644
7	0.266885	0.248709	0.0334	7.981824	0.9977
8	0.018176	---	0.0023	8.000000	1.0000

Eigenvectors (loadings):

Variable	PC 1	PC 2	PC 3	PC 4	PC 5	PC 6	PC 7	PC 8
NETROP	0.091038	-0.486542	0.448507	0.589474	0.209069	-0.378003	-0.140551	-0.000731
EXCH	0.408069	-0.318010	0.337029	-0.179959	-0.102101	0.314631	0.688143	-0.058459
UNE	0.453545	-0.141458	0.227078	-0.282798	0.037827	0.398689	-0.694094	0.024427
GDP	0.501442	0.287246	-0.141663	0.009679	0.151236	-0.322946	0.016230	-0.720037
GEX	0.502799	0.220892	-0.112173	-0.111947	0.201893	-0.397417	0.099158	0.681727
INF	-0.203347	0.434306	0.430395	-0.012761	0.718032	0.241870	0.102381	-0.008562
INTR	0.267196	0.350778	-0.130444	0.721687	-0.203197	0.461789	0.024514	0.112134
BOP	-0.049950	0.446280	0.631492	-0.080870	-0.569159	-0.255311	-0.061310	0.011503

Ordinary correlations:

	NETROP	EXCH	UNE	GDP	GEX	INF	INTR	BOP
NETROP	1.000000							
EXCH	0.313274	1.000000						
UNE	0.147119	0.698657	1.000000					
GDP	-0.044094	0.368318	0.522477	1.000000				
GEX	-0.018716	0.427130	0.543207	0.968897	1.000000			
INF	-0.132374	-0.294747	-0.212788	-0.156793	-0.170081	1.000000		
INTR	-0.030981	0.113404	0.193324	0.478861	0.345354	-0.036474	1.000000	
BOP	-0.105373	-0.057766	-0.056368	0.010816	-0.016425	0.297260	0.072758	1.000000

Principal Components Analysis
Date: 07/29/14 Time: 15:18
Sample: 1 136
Included observations: 136
Computed using: Ordinary correlations
Extracting 7 of 7 possible components

Eigenvalues: (Sum = 7, Average = 1)

Number	Value	Difference	Proportion	Cumulative Value	Cumulative Proportion
1	2.514773	0.858948	0.3593	2.514773	0.3593
2	1.655825	0.573957	0.2365	4.170599	0.5958
3	1.081869	0.387029	0.1546	5.252467	0.7504
4	0.694840	0.124932	0.0993	5.947307	0.8496
5	0.569908	0.213331	0.0814	6.517215	0.9310
6	0.356577	0.230369	0.0509	6.873792	0.9820
7	0.126208	---	0.0180	7.000000	1.0000

Eigenvectors (loadings):

Variable	PC 1	PC 2	PC 3	PC 4	PC 5	PC 6	PC 7
GDP	0.505741	-0.349512	0.083848	-0.286693	0.225238	-0.012742	0.694226
GEX	0.540506	-0.273450	0.046451	-0.248863	0.188057	-0.193589	-0.704376
BOP	0.312454	0.481584	0.268326	-0.385060	-0.371896	0.556582	-0.045715
INF	-0.058333	0.615485	0.197885	-0.148131	0.712535	-0.218949	0.032093
INTR	0.322408	0.008559	0.556441	0.756944	0.053400	0.102649	-0.000618
UNE	0.392363	0.412457	-0.263055	0.136370	-0.421317	-0.626398	0.135103
EXCH	0.305211	0.148755	-0.707693	0.306756	0.295857	0.449141	-0.023045

Ordinary correlations:

	GDP	GEX	BOP	INF	INTR	UNE	EXCH
GDP	1.000000						
GEX	0.862775	1.000000					
BOP	0.165453	0.212503	1.000000				
INF	-0.287658	-0.233785	0.347385	1.000000			
INTR	0.311115	0.330122	0.228222	0.016312	1.000000		
UNE	0.169888	0.295839	0.488550	0.170803	0.201573	1.000000	
EXCH	0.210700	0.261649	0.097493	0.008730	0.010324	0.461465	1.000000

Dependent Variable: GDP
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 07/29/14 Time: 15:28
Sample: 1 7
Included observations: 7
Convergence achieved after 28 iterations
Presample variance: backcast (parameter = 0.7)
GARCH = C(1) + C(2)*RESID(-1)^2 + C(3)*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
		Variance Equation		
C	-0.004336	0.553814	-0.007830	0.9938
RESID(-1)^2	-0.404984	3.315573	-0.122146	0.0298
GARCH(-1)	1.417830	6.546557	0.216576	0.0285

R-squared	-3.331743	Mean dependent var	0.331479
Adjusted R-squared	-2.712923	S.D. dependent var	0.196152
S.E. of regression	0.377965	Akaike info criterion	1.628574
Sum squared resid	1.000000	Schwarz criterion	1.605392
Log likelihood	-2.700008	Hannan-Quinn criter.	1.342057
Durbin-Watson stat	0.348152		

Dependent Variable: GEX
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 07/29/14 Time: 15:29
Sample: 1 7
Included observations: 7
Convergence achieved after 15 iterations
Presample variance: backcast (parameter = 0.7)
GARCH = C(1) + C(2)*RESID(-1)^2 + C(3)*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
		Variance Equation		
C	0.102546	0.171275	0.598718	0.0494
RESID(-1)^2	-0.583126	0.685326	-0.850873	0.0348
GARCH(-1)	0.868250	1.255119	0.691767	0.0491

R-squared	-0.184369	Mean dependent var	0.149125
Adjusted R-squared	-0.015174	S.D. dependent var	0.375129
S.E. of regression	0.377965	Akaike info criterion	0.837032
Sum squared resid	1.000001	Schwarz criterion	0.813850
Log likelihood	0.070389	Hannan-Quinn criter.	0.550514
Durbin-Watson stat	1.194822		

Dependent Variable: BOP
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 07/29/14 Time: 15:30
Sample: 1 7
Included observations: 7
Convergence achieved after 26 iterations
Presample variance: backcast (parameter = 0.7)
GARCH = C(1) + C(2)*RESID(-1)^2 + C(3)*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
	Variance Equation			
C	-0.052615	0.384036	-0.137005	0.8910
RESID(-1)^2	-1.406884	4.623150	-0.304313	0.0369
GARCH(-1)	2.740026	6.363789	0.430565	0.0168

R-squared	-0.004765	Mean dependent var	0.026029
Adjusted R-squared	0.138773	S.D. dependent var	0.407279
S.E. of regression	0.377964	Akaike info criterion	1.240397
Sum squared resid	0.999999	Schwarz criterion	1.217216
Log likelihood	-1.341391	Hannan-Quinn criter.	0.953880
Durbin-Watson stat	1.053429		

Dependent Variable: INF
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 07/29/14 Time: 15:31
Sample: 1 7
Included observations: 7
Failure to improve Likelihood after 79 iterations
Presample variance: backcast (parameter = 0.7)
GARCH = C(1) + C(2)*RESID(-1)^2 + C(3)*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
	Variance Equation			
C	0.087919	1.680933	0.052303	0.0483
RESID(-1)^2	-0.322152	1.435444	-0.224427	0.0224
GARCH(-1)	0.650992	11.91127	0.054654	0.0464

R-squared	-0.002470	Mean dependent var	0.018760
Adjusted R-squared	0.140740	S.D. dependent var	0.407745
S.E. of regression	0.377964	Akaike info criterion	1.490996
Sum squared resid	1.000000	Schwarz criterion	1.467815
Log likelihood	-2.218487	Hannan-Quinn criter.	1.204479
Durbin-Watson stat	1.309420		

Dependent Variable: INTR
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 07/29/14 Time: 15:32
Sample: 1 7
Included observations: 7
Failure to improve Likelihood after 18 iterations
Presample variance: backcast (parameter = 0.7)
GARCH = C(1) + C(2)*RESID(-1)^2 + C(3)*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
		Variance Equation		
C	0.081582	0.564259	0.144583	0.0450
RESID(-1)^2	-0.289777	2.381645	-0.121671	0.0132
GARCH(-1)	0.559479	2.661370	0.210222	0.0135

R-squared	-0.071147	Mean dependent var	0.097411
Adjusted R-squared	0.081874	S.D. dependent var	0.394457
S.E. of regression	0.377965	Akaike info criterion	1.402647
Sum squared resid	1.000001	Schwarz criterion	1.379465
Log likelihood	-1.909264	Hannan-Quinn criter.	1.116129
Durbin-Watson stat	2.665071		

Dependent Variable: UNE
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 07/29/14 Time: 15:33
Sample: 1 7
Included observations: 7
Convergence achieved after 33 iterations
Presample variance: backcast (parameter = 0.7)
GARCH = C(1) + C(2)*RESID(-1)^2 + C(3)*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
		Variance Equation		
C	-0.016373	0.462517	-0.035399	0.9718
RESID(-1)^2	-0.847266	4.739333	-0.178773	0.8581
GARCH(-1)	1.866415	5.155013	0.362058	0.0173

R-squared	-0.000459	Mean dependent var	0.008099
Adjusted R-squared	0.142463	S.D. dependent var	0.408155
S.E. of regression	0.377965	Akaike info criterion	1.521241
Sum squared resid	1.000000	Schwarz criterion	1.498059
Log likelihood	-2.324343	Hannan-Quinn criter.	1.234724
Durbin-Watson stat	2.988629		

Dependent Variable: EXCH
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 07/29/14 Time: 15:35
Sample: 1 7
Included observations: 7
Failure to improve Likelihood after 11 iterations
Presample variance: backcast (parameter = 0.7)
GARCH = C(1) + C(2)*RESID(-1)^2 + C(3)*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
	Variance Equation			
C	0.160657	0.180443	0.890346	0.0133
RESID(-1)^2	0.666021	0.477885	1.393686	0.0334
GARCH(-1)	-0.649830	0.952124	-0.682506	0.0249

R-squared	-0.001099	Mean dependent var	0.012524
Adjusted R-squared	0.141915	S.D. dependent var	0.408024
S.E. of regression	0.377964	Akaike info criterion	0.956015
Sum squared resid	0.999999	Schwarz criterion	0.932833
Log likelihood	-0.346051	Hannan-Quinn criter.	0.669497
Durbin-Watson stat	2.440478		

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