Financial and monetary policy responses to oil price shocks: Evidence from oil importing and oil-exporting countries.

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Abstract

In this study, we investigate the financial and monetary policy responses to oil price shocks using a Structural VAR framework. We distinguish between net oil-importing and net oil-exporting countries. Since the 80s, a significant number of empirical studies have been published investigating the effect of oil prices on macroeconomic and financial variables. Most of these studies though, do not make a distinction between oil-importing and oil-exporting economies. Overall, our results indicate that the level of inflation in both net oil-exporting and net oil-importing countries is significantly affected by oil price innovations. Furthermore, we find that the response of interest rates to an oil price shock depends heavily on the monetary policy regime of each country. Finally, stock markets operating in net oil-importing countries exhibit a negative response to increased oil prices. The reverse is true for the stock market of the net oil-exporting countries. We find evidence that the magnitude of stock market responses to oil price shocks is higher for the newly established and/or less liquid stock markets.

Keywords: Structural oil price shocks, monetary policy, stock market returns, SVAR

JEL: C32, E44, E52, G15, Q40

1. Introduction

The aim of this paper is to examine the financial and monetary policy responses to oil price shocks for eight European countries; namely, the UK, Germany, France, Italy, Spain, Netherlands, Portugal and Norway. We also consider Russia, as it constitutes a key energy supplier of Europe. In particular, both the level of inflation and interest rates will be used as proxies of the monetary policy response to oil price shocks, while stock market returns will serve as a measure of the financial response to these shocks. We distinguish between net oil-importing and net oil-exporting countries.

It is worth noting that very little work has been done with respect to monetary policy and oil prices for Russia, while at the same time most papers usually examine the effect of oil price shocks on the macroeconomic aggregates and not on monetary policy.

The selection of countries satisfies three main concerns of the authors. Primarily this study is related to European continent countries, which have not been extensively studied in the past. In addition, given that the sample consists of two net oil-exporting countries (Norway and Russia) and seven net oil-importing countries (UK[1], Germany, France, Italy, Spain, Netherlands and Portugal), it allows for a thorough comparison of their financial and monetary responses to oil price shocks. Relatively little research has been conducted on the different effects of an oil price shock on the two aforementioned groups of countries (see, *inter alia*, Korhonen and Ledyaeva, 2010; Bjornland, 2009; Lescaroux and Mignon, 2008; Jimenez-Rodriguez and Sanchez, 2005). Finally, there is a special focus of this study on possible diverse oil price effects between the traditional stock markets, such as UK, Germany, France, Italy, Spain and Netherlands and the newly established and/or less liquid stock markets, such as Russia, Norway and Portugal. Thus

[1] UK is classified as a net oil importer based on its current status. We need to consider though, that for most part of the sample period the country was a net oil-exporter. This draws a distinction between UK and the remaining six net oil-importing countries of the sample. We further consider this distinction in the analysis of the empirical findings.

motivated, our study elucidates three important aspects, which have not been extensively examined in the past.

The extensive literature has so far addressed several issues related to the impact of oil price innovations in member-countries of the G7, OPEC and OECD (see, *inter alia*, Miller and Ratti, 2009; Cologni and Manera, 2008; Jimenez-Rodriguez and Sanchez, 2005). Prominent among these issues is the investigation of the effects of an oil price shock on various macroeconomic variables, such as GDP, consumer price index, interest rates, industrial production and unemployment.

Furthermore, authors such as Sadorsky (1999), Jones and Kaul (1996) and Haung, Masulis and Stoll (1996) investigate the relationship between oil prices and stock market returns. They all conclude that oil price changes are important determinants of stock market returns. Economic theory documents that any asset price is determined by the expected discounted cash flows of that asset. Therefore, an oil price increase would inflate costs and profits would eventually decrease, undermining shareholders value. In this regard, stock prices will tend to decrease. However, the aforementioned studies do not examine whether the relationship between oil prices and stock market performance is different for oil-importing and oil-exporting countries. This paper fills this void.

The rest of the paper is organized as follows. In the next section, we briefly discuss the theory underpinning the transmission mechanisms among oil, inflation, interest rates, and the stock market. We then turn our focus to the existing work in the field under consideration, documenting the relationship between oil prices, the economy and stock markets. A brief description of the Structural VAR model, as well as, the presentation of our dataset, follows. Finally, empirical results are outlined and discussed, before a conclusion is reached.

2. Theoretical context of transmission mechanisms

Figure 1 portrays a simple AD/AS framework adopted by Elwood (2001) of the effects of oil price shocks on a net oil-exporting country. The effects of an oil price increase are expected to be positive, as initially, the income of this country is likely to increase, shifting the AS_1 curve towards the right (AS_2) – this is displayed as the income effect. It is reasonable to expect that the increase in oil prices will increase production costs in the oil exporting country (production cost effect); however, the magnitude of the income effect can reverse the negative impact of oil on production costs, thus leading to an overall increase in aggregate supply (Q_2). In addition, we anticipate the AD_1 curve to shift rightwards to AD_2, as the value of export demand for oil rises. Consequently, both consumption and investment are expected to rise in magnitude and this, in turn, will lead to an increase in employment. Stock markets are expected to rise as a result of a prosperous environment. This period of growth is likely to come to an end though, as demand-side inflation will eventually make its appearance (price levels will rise from P_1 to P_2).

[FIGURE 1 HERE]

Figure 2 describes the effects of an oil price shock on a net oil-importing country. As depicted on the AD/AS model, a net oil-importing country immediately faces increased production costs (production cost effect), considering that oil, in its various forms, constitutes one of the most basic inputs of production. The oil price increase will have a negative impact on the country's welfare, causing a reduction in the quantity supplied (income effect). Overall, it is observed that both the income and production cost effects will move the AS_1 curve leftwards to AS_2, with the output equal Q_2. Furthermore, increased production costs will be passed on to consumers (see, for example, Abel and Bernanke, 2001; Hamilton, 1996; Hamilton, 1988; Barro, 1984, among other),

resulting in relatively low levels of aggregate demand (AD_1 curve will shift to the left to AD_2) and higher prices (cost-push inflation – price levels move from P_1 to P_2).

[FIGURE 2 HERE]

Subsequently, unemployment is expected to rise, as a result of the reduction in consumption and output levels. Stock markets are expected to decline as a result of a negative environment. In short, this country may very well enter a period of economic downturn.

Eventually it all comes down to monetary policy to keep the economy on an even keel (Bernane, Gertler and Watson, 1997). Based on the ISLM framework, an increase in the short term interest rates (i.e. contractionary monetary policy) might be a suitable treatment for the demand-side inflation in a net oil-exporting country. The transmission channel of such monetary policy, in the case of increased inflation, can be shown schematically, as follows:

$$\Downarrow \mathbf{M} \Rightarrow \Uparrow \mathbf{i_r} \Rightarrow \Downarrow \mathbf{I} \Rightarrow \Downarrow \mathbf{Y}$$

where M indicates money supply, a decline of which will lead to an increase in the level of interest rates (i_r) which in turn exercise a negative effect on investment (I) and output (Y). Thus, if the central bank decides to raise the short term interest rates, the expected confinement of investment and output will eventually restrain inflation. This rise of interest rates though, will negatively affect stock market performance.

On the other hand, a decrease in the interest rates will probably be a suitable decision for the net oil-importing country, providing demand stimulus. Schematically, this is shown below:

$$\Uparrow \mathbf{M} \Rightarrow \Downarrow \mathbf{i_r} \Rightarrow \Uparrow \mathbf{I} \Rightarrow \Uparrow \mathbf{Y}$$

More specifically, we anticipate that the period of distress will come to an end, as both investment spending and output rise. Such a decision can have a positive effect on the stock market.

It is also important not to lose sight of the fact that such monetary policy decisions will be made by countries whose primary concern is to regulate inflation. Granville and Mallick (2006) suggest that only mature economies are trying to regulate inflation using interest rates. Other economies, mainly emerging, are trying to regulate their exchange rate fluctuations, instead.

Despite the fact that these are the theoretical transmission mechanisms through which oil price shocks propagate the economy and the stock market, it is important to consider the findings of the empirical research in this area, as well. In this regard, this will be the focal point of Section 3.

3. Background of the Study

3.1. Oil price effect on the economy

Mounting empirical evidence indicates that oil prices exercise a strong influence on the economy. Various authors in the past have examined the effects of oil prices on industrial production and inflation, suggesting a negative effect on industrial production and a positive effect on inflation (see, *inter alia*, Tang, Wu and Zhang, 2010; Du, He and Wei, 2010; Miller and Ratti, 2009; Cologni and Manera, 2008; Ciner 2001; Haung et al, 1996; Ferderer, 1996; Gisser and Goodwin, 1986; Burbridge and Harrison, 1984; Hamilton, 1983). An increased oil price would inflate production costs, subsequently resulting in lower production and lower expected earnings (Jones, Lelby and Paik, 2004).

Jimenez-Rodriguez and Sanchez (2005) find that there is a bidirectional relationship between oil price movements and macroeconomic indicators, such as inflation. They also point out the

different effect that oil prices exercise on oil-importing and oil-exporting economies. On one hand, an oil price increase could be beneficiary for the oil-exporting country whereas, on the other hand, it could be detrimental for the oil-importing country. Similar findings were presented by Mendoza and Vera (2010), Korhonen and Ledyaeva (2010), Bjornland (2009) and Lescaroux and Mignon (2008). Cunado and Perez de Gracia (2005) suggest that the effect of oil prices on macroeconomic indicators tends to be different when oil prices are converted to domestic currency rather than US dollar terms. Barsky and Kilian (2004), on the other hand, argue that an oil price shock does not necessarily lead to an immediate effect on the economy.

Other studies have shown, though, a structural break in the relationship between oil prices and macroeconomic indicators after the 1980s. More specifically, they support the view that oil price changes do not significantly affect inflation and thus they are not the main source for economic downturn, as Hamilton had suggested back in 1983. This structural break can be partly attributed to the recent trend in national monetary policy formulation being focused on the confrontation of inflationary pressures (Lescaroux and Mignon, 2008; Blanchard and Gali, 2007; Bernanke et al, 1997). The International Energy Agency (2006) reports that when a country is in a state of economic growth, it is not likely to face the negative impacts of an oil price increase, with respect to inflation. This is mainly due to the fact that both increased productivity and investments enable firms to absorb production input costs.

Through the lens of monetary policy response to oil price shocks, central banks are faced with a trade-off between inflation and output (Castillo, Montoro and Tuesta, 2010). Bernanke et al (1997) argue that a contractionary monetary policy is not necessarily the optimal solution, since it could aggravate the negative effects of these shocks. In particular, they advocate that the negative effects of oil price shocks that the US economy experienced during the period of late 70s to early

90s, should be mainly attributed to the monetary policy response of the Federal Reserve Bank, rather than to the oil price shock itself. Had the FED assumed a neutral policy (i.e. no alteration of the funds rate) the output contraction would have been substantially less. This analysis is in line with an earlier study by Bohi (1989). However, Hamilton and Herrera (2004) support the view that the relative contribution of monetary policy and oil price shocks to economic developments may not be as effective as Bernanke et al (1997) have suggested. In addition, Clarida, Gali and Gertler (2000), as well as, DeLong (1997) propose that different monetary policy rules could result in substantially different inflation responses to oil price shocks.

At the other end of the spectrum, considering that oil price shocks could be regarded as purely monetary shocks in nature, active monetary policy is then required not only to subdue inflationary pressures but also to ensure minimum contractionary effects on output (Castillo et al, 2010; Romer and Romer, 1989).

Jimenez-Rodriguez (2009) provides another angle on the relationship between oil prices and the economy. She argues that the effects of oil price shocks should be considered along with the economic environment at the time of the shock. Oil price shocks during stable economic periods would generate a higher impact on the economy compared to similar shocks during turbulent periods.

3.2. Oil price effect on the stock market

Oil prices are expected to have both a direct and an indirect negative influence on stock market performance. The direct effect can be explained by the fact that oil price shocks can be considered as a risk factor for financial markets and thus a positive oil price shock may induce a decrease in share prices (Jones and Kaul, 1996). On the other hand, an indirect negative effect

can also be justified. Evidence from the previous section (section 3.1) supports the view that higher oil prices lead to higher inflation, which, in turn cause a negative effect on the stock market.

This negative relationship between oil prices and stock returns has also been documented by Filis (2010), Chen (2009), Miller and Ratti (2009), Driesprong, Jacobsen and Maat (2008), Nandha and Faff (2008), O'Neill, Penm and Terrell (2008), Park and Ratti (2008), Bachmeier (2008), Ciner (2001) and Gjerde and Sættem (1999). Nandha and Brooks (2009) maintain that the effect of oil prices on stock market returns depends not only on the country's characteristics but also on the industry sector. Sadorsky (1999), also reaches the same conclusion and further documents that oil price volatility has an impact on stock returns, as well. Similar findings are reported by Malik and Ewing (2009), who also observe that the oil price volatility causes negative effects on stock market returns. Oberndorfer (2009) seconds that opinion in his study of the effect of oil price volatility on European stock markets.

A slightly different approach is adopted by Haung et al (1996) who examine the relationship between oil future price returns and US stock returns. In agreement with Chen, Roll and Ross (1986), they provide evidence that oil future prices tend to influence oil companies' stock returns but not the overall market.

All aforementioned studies mainly concern oil-importing countries. Pertaining to oil-exporting countries, Arouri and Rault (2009) subscribe to the belief that a positive oil price shock has a positive impact on the stock market performance. Similar results are documented by Bashar (2006). However, Al-Fayoumi (2009) finds no evidence regarding the aforementioned relationship.

Several studies focus on the origin of the oil price shock in order to understand and interpret the effects of oil price shocks on stock markets (see, *inter alia*, Hamilton, 2009a,b; Kilian, 2009; Lescaroux and Mignon, 2008; Barsky and Kilian, 2004; Terzian, 1985). Hamilton (2009a), for example, draws a distinction line between the sources of an oil price shock. According to him, an oil price shock could either originate from the industrialisation of countries such as China (demand-side shock) or from the lack of an immediate response of oil-supply to a large scale increase in oil-demand (supply-side shock). Kilian (2009), on the other hand, argues that there are three sources of oil price shocks, namely, aggregate demand-side shock, precautionary demand-side shock and supply-side shock. Aggregate demand-side shocks occur due to global business cycle's fluctuations, precautionary demand shocks occur due to the uncertainty of future oil supply based on the expectations of future oil demand, while supply-side shocks are exogenous shocks and occur due to reduction of crude oil availability. Kilian and Park (2009) maintain that demand-side oil price shocks influence stock prices more than the supply-side shocks.

In particular, Kilian and Park (2007) show that demand driven shocks cause negative effects on US stock market returns. However, oil price increases, due to global economic expansion, tend to have a significant positive effect on stock returns. In the same line of reasoning, Hamilton (2009a) argues that demand-side shocks deriving from the industrialisation of countries such as China could have a significant positive impact on the stock markets.

A quite different approach on the investigation of oil price effect on stock markets is followed by Filis, Degiannakis and Floros (2011) and Bharn and Nikolova (2010). These studies use measures of dynamic correlation between stock market and oil prices and provide evidence of an

asymmetric behaviour of the correlation between the two asset returns, which depends on the source of the oil price shock (i.e. demand-side shock or supply-side shock).

Contrary to the above, part of the literature finds that there is no relationship between oil price innovations and stock markets (see, *inter alia*, Jammazi and Aloui, 2010; Apergis and Miller, 2009; Cong, Wei, Jiao and Fan, 2008).

It should also be noted that the majority of these studies do not include both oil-importing and oil-exporting countries in their sample. Thus the current research bridges this gap by including both oil-importing and oil-exporting countries in the sample.

4. Methodology and Data Description

4.1. Methodology

We examine the dynamic relationship among the growth rates of oil prices (OIL), the consumer price index (INF), interest rates (INT) and stock market index (IND), in two net oil-exporting countries (Norway and Russia) and seven net oil-importing countries (UK, Germany, France, Italy, Spain, Netherlands and Portugal), by employing a Structural VAR model, separately for each country. We also investigate the transmission mechanism of the stochastic shocks of these series.

The structural representation of the VAR model of order *p* takes the following general form:

$$A_0 y_t = c_0 + \sum_{i=1}^{p} A_i \, y_{t-i} + \varepsilon_t \qquad (1)$$

where $\mathbf{y}_t$ is a m × 1 vector of endogenous variables, A_i are m × m autoregressive coefficient matrices, ε_t is an m × 1 vector of structural disturbances, assumed to have zero covariance and be serially uncorrelated. A_0 is a m × m matrix containing the contemporaneous relations among the variables. In order to get the reduce form of model (1) we multiply both sides of the equation

with A_0^{-1}. Let e_t be the reduced form errors, where $e_t = A_o^{-1}\varepsilon_t$, assumed to be white noise processes. The structural disturbances can be derived by imposing suitable restrictions on A_0. With reference to the AD/AS and the ISLM frameworks analysed in section 2, the ordering of the variables and the exclusion restrictions in our model, are as follows:

$$\begin{bmatrix} e_{1t}^{OIL} \\ e_{2t}^{INF} \\ e_{3t}^{INT} \\ e_{4t}^{IND} \end{bmatrix} = \begin{bmatrix} a_{11} & 0 & 0 & 0 \\ a_{21} & a_{22} & 0 & 0 \\ a_{31} & a_{32} & a_{33} & 0 \\ a_{41} & a_{42} & a_{43} & a_{44} \end{bmatrix} \times \begin{bmatrix} \varepsilon_{1t}^{OIL\ Shock} \\ \varepsilon_{2t}^{INF\ Shock} \\ \varepsilon_{3t}^{INT\ Shock} \\ \varepsilon_{4t}^{IND\ Shock} \end{bmatrix}$$

In short we assume that the oil price shock is considered to be our exogenous shock that triggers inflationary pressures in the economy. Monetary policy authority will, in turn, respond to these pressures by altering interest rates. All aforementioned variables are expected to affect stock market developments.

To proceed to the estimation of the reduced form of model (1), it is first necessary to establish the stationarity of the variables. The ADF and PP unit root tests with intercept only and trend and intercept suggest that all variables are I(0)[2]. The order of each model was identified using the Akaike Information Criterion[3]. For almost all countries (UK, Germany, France, Netherlands and Russia) the AIC proposes a VAR model of order 6. For the rest of the countries (Italy, Spain, Portugal and Norway) the lag-length that was suggested by AIC was 5. In this regard, we have decided to use six lags for all countries.

4.2. Data Description

We use monthly data from 1991:01 to 2010:04 for UK, France, Germany, Italy, Spain,

[2] Results can be obtained upon request.
[3] Results can be obtained upon request.

Netherlands and Norway. For Russia the data used are from 1996:04 to 2010:04[4] and for Portugal from 1995:02 to 2010:04[5]. The stock market indices used are the FTSE100 (UK), DAX30 (Germany), SBF120 (France), MIBTel (Italy), IBEX35 (Spain), AEX (Netherlands), PS120 (Portugal), OBX25 (Norway) and RTS (Russia). We also take each country's CPI, which is seasonally adjusted with the same base year (2000). The interest rates used in this study are the 1-month interbank rates of each country. For oil we use the Brent crude oil prices, converted in local currency. Brent crude oil was chosen, as a proxy of world oil price, due to the fact that this type of oil represents the 60% of the world oil daily consumption (Maghyereh, 2004). We convert oil prices into real oil prices by taking into consideration the exchange rate between the currency[6] of each country and the US dollar over the period of study, as well as, the consumer price indices. Interest rates and stock market prices are expressed in real terms, as well, taking into consideration the corresponding CPI index.

The stock market prices and interest rates were collected from *Datastream*®, consumer price indices were collected from the Eurostat and the national statistical services of the selected countries and oil prices in dollar terms were extracted from Energy Information Administration. All variables are expressed in logarithms.

5. Empirical Results and Discussion

5.1. Preliminary Tests

Table 1 reports the descriptive statistics of the series. It can be observed that OIL is showing the lower amplitude on all countries, whereas INT exhibits the higher amplitude. An exception is Russia, whose stock market (IND) exhibit greater volatility than all other series. In addition, the

[4] We do not consider any available data prior to 1996, as during this time Russia was in a transition period, which was characterised by a volatile behaviour of the variables under consideration. This is in line with Granville and Mallick (2010).

[5] Data availability issues have imposed constraints to our sample period.

[6] Exchange rates were collected from Pacific Exchange Rate Service.

Russian stock market is having the higher volatility compared to all stock markets. This is mainly due to the fact that Russia has a newly established stock market. CPI exhibits low amplitude on all countries, expect for Russia. Furthermore, we can observe that the INT is negative in some countries, which shows the declining nature of interest rates during the period under consideration in this study.

[TABLE 1 HERE]

All variables have a mean very close to zero. However, there is an indication of non-normally distributed series, as J-B statistic is significant in all cases. This is probably due to non-linearities involved in the growth rate fluctuations. This non-normality is also evident from the kurtosis and skewness coefficients.

5.2. Structural VAR results – Impulse Response Functions

The purpose of the VAR-family models (including the SVAR framework) is mainly to examine the dynamic adjustments of each of the involved variables to exogenous stochastic structural shocks (see, *inter alia*, Bjornland and Leitemo, 2009; Kilian and Park, 2009; Papapetrou, 2001; Burbridge and Harrison, 1984). Thus, as space is limited, we only present the analysis of the impulse response functions[7].

[FIGURE 3]

[TABLE 2]

[7] The actual VAR(6) coefficient tables are available upon request.

Starting from the net oil-importing countries of our sample; a positive oil price shock in Germany results in an immediate positive response of inflation. This effect decreases over time, until it becomes negligible 10 months later. However, since the forth month after the initial oil price shock, the response of inflation is at a minimum. Interest rates react immediately and positively to the oil price increase. On the other hand, interest rates react positively to inflationary pressures with one month delay. The stock market initially has a negative response to the oil price shock, oscillating negatively for a period of 8 months before starting to fade out. In addition, inflation and interest rates seem to exercise a negative impact on the stock market, as these are depicted by the impulse response functions. Kaul and Seyhun (1990) proponent that the effect of inflation on stock market performance could be triggered by output shocks caused by disturbances in crude oil prices. Past studies have also documented these relationships (see, *inter alia*, Miller and Ratti, 2009; Nandha and Faff, 2008; Park and Ratti, 2008 for the effect of oil prices on the stock market; Cologni and Manera, 2008; Omrana, 2003; Flannery and Protopapadakis, 2002 for the effect of inflation on the stock market). With respect to the effect of interest rates on the stock market, a similar finding is reported in the empirical work of Laopodis (2010) and Bjornland and Leitemo (2009).

Overall, the patterns that hold for Germany can also be observed in all remaining net oil-importing countries, namely UK, France, Italy, Spain, Netherlands and Portugal. Our results are in line with economic theory, in the sense that such developments are expected in countries that employ an inflation targeting monetary policy rule.

However, particularly for UK and Portugal, we notice that the positive response of inflation to the oil price shock exhibits an increasing pace for two months, before it eventually starts decreasing. Hence, we observe that the oil price shock is more persistent in the UK and Portugal,

as opposed to all remaining net oil-importers. This finding suggests that Germany, France, Italy, Spain and Netherlands exhibit their capacity to battle inflationary pressures (due to oil price increases) immediately, whereas delays are observed in the UK and Portugal. With reference to Portugal, a plausible explanation of this persistence could be the small size of its economy, reflecting, to a certain extent, its limited ability to absorb oil price shocks immediately. By contrast, the inflation persistence in the UK can be explained, in part, due to the country's trade dependence on oil. In particular, even though UK is currently a net oil-importer, it is at the same time a major oil producer. Thus, a positive oil price shock will have multiple effects. On one hand, the economy will experience cost-push inflation, reflecting the country's oil importer character; while, on the other hand, demand-side inflationary pressures could also arise, reflecting the country's oil producer status.

The UK stock market response to a positive oil price shock is typical for a net oil-importing country, even though the country is also regarded as a major oil producer. Nevertheless, this response is expected, as an increase in oil prices could cause a significant appreciation of the UK currency, as shown by Jimenez-Rodriguez and Sanchez (2005). The currency appreciation could lead to output reduction, via the decrease of the country's competitiveness and thus the stock market will respond negatively to such an event.

A final comment on net oil-importers concerns the fact that the Dutch stock market does not respond to oil and interest rate innovations.

Turning to the net oil-exporting countries; a positive oil price shock in Russia causes a positive response of inflation; a response which is immediate and of high magnitude, indicating demand-side inflation (see, *inter alia*, Bjornland, 2009; LeBlanc and Chinn, 2004; Hooker 2002). The effect of oil price increases on inflation disappears rapidly (one to two months later) and

eventually becomes negligible eight months after the shock. Furthermore, an immediate and negative response of interest rates to a positive oil price shock can be reported. Interest rates respond negatively and immediately on inflationary pressures, as well. Admittedly, these results lack theoretical flavour in the sense that they are not supported by any prevailing economic argument. Nonetheless, a plausible explanation of these responses could be found in the monetary policy targeting that Russia is engaged with. In particular, Russia's monetary policy is not inflation targeting; instead, it has an exchange rate targeting regime (for further details on the Russian monetary policy regime the reader is directed to the paper by Granville and Mallick (2010), as well as, to the guidelines for the single state monetary policy prepared by the central bank of Russia for the year 2010). Increased oil prices will trigger an appreciation of the Russian ruble. Considering that the appreciation of the currency will breach the upper boundary set by the Russian monetary authority and taking into account the interest rate parity, we anticipate an immediate reduction on the country's interest rates in response to the oil price increase. To further our analysis regarding Russia, its stock market initially responds negatively to the positive oil price shock; this response, however, becomes positive from the second month onwards and eventually dies out completely in about two years time. In addition, stock market responds negatively to both inflation and interest rates shocks. Similar conclusions were presented in other studies, such as Omrana (2003), Flannery and Protopapadakis (2002) and Siklos and Kwok (1999).

As far as Norway is concerned, a positive oil price shock causes a positive response from inflation which is rather low in magnitude and eventually becomes negligible three months later. Furthermore, we cannot identify any significant effect of oil on interest rates; at least not until four months have passed. Interest rates though, respond immediately and positively to

inflationary pressures and a peak is reached by the seventh month. The magnitude of this response, however, is rather low. Finally, on one hand, we have a positive impact of the oil price shock on the stock market (similarly with Bjornland, 2009; Jimenez-Rodriguez and Sanchez, 2005), whereas, on the other hand, the stock market reacts negatively to inflationary pressures and interest rates developments.

Overall, we find evidence suggesting that oil prices affect the level of inflation in both net oil-exporting and net oil-importing countries, which is in disagreement with what Hamilton (2008), Lescaroux and Mignon (2008) and Blanchard and Gali (2007) have said, i.e. that from 1980s onwards inflationary pressures cannot be attributed to oil price increases, since the importance of oil, as a production input, gradually decreases.

Furthermore, we find that the response of interest rates to an oil price shock depends heavily on the monetary policy regime of each country. We observe that countries which adopt an inflation targeting regime, exhibit an inclination towards restricting inflationary pressures (triggered by oil price increases) by immediately increasing interest rates.

On general principles, stock markets in net oil-importing countries exhibit a negative response to increased oil prices. On the contrary, the response is positive for net oil-exporters, as expected.

Finally, our results distinguish between responses of traditional and newly established and/or thin stock markets in oil price shocks. In particular, it is evident that the magnitude of stock market responses to oil price shocks is higher for the newly established and/or thin stock markets (such as Russia and Norway). This finding can be attributed to the fact that thin stock markets tend to overestimate the workings of economic activity.

A summary of the findings can be found in table 3.

[TABLE 3 HERE]

6. Conclusion

In this study, we investigate the financial and monetary policy responses to oil price changes in nine countries, namely UK, Germany, France, Italy, Spain, Netherlands, Portugal, Norway and Russia; corresponding to two net oil-exporting countries (Norway and Russia) and seven net oil-importing countries (UK, Germany, France, Italy, Spain, Netherlands and Portugal).

Overall, we find evidence show that the level of inflation in both net oil-exporting and net oil-importing countries is positively affected by oil prices. A finding which poses a contradiction to what Hamilton (2008), Lescaroux and Mignon (2008) and Blanchard and Gali (2007) have argued, i.e. that from 1980s onwards inflationary pressures cannot be attributed to oil price increases. Furthermore, we find that the response of interest rates to an oil price shock depends heavily on the monetary policy regime of each country. In addition, the stock markets of net oil-importers exhibit a negative response to increased oil prices. However, the reverse is true for net oil-exporting countries, a finding which is in line with Bjornland (2009) and Arouri and Rault (2009).

Finally, our results distinguish between responses of traditional and newly established and/or thin stock markets to oil price shocks. In particular, it is evident that the magnitude of stock market responses to oil price shocks is higher for the newly established and/or less liquid stock markets (such as Russia and Norway). This can be attributed to the fact that these stock markets tend to overestimate the workings of real economic activity.

Further research in the field should incorporate the origin of oil price shocks; that is whether it comes from the supply-side or the demand-side. Finally, further study could examine the asymmetric effects of oil prices on monetary policy and stock market responses.

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Tables

Table 1: Descriptive statistics for oil prices, inflation, interest rates and stock market

	Series	Mean	St. Dev.	Skewness	Kurtosis	J-B Stat.
UK	OIL	0.002	0.004	1.209	12.721	948.959*
	INF	0.004	0.043	-0.731	5.523	80.417*
	INT	0.006	0.106	-0.045	3.938	8.413*
	IND	-0.014	0.059	-2.915	16.84	2170.882*
Germany	OIL	0.001	0.002	0.252	15.254	1422.681*
	INF	0.005	0.065	-1.064	7.454	230.191*
	INT	0.006	0.104	-0.173	4.194	14.636*
	IND	-0.012	0.064	-1.711	9.904	571.665*
France	OIL	0.001	0.001	0.446	4.314	23.867*
	INF	0.004	0.059	-0.765	5.591	85.623*
	INT	0.007	0.104	-0.195	4.201	15.101*
	IND	-0.011	0.084	0.643	13.468	1070.758*
Italy	OIL	0.001	0.001	0.489	8.671	320.128*
	INF	0.002	0.001	-0.238	4.001	8.751*
	INT	-0.021	0.084	-2.051	10.593	530.704*
	IND	0.005	0.063	-0.626	4.218	21.751*
Spain	OIL	0.001	0.002	0.326	4.389	22.759*
	INF	0.002	0.002	-0.293	3.861	7.722*
	INT	-0.021	0.082	-2.059	10.943	570.301*
	IND	0.004	0.063	-0.617	4.155	20.339*
Netherlands	OIL	0.002	0.002	0.267	8.923	341.881*
	INF	0.002	0.002	-0.100	6.625	93.937*
	INT	-0.014	0.081	-1.922	9.580	413.709*
	IND	0.001	0.068	-1.650	8.590	300.234*
Portugal	OIL	0.002	0.003	0.434	3.712	9.883*
	INF	0.007	0.056	-0.202	3.734	5.569*
	INT	0.008	0.101	-0.359	4.103	13.742*
	IND	-0.016	0.071	-1.547	9.091	356.009*
Norway	OIL	0.001	0.004	0.637	7.037	114.292*
	INF	0.011	0.061	-0.867	3.969	25.186*
	INT	0.010	0.102	-0.382	3.896	8.857*
	IND	-0.007	0.086	-0.461	8.441	293.237*

Russia	OIL	-0.001	0.033	0.375	66.294	2242.971*
	INF	0.021	0.139	-0.807	5.635	60.741*
	INT	0.024	0.127	1.183	9.717	323.433*
	IND	-0.012	0.207	1.126	5.219	71.265*

* significant at 5% level.

Table 2: Structural VAR model: Impulse Response Functions (time required for the shock to be absorbed)

		UK	Germany	France	Italy	Spain	Netherlands	Portugal	Norway	Russia
Response of OIL to shocks from	OIL	24	22	26	15	13	31	36	25	23
	INF	26	25	30	13	10	30	34	26	22
	INT	25	23	27	11	12	26	32	22	20
	IND	16	27	26	12	14	28	41	26	19
Response of INF to shocks from	OIL	22	25	25	21	19	28	41	30	25
	INF	32	29	30	20	17	29	47	31	26
	INT	28	31	26	18	18	27	38	27	21
	IND	27	30	21	19	18	31	40	32	26
Response of INT to shocks from	OIL	23	19	27	24	21	33	35	30	25
	INF	20	25	34	23	19	34	32	32	26
	INT	24	22	22	20	21	32	33	29	24
	IND	26	24	18	21	20	35	38	31	26
Response of IND to shocks from	OIL	18	22	27	18	19	27	37	25	20
	INF	21	16	32	19	17	28	31	23	22
	INT	16	19	31	16	18	26	34	26	21
	IND	18	24	24	17	18	29	30	26	22

Table 3: Summary of the SVAR findings

Country	Responses to positive OIL shocks			Responses to positive CPI shocks			Responses to positive INT shocks			Responses to positive IND shocks		
	CPI	INT	IND	OIL	INT	IND	OIL	CPI	IND	OIL	CPI	INT
Net oil-importers:												
UK	+ D	+ D	-	- D	+	-	0	0	-	0	+	+ D
Germany	+	+ D	-	- D	+ D	-	0	0	- D	0	+ D	+ D
France	+	+ D	-	0	+	-	0	0	- D	0	+ D	+ D
Italy	+	+	- D	0	+	-	0	0	-	0	0	+ D
Spain	+	+	- D	0	+	- D	0	+ D	- D	0	+ D	+ D
Netherlands	+	+ D	0	0	+	- D	0	- D	0	0	0	+ D
Portugal	+ D	+ D	-	0	+	-	0	0	- D	0	+	+ D
Net oil-exporters:												
Russia	+	-	+ D	0	-	-	+ D	+ D	-	+ D	-	-
Norway	+	0	+	-	+	-	0	0	-	+ D	0	+ D

Note: + denotes a positive response, - denotes negative response, 0 denotes no response

D denotes a delayed response

Figures

Figure 1: Oil price effect on a net oil-exporting country

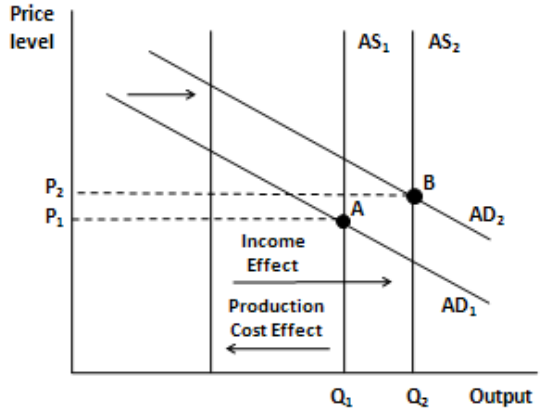


Figure 2: Oil price effect on a net oil-importing country

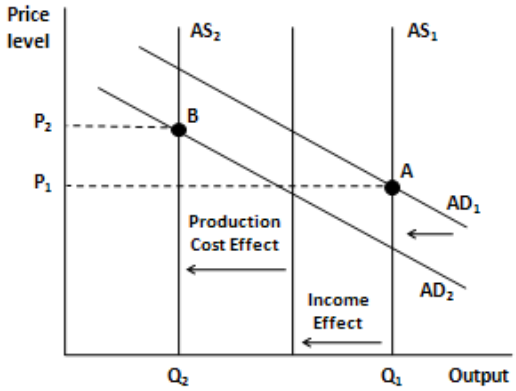
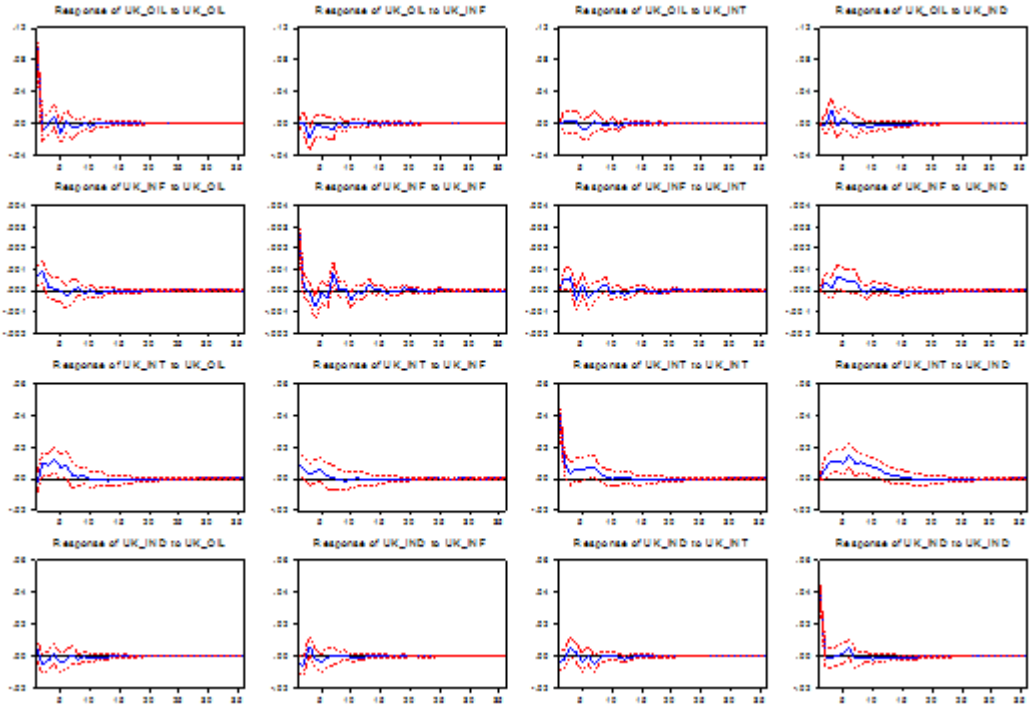
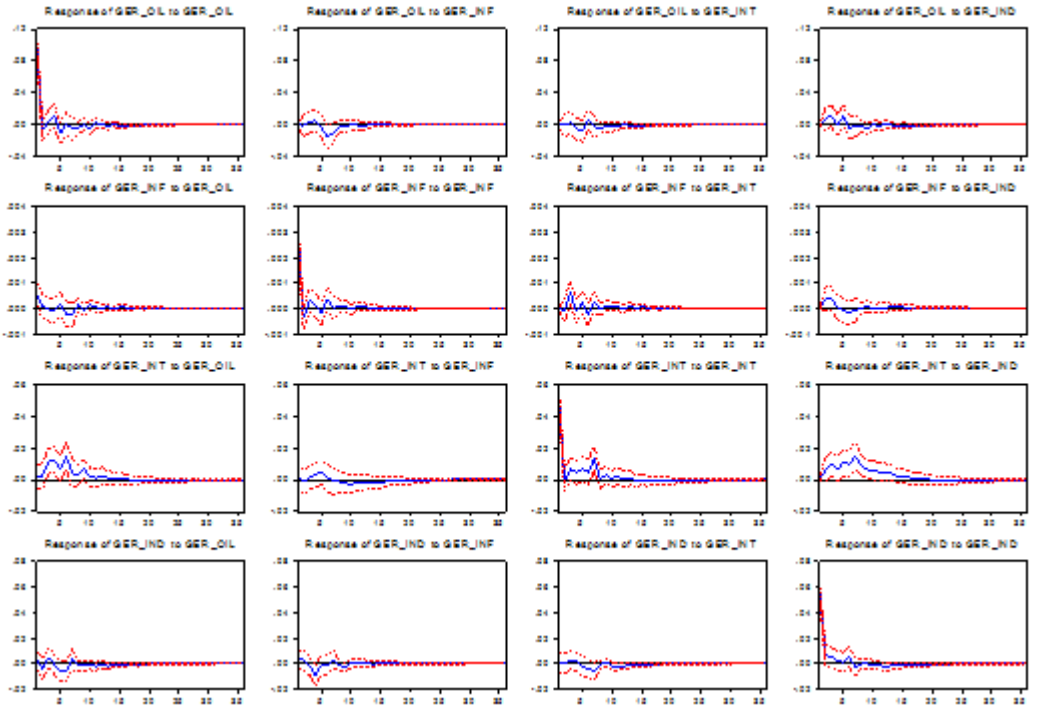


Figure 3: Structural VAR model: Impulse Response Functions

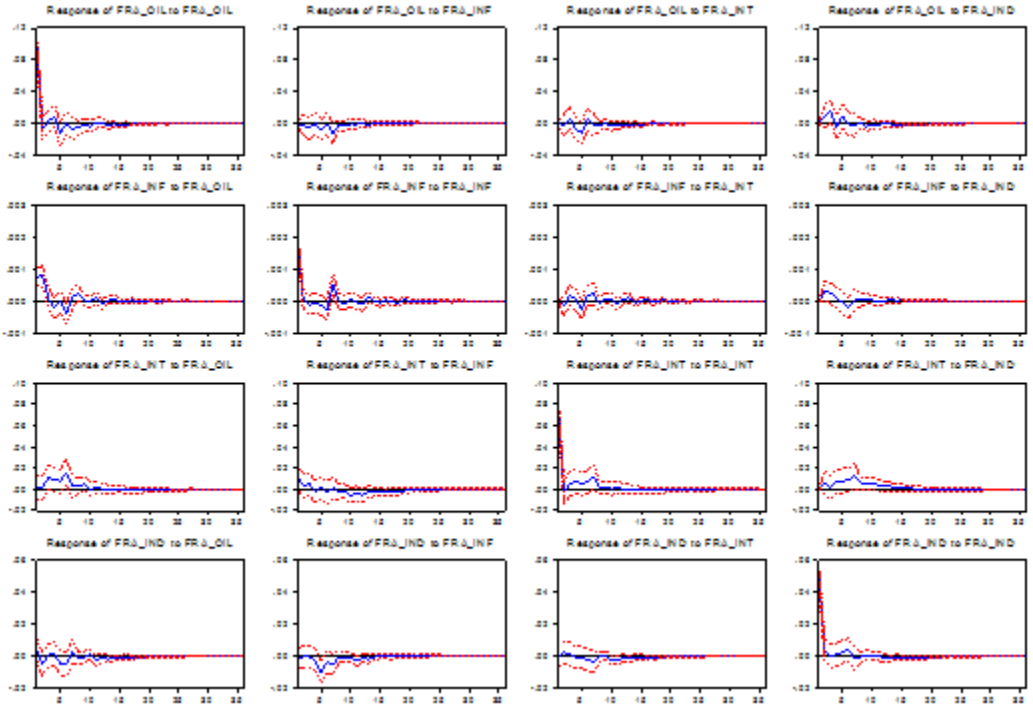
UK



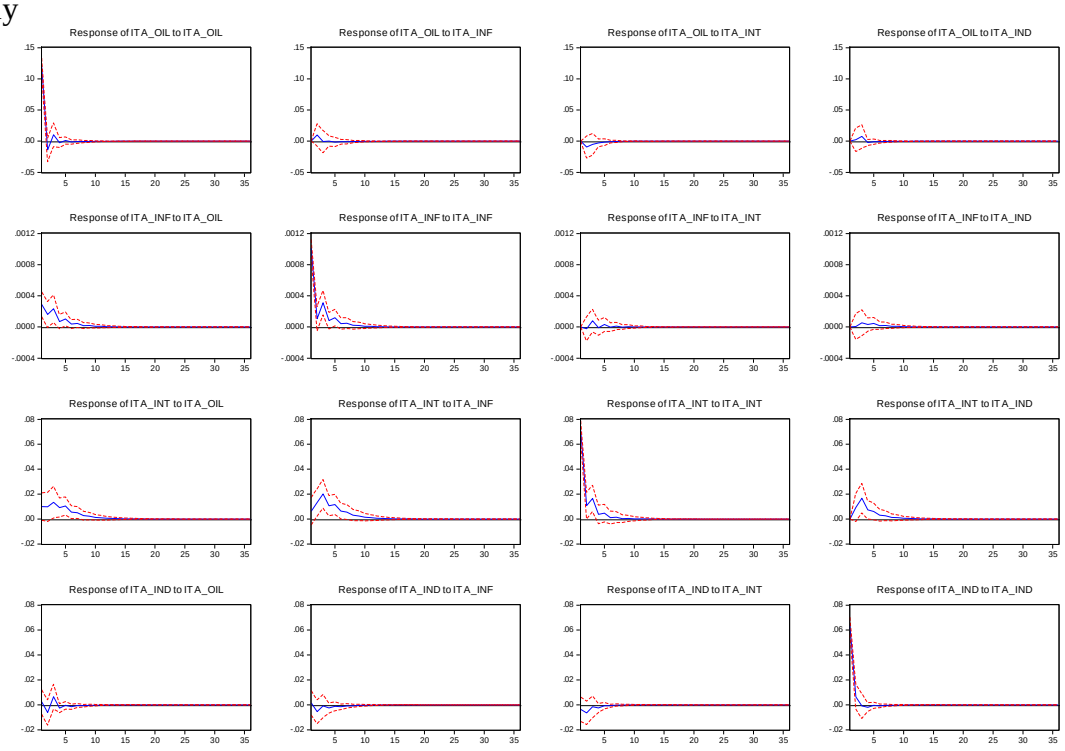
Germany



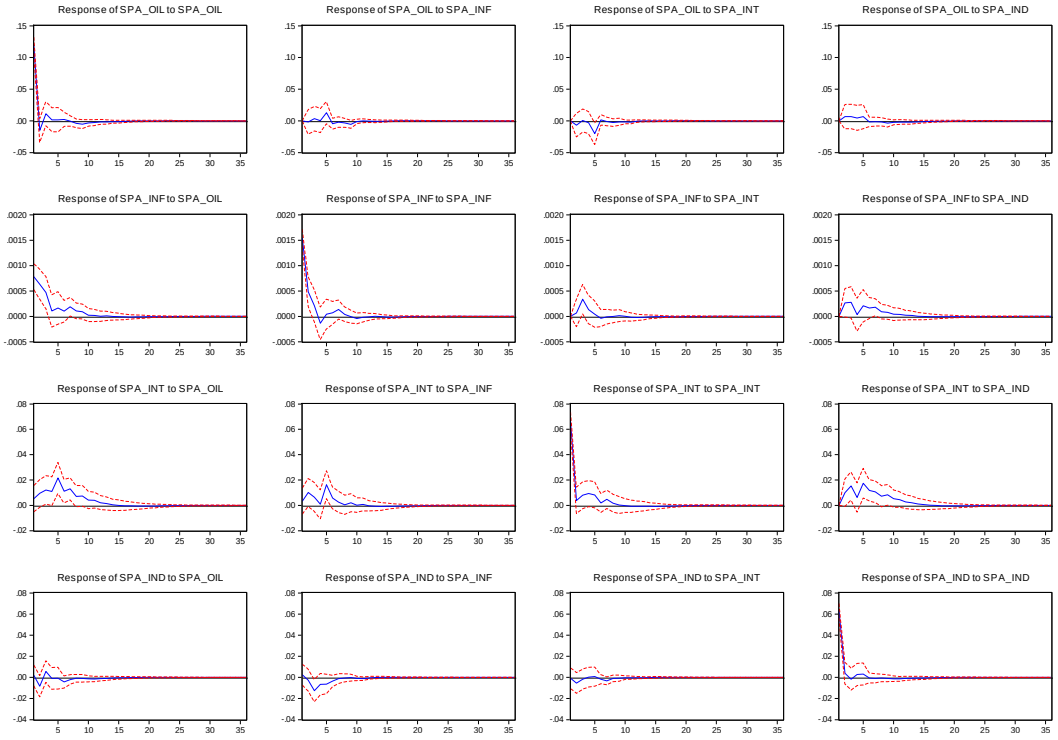
France



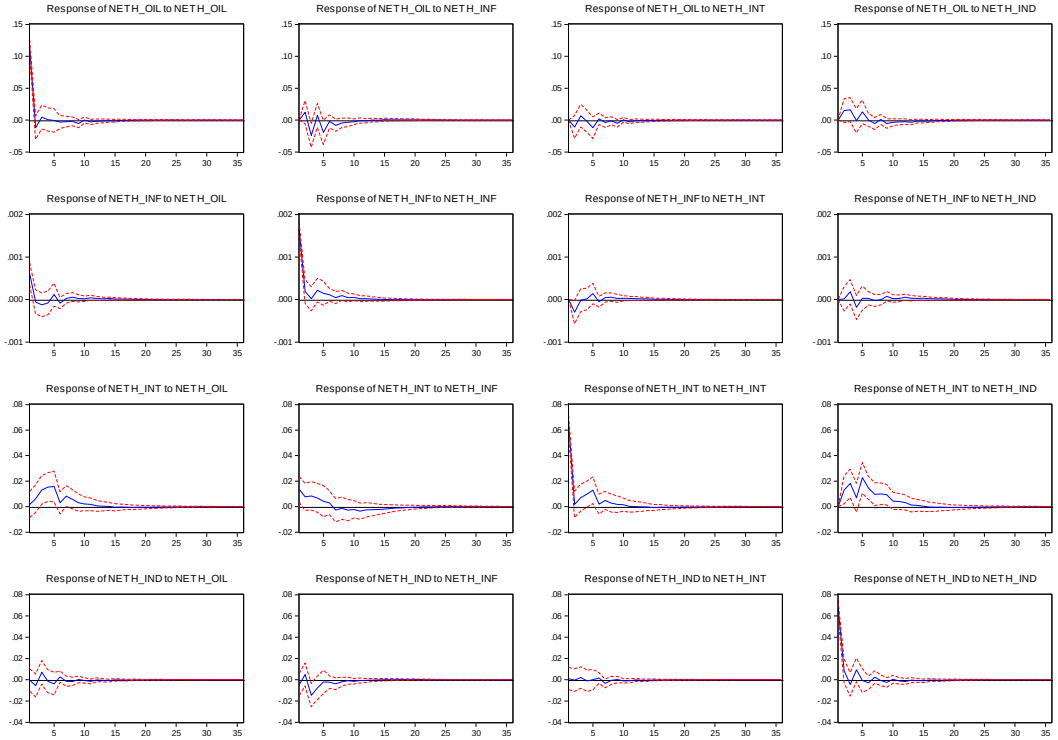
Italy



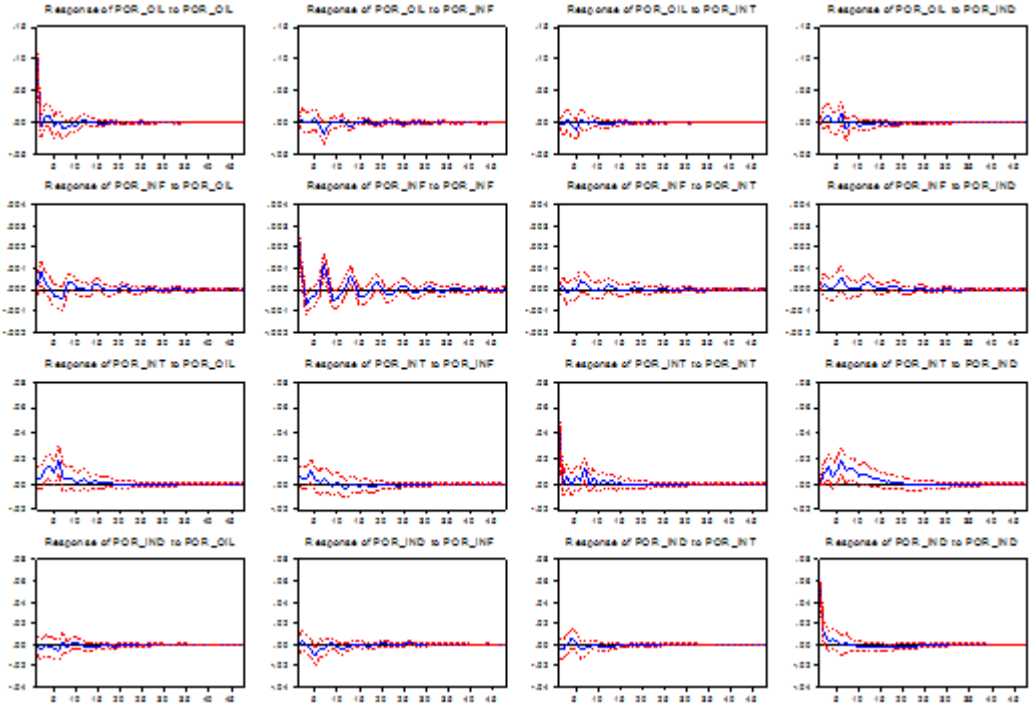
Spain



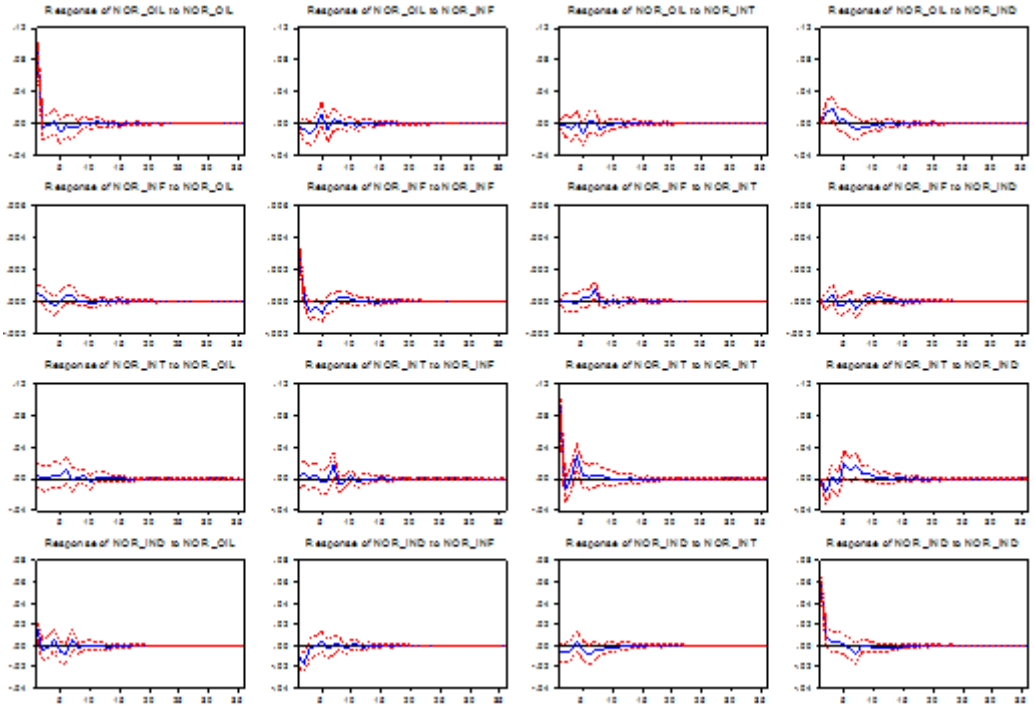
Netherlands



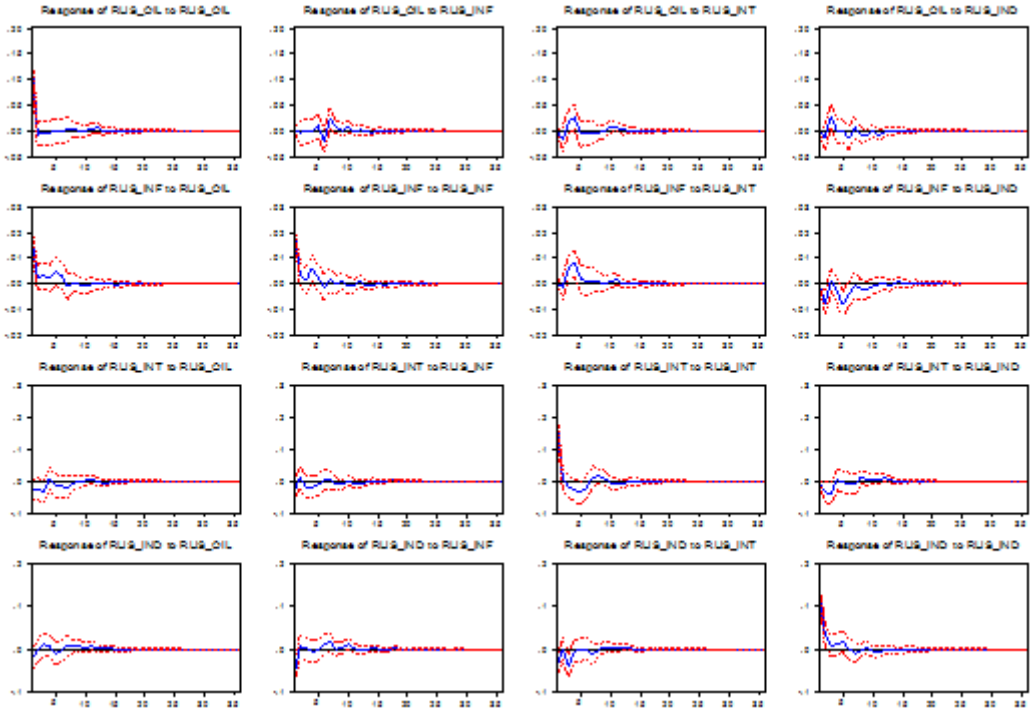
Portugal



Norway



Russia


Response of RUS_OIL to RUS_OIL
Response of RUS_OIL to RUS_INF
Response of RUS_OIL to RUS_INT
Response of RUS_OIL to RUS_IND
Response of RUS_INF to RUS_OIL
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