

OIL PRICE FLUCTUATIONS AND THE AUSTRALIAN DOLLAR

Mehdi S. Monadjemi

Visiting Fellow, School of Economics University of New South Wales, Sydney, Australia

mehdimonadjemi@yahoo.com

Abstract

It has been well documented that the Australian dollar exchange rate is closely correlated with the commodity prices. The price of oil is the leading item among the commodity prices. Recently it has been observed that the Australian dollar is closely related to the oil price fluctuations. The regression results of this study show that the Australian dollar is influenced by oil prices and the latter is related to the global economic activity. Sharp rise in oil prices in 2008 and recently experienced significant fall in price are evidences in support of the influence of global economy on energy prices. Some forecast of oil prices in 2016 and 2017 is presented. These forecasts indicate the recovery of the oil prices and the Australian dollars during the next two years.

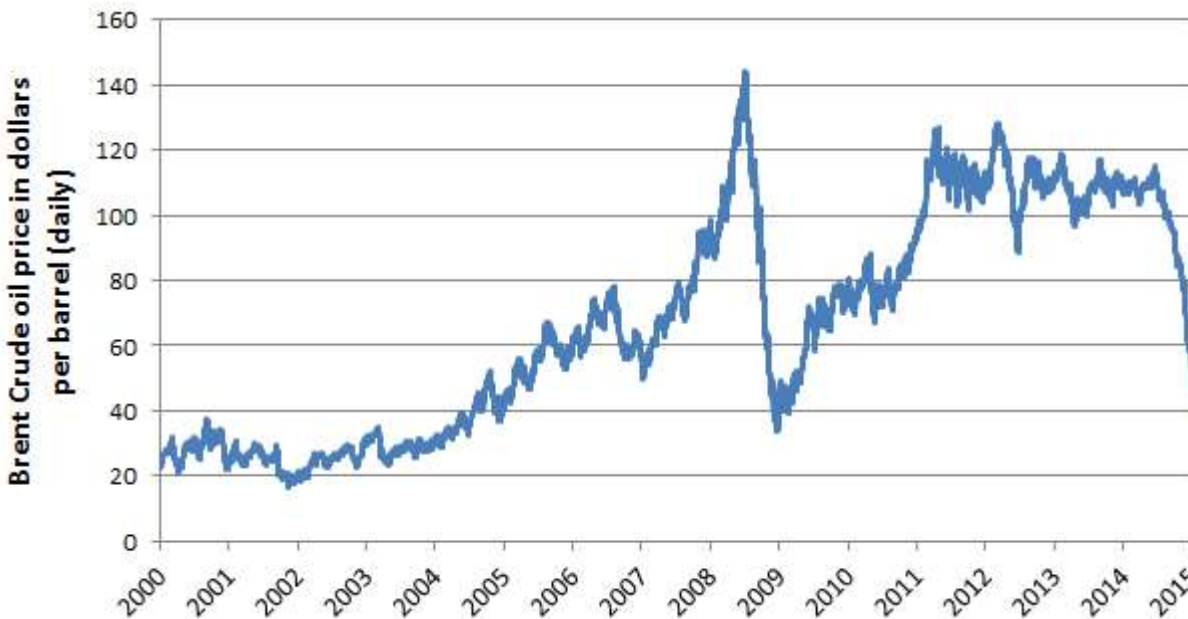
Keywords: Oil Price, Exchange Rate, Global Output, Interest Parity Condition, Australian Dollar, Oil Export, Demand for Oil, Supply of Oil

INTRODUCTION

It has been well documented that the Australian dollar exchange rate is closely correlated with the commodity prices. The price of oil is the leading item among the commodity prices. Recently it has been observed that the Australian dollar is closely related to the oil price fluctuations. The Australian dollar remained fairly strong during the period of rapidly rising oil prices 2001 -2009. Subsequently the Australian currency weakened during the latter parts of 2014 and the entire 2015 when oil prices fell sharply and has remained fairly weak in recent periods.

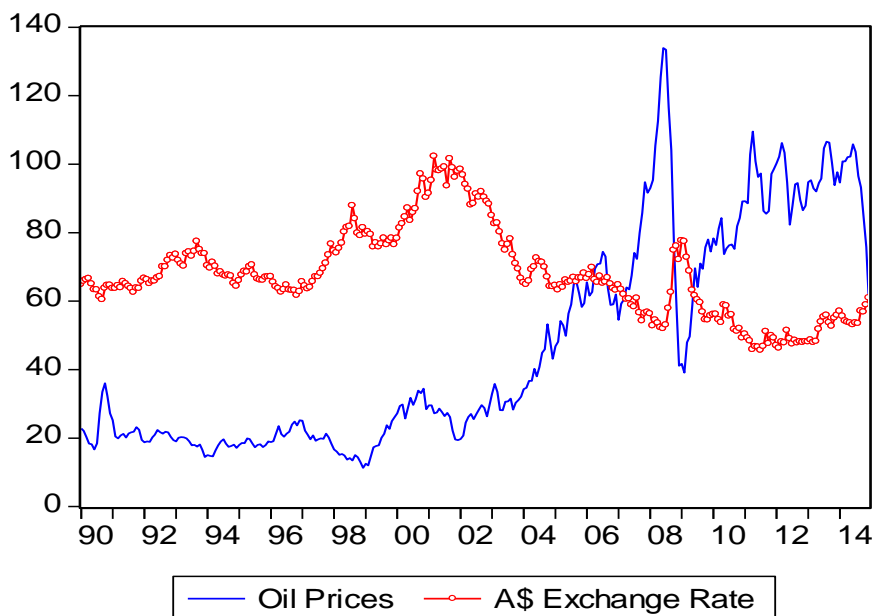
The oil prices are influenced by international demand and supply for oil. The demand for oil is a function of growth rates of oil importing countries as well as the availability of oil substitutes. The supply of oil is influenced by the political developments in Middle East (60 percent of world's oil is produced in Middle East), world's rate of interest and transportation and insurance costs of transporting crude oil to importing countries.

Figure 1: Brent Crude oil price in US dollars per barrel (2000-2015)



Note: The chart is compiled using the daily price from 4 January 2000 to 12 January 2015. Data from EIA, This graph was borrowed from the website www.InfoMine.com.

Figure 2: Oil Price and the Australian Dollar Exchange Rate



The above figure is based on national currency per unit of US dollar. The oil price series are crude oil prices: west Texas intermediate, US dollar per barrel collected from Economic Research, Federal Reserve Bank of St. Louis.

The crude price of oil series in US dollar 2000 – 2015 is plotted in Figure 1. For the purpose of comparison, crude oil prices and the Australian dollar exchange rate (A\$ per unit of US dollar) 1990 – 2014 are plotted in Figure 2. Opposite movements of two series, particularly starting in the late 1990s can be observed from the graph. The peak of the oil price was 140 \$US per barrel in July 2008 which coincided with the highest value of the A\$ in a decade. Relatively weak oil prices until 2006 were also associated with weaker A\$. The coefficient of correlation between oil prices and the A\$ exchange rate in 1990 – 2014 was -0.69.

THEORETICAL DISCUSSIONS

This section starts with the estimation of Australian dollar exchange rate based on a modified version of the uncovered interest parity condition (UIPC) in which real oil prices appear as an additional explanatory variable.

$$e_a = (r_f - r_d) + \rho \quad (1)$$

The UIPC is presented in equation 1, where e_a , r_f , r_d and ρ respectively are the exchange rate (price of foreign currency), foreign rate of interest, domestic interest rate and the risk premium. In this model the risk premium is represented by the price of oil. Changes in the oil prices introduce additional loss (gain) for holders of the Australian currency. Equation 1 can readily be converted into real terms where real exchange rate is a function of real interest rate differential and real oil prices.

The regression results for monthly data 1990 – 2009 are presented in equation 2. The results show that coefficients of real oil prices and real interest rate differential are both significant with correct signs.

$$E_a = 1.05 + 0.026 (R_f - R_d) - 0.25 \text{ OIL} \quad R^2 = 0.55 \quad (2)$$

(8.09) (-13.36)

Where, E_a , R_f , R_d and OIL are logs of real exchange rate (Australian dollar per unit of US dollar multiplied by the ratio of foreign price to domestic price) foreign and domestic real interest rates and log of real oil prices. Figures in brackets are t statistics.

Equation 2 suggests that the Australian dollar exchange rate is strongly influenced by changes in real oil prices and real interest rate differential. This result is not surprising as it is well known that changes in commodity prices are important of determinant of the exchange rate in Australia.

Next a model for oil prices is developed and tested using an appropriate statistical technique.

THE MODEL OF OIL PRICES AND ITS ESTIMATION

Oil prices are determined in the global market for oil. Like any other markets for commodities, the price of oil depends on the factors influencing the demand for and the supply of oil. The market for oil is presented in equations 3 and 4.

$$D_o = f (P_o, g_w) \quad (3)$$

$$S_o = g (P_o, i_w, E_p) \quad (4)$$

Solving equations 3 and 4 for the price of oil gives:

$$P_o = f (g_w, i_w, E_p) \quad (5)$$

Equations 3 and 4 are demand for and supply of oil. P_o , g_w , i_w and E_p are real price of oil, world's growth rate, world's real interest rate and political events in Middle East respectively. Equation 5 is not a reduced form equation because g_w is endogenous, the price of oil affects world's growth and world's growth is affected by the price of oil.

Hamilton (2009) argues that in the short run most of the fluctuations in demand for oil are due to changes in income rather than changes in price. The author shows that for 60 years in the United States, petroleum consumption followed growth of income fairly closely. Furthermore, the study argues that the price elasticity of petroleum is very low. Despite substantial increase in oil prices in 2007 – 2008, the quantity of oil demanded in the United States remained relatively stable.

Hamilton (2009) also considers the effects of historical interruption of oil supply as a result of political turmoils in Middle East. The four episodes are Iranian revolution in 1979, Iraq invasion of Iran in 1980, Iraq invasion of Kuwait in 1990 and Yom Kippur War in 1973. In each episode, oil production declined and oil prices rose after the fall in production. The author argues that in each of these events world's oil production fell by 7 to 9 percent causing oil prices to rise by 25 percent in 1980 and 70 percent in 1990.

Killian (2009) argues that the effects of political developments in the Middle East on the price are not so important. The author believes that price rises after the political events are precautionary demands as market participants become concerned about the future availability of oil. Monadjemi and Lodewijks (2012) also found, aside from the early 1970s OPEC pushed oil price rise, little support for the prolong effect of political developments on oil prices. This study also maintained that the 2008 rise in oil prices had no effect on the US economy. The empirical results of this article showed that the growth of global output is the most important determinant of oil prices. The authors referred to the sharp increase in oil prices in 2008 was as result of a rapid rise in demand for oil China and India. Some commentators argue that recent significant

drop in oil prices are due to the slower growth of Chinese economy, depressed global economic activity and over production of oil in the United States.

Hamilton (2009) maintains that most of the changes in oil prices are due to the political developments causing changes in output of oil in oil exporting countries. This view is different than Kilian (2009) that argues changes in global oil prices are mostly as a result of changes in demand for oil rather than supply of oil. The author maintains that during political crises oil prices rise because oil importers expect shortage of supply and attempt to store more oil. Therefore, even during the political developments in oil exporting country, the demand for oil causes the price to rise.

Frankel (2006) argues that during rising real interest rates as in the 1980s, investors move capital towards interest bearing assets forcing commodity prices (oil prices) to fall. This downward pressure continues until wealth holders expect that oil prices have reached the bottom. Conversely, when real interest rates are low such as during the early and late 2000s, speculators purchase oil, thus causing upward pressure on oil prices. The rising oil prices continue until investors are convinced it is too high and expect it to fall. Hence, oil price and global real interest rates move in opposite direction. Monadjemi (2011) shows that commodity prices and in particular, oil prices, should be considered in setting monetary policy strategy.

Barsky and Kilian (2004) argue that standard approach in studies of oil price and aggregate macroeconomic activity is to assume that the price of oil is exogenous. However, the direction of causation in oil price and economic activity is both ways. Oil prices influence economic activity, but also changes in aggregate economic activity affect oil prices. Accordingly, estimate of coefficient of economic activity in the regression of oil prices is biased. Furthermore, the Granger Causality between US real GDP and real oil prices gave the following results:

Table 1: Granger Causality Test Results

Hypothesis	F statistic	Probability
Real oil price doesn't GC US real GDP	10.14	00
US real GDP doesn't GC real oil Price	5.31	0.0054

GC stands for Granger Causality.

Large value of F statistics and low probabilities reject the null hypothesis

High values of F statistics together with low p values indicate that both hypotheses are rejected. That is, the direction of causation between real oil price and US real GDP runs both ways. Along this line of reasoning Kilian (2009) examined the effects of oil price changes using a VAR model. Following Kilian (2009) approach, in this study a VAR model including previously

mentioned variables is used to estimate the equation of oil prices. The impulse response functions of four variables (equation 5) VAR model produced only 2 positive significant results.

These responses are shown in Figures 3 and 4. In Figure 3 a shock of global output has a positive effect on real oil price. However, In Figure 4 a shock of real oil price initially has a strong positive effect on global output but the effect tends to diminish in the long run. This latter result is supportive of those who argue that after negative oil shock of 1973-1974, there has not been much evidence to show that oil price rises depress global output. This evidence is in contrast with Hamilton (2011) that argues whether caused by geopolitical disturbances or sustained rise in demand, oil price rises have contributed to the post war recessions in the United States.

Figure 3 also supports the rapid rise in oil prices in 2008-2009 and recent sharp fall both caused by fluctuations of global growth of output. Rapid rise in demand for oil from China and India in 2008 led a significant rise in price of oil. Many argue that recent fall in oil price is as result of weak global activity relative to the unchanged supply of oil. This argument is discussed further below.

Figure 3: Response of Real Price of Oil to Global Output

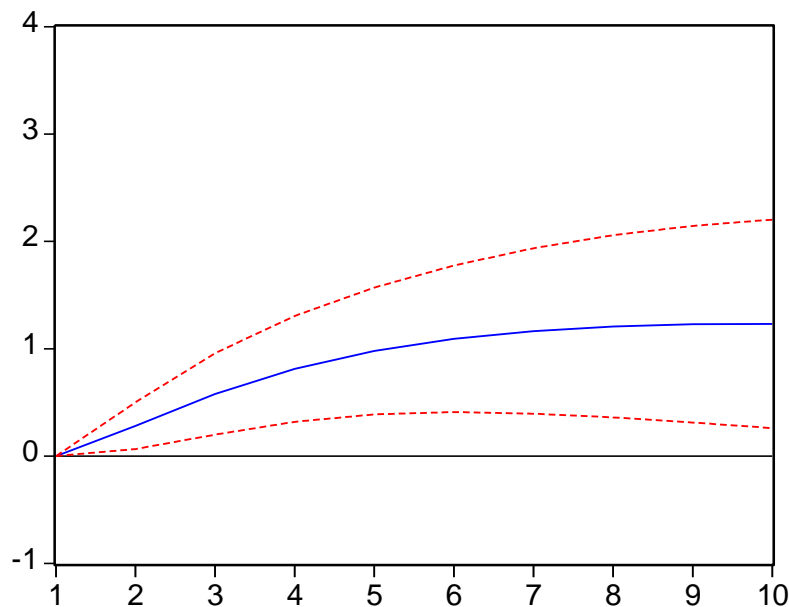
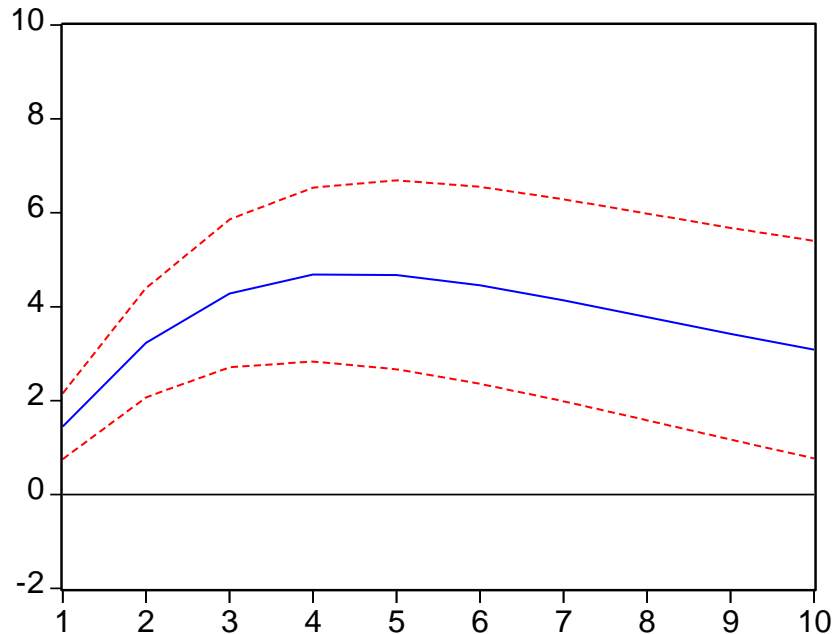


Figure 4: Response of Global Output to Real Price of Oil



WHY THE PRICE OF OIL FALLING?

Oil Prices have fallen from peak of 145 US dollars per barrel in July 2008 to as low as \$28 per barrel in January 2016. This is 81 percent over eight years after nearly five years of stability to June 2014. Tumbling oil prices hurts the economy of oil exporting counties such as Russia, Iran, Nigeria and Venezuela whereas it is beneficial for oil importing countries like China, India, Japan and most of the Western European countries.

The Economist (2014) suggests that the price of is partly determined by supply and demand as well as by expectation. Demand for oil is closely related to the world's economic activity.

Three factors at the present are influencing weak oil prices. Demand is low because of depressed economic activity, higher efficiency, and an increasing substitution of other fuels for oil. Second, United States has become the world's largest oil producer. Although US are not a net exporter of oil, its net imports are now much less, creating excess supply. Finally, the Saudis and Gulf allies have decided not to reduce their market shares to halt the price fall. These countries may reduce production sharply, but they avoid doing so because countries such as Iran and Russia will benefit from their action. With large foreign reserves and low cost of oil production (around \$5-6 per barrel), Saudi Arabia can easily absorb lower oil prices.

Falling oil prices have political implications for the oil exporting countries. Most of these countries rely on oil revenue to finance their social welfare programs. Falling oil revenues means larger budget deficits and cut in social welfare expenditure. Past observations indicate

that cutting welfare expenditure is often followed by public discontent and domestic uprising. Economist (2014) argues that Qatar has already announced reducing subsidies on gasoline, gas and electricity.

Although falling oil prices is beneficial for oil importing countries, it could create instability and uncertainty in the global financial markets, particularly a sharp fall such as recently experienced. Falling oil prices reduces demand of oil exporting countries for imports from industrial countries which together with weak global activity could spread to a worldwide recession. Recent falling global share markets, commencing January 2016, is an evidence of markets being concerned.

How will the drop in oil prices affect European economies? Bert Scholtens argues that, the general expectation is that a fall in oil prices should assist economic growth in Europe. However, there are several factors that are important in how the fluctuating oil price transmits into individual economies. Oil prices are very volatile in recent periods. During the last six months, prices have fallen by more than 60 per cent. Some economists suggested an increase in oil prices of \$20 per barrel will cause the GDP growth of a particular country to drop by 0.25 per cent in the first year and 1 per cent after three years. For the sake of convenience, the impact of an oil price reduction could be assumed to be the opposite. Many analysts are therefore quite optimistic about the effect on the economies of most European countries.

LONG TERM OUTLOOK OF OIL PRICES

As of May 2016 the fall in oil prices has already stabilized around 38 to 40 US dollars per barrel. This stability is mainly due to a significant reduction in over supply of oil in US market as well as gradual improvement in China's growth rate.

US Energy Information Administration (EIA) in annual energy outlook (2016) argues that oil prices are lower than those in last year's outlook, particularly in the near term. The report maintains that, the Brent crude oil price averages \$37 per barrel in 2016, increasing to \$77 per barrel in 2020 as demand and supply come into balance. Beyond 2020, the prices continue to rise, as growing demand causes the development of more costly resources. The US import share of total consumption dropped sharply between 2005 and 2015, from 60% to 24%, and continues to drop after 2017, to just over 7% in 2040, when the United States imports 1.5 million barrels per day.

The following quotation from the May 2016 web site of the US EIA discusses volatility and uncertainty of oil prices in 2016 and 2017.

"Brent crude oil spot prices increased by \$3/b in April to a monthly average of \$42/b, which was the highest monthly average for Brent so far this year. This was the third consecutive increase

in the monthly average Brent price, the longest such stretch since April-June 2014. Several factors put upward pressure on crude oil prices in April: improving economic data and related indications that global oil demand growth is accelerating; ongoing declines in the U.S. rig count and crude oil production; and growing oil supply outages.

Despite the recent increase in prices, EIA expects global oil inventory builds to average 0.9 million b/d in the second and third quarters of 2016, limiting upward price pressures in the coming months. Brent prices are expected to average \$42/b in the second and third quarters of 2016, before rising to \$44/b in the fourth quarter as a result of slowing global oil inventory growth.

The following quotation from the May 2016 web site of the US EIA discusses volatility and uncertainty of oil prices in 2016 and 2017.

EIA expects global oil inventory draws to begin in the third quarter of 2017. The expected inventory draws contribute to forecast rising prices in the first half of 2017, with price increases expected to accelerate later in 2017. Brent prices are forecast to average \$51/b in 2017, \$10/b higher than forecast in last month's Short Term Energy Outlook (STEO). Forecast Brent prices reach an average of \$57/b in the fourth quarter of 2017, reflecting the potential for more significant inventory draws beyond the forecast period.

The higher oil price forecast in this month's STEO compared with the April STEO largely reflects tighter market balances, particularly for the second half of 2017, based on a stronger outlook for global oil consumption. Higher oil consumption data in non-OECD Asia, supported by economic data, contributed to upward revisions for global oil consumption growth of 0.3 million b/d and 0.2 million b/d in 2016 and 2017, respectively. Previously, the pace of economic growth and related oil demand growth had been considered one of the main downside risks to oil prices in the forecast period, and although economic risks remain, they are lower than previously assumed.

In addition, a recent increase in global oil supply outages has taken pressure off storage capacity in the near term. These supply reductions were reflected in a narrowing differential for oil prices for near-term delivery compared with prices for delivery further in the future. Increased outages have reduced the possibility that inventory growth will cause storage costs to quickly rise and put downward pressure on oil prices.

Forecast West Texas Intermediate (WTI) crude oil prices average slightly less than Brent crude oil in 2016 and the same as the Brent price in 2017. The relative price parity of WTI with Brent in the forecast period is based on the assumption of competition between the two crudes in the U.S. Gulf Coast refinery market, as transportation price differentials to move the crudes from their respective pricing points to that market are similar.

The current values of futures and options contracts highlight the heightened volatility and high uncertainty in the oil price outlook (Market Prices and Uncertainty Report). WTI futures contracts for August 2016 delivery that were traded during the five-day period ending May 5 averaged \$46/b, and implied volatility averaged 41%. These levels established the lower and upper limits of the 95% confidence interval for the market's expectations of monthly average WTI prices in August 2016 at \$32/b and \$65/b, respectively. The 95% confidence interval for market expectations widens over time, with lower and upper limits of \$26/b and \$83/b for prices in December 2016. At this time last year, WTI for August 2015 delivery averaged \$61/b, and implied volatility averaged 33%, with the corresponding lower and upper limits of the 95% confidence interval at \$46/b and \$81/b.”

SUMMARY AND CONCLUDING REMARKS

The empirical results of this study showed a positive relationship between global oil price movements and the Australian dollar exchange rate was examined. Furthermore it was shown that recently oil price fluctuations are influenced by changes in the global output rather than political unrest in oil exporting countries.

With reference to EIA forecast and given that oil prices are an important determinant of commodity prices and assuming that the Australian dollar is correlated with the commodity prices, it is expected that the Australian dollar to recover from its current level of 0.72 US dollar to an average of 0.75 to 0.80 during 2017. This prediction does not allow for the impact of the outcome of forthcoming federal election in Australia. With moderate recovery in the world economy, monetary policy in Australia is not expected to change drastically.

REFERENCES

- Barsky, R. and Kilian, L. (2004), “Oil and the Macro economy since the 1970s”, *Journal of Economic Perspectives*, 18(4), pp. 115-134.
- Frankel, J. (2006), “The Effect of Monetary Policy on real commodity Prices”, *NBER Working Paper* No.12713, December.
- Hamilton, J. (2009), “Causes and Consequences of the Oil Shock of 2007-08”, *Brooking Papers on Economic Activity*, Spring, pp. 215-261.
- Hamilton, J. (2011), “Historical Oil Price Shocks”, *NBER Working Paper 16790*, February.
- Kilian, L. (2009), “Not All Oil Price Shocks Are Alike: Disentangling Demand and Supply Shocks in Crude Oil Market”, *American Economic Review*, 93: 3, pp. 1053-1069.
- Monadjemi, M. (2011), “Monetary Policy and Oil Prices”, *Global Economy Journal*, vol. 11, issue 3, article 8.
- Moadjemi, M. and Lodewijks, J. (2012), “Oil Price Fluctuations and the American Economy”, *Global Review of business and Economic Research*, pp. 42 – 57.

Scholtens, B. "How will the drop in oil prices affect European economies?" [http://blogs.lse.ac.uk/politicsandpolicy/January 20, 2015](http://blogs.lse.ac.uk/politicsandpolicy/January%20,2015).

US Energy Information Administration, May 20, 2016, www.eia.gov/forecast/ieo/ *The Economist*, "Why Oil Price is Falling?", (2014, December 8).