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Original Paper

The Impact of Oil Prices Shocks on Stock Market Performance-Examination for Six European Countries and India

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Abstract

This study employs a Vector Auto-regressive model to analyses how oil price impact real stock returns, comparing oil-importers (Italy, Spain, Finland, France, UK, and India) and exporter Norway. Focusing on six European nations, it examines regional systematic responses, contrasting with prior European analyses using national oil prices. The results show a statistically significant impact on stock market return for Norway, Italy and Spain, while show an insignificant impact for India, Finland, the UK and France. Besides, this study found that the responds of stock return on oil shocks are differ depend on the nature of economy and European countries show more responsive crude oil shocks than emerging market India.

Keywords

Oil Prices Shocks, Stock Return, Vector Auto-regressive Model

1. Introduction

1.1 Background

Oil emerged as a pivotal commodity during the 20th-century industrialization, with its price volatility becoming a critical economic destabilizer post-WWII. The 1990s saw surging demand, particularly from Asian markets, while the 2008 crisis triggered a $60/b price collapse. Academic research extensively links oil shocks to macroeconomic shifts in GDP, inflation, employment, and industrial output (Cao et al., 2024; Yang et al., 2023). Supply-side models highlight risks for net oil-consuming economies (Huber et al., 2012).

Oil prices shocks could impact macro economy through several ways. One of the impacts is reduction the productive capacity of the economy of industrialized countries. Due to the low elasticity or even perfectly inelasticity demand of oil, an oil prices rise will lead to an decrease in the profit of firms then depress their willingness to product new goods. On the other hand, if the energy price rise is expected as abiding, then the firms will invest in more energy-efficient capital in order to save the cost of production in the future. Thus, in the long-run, the higher energy cost may induce firms decline their investment in new capital. Therefore reduce the productive capacity (Cao et al., 2024).

The ‘real balance’ effect is an additional influence as any rise in oil prices will subsequently lead to an increase in the cost of oil-based commodities, including heating oil gasoline. Thus, the consumer may have to find a different source of energy, which stimulates growth in other sectors, such as the gas sector for example. In this scenario, the rate of inflation will rise. In addition, this may lead to indirect effects, known as second round effects, as companies may offset increased production costs by increasing non-energy prices, which will cause workers’ overall cost of living to increase. As a result, workers may demand wage increases and this may cause inflation levels to rise or may hinder economic growth. In addition, as the value of the currency declines, the consumer will have less disposable income and will likely lower their consumption. At the same time, people will likely demonstrate a ‘liquidity preference’ whereby they modify their portfolios to achieve greater liquidity. In such cases, if monetary policy cannot satisfy the increased money demand, interest rates will rise while real balances will fall (Park & Ratti, 2008).

Further still, crude oil shocks can result in the transfer of wealth from countries importing oil to those exporting oil, which naturally has a significant impact on the macro economy. Increasing oil prices from exporters can be treated as tax levied. From a long-term perspective, consumer demand in oil importing nations will likely drop. Although reduced domestic demand may be partially offset by export demand from foreign beneficiaries of wealth transfers (Cologni & Manera, 2008).

Despite robust analysis of oil-price-economic causality, studies on oil's impact on asset prices—particularly equities—remain scarce, signalling a critical research gap. Besides, existing studies have explored the impact mechanism of oil price shock on the stock market through CGE, GARCH, VAR and other models. In contrast, VAR is an economic models used to capture the linear inter-dependencies among multiple time series. It allowing for more than one variables and it can capture the complex and dynamic relations among those variables, which becomes the core method of this study. The innovation of this study is reflected in the dual dimension comparison: horizontal comparison of the difference in market response between the six oil importing countries (Italy, Spain, Finland, France, the United Kingdom, and India) and the exporting country Norway, vertical extension of Garcia and Cunado (2014) and Chang and Le (2015), focusing on the systematic volatility characteristics of the European regional stock market. Therefore, the existing research boundaries are extended in the methodological and empirical dimensions.

2. Literature Review

2.1 Theory

According to the capital market theory, stock prices can be presented as expected discounted dividends:

$$P=E(c)/k \tag{1}$$

Where c refers to the dividend stream, and k refers discount rate. After deformation, real returns in any period can be given by:

$$d\,p / p + c / p = d\,[\,E\,(c)\,] / E\,(c) - d\,k / k + c / p \tag{2}$$

This formula implies that any factor that may influenced stocks returns are those that changing discounted factors k, or expected cash flow E (c).

Stock prices are expected to reflect all available information include macro-economy conditions. The discounted rate k is affected by inflation rate or interest rate. The expected cash flow E(c) is affected by consumer confidence, economic growth, industrial capacity and employment etc. Therefore, oil prices shocks can influence stock prices through bring negative impact on macro-economy. For instance, the increased inflation rate or increase in inflation, which would generate an increase in discounted rate (Le & Chang, 2015; Koh, 2016), and then impact the future cash flow. Moreover, expected cash flow changes because both real and nominal force. For example, change in the expected rate of inflation would influence nominal expected interest rate and nominal expected cash flows. Further, changes in the expected level of real industrial capacity would influence the stock prices through influence the current real value of cash flows.

In addition, from macro economy aspect, for firms who use oil directly or indirectly, the oil price increase may increase their cost. If companies are unable to pass the rising cost to their customer, it is difficult to maintain the original profits and dividends. Thus, the decreasing of profit and dividends may affect their stock markets negatively even may lead to the existing capital stock to become technically and economically obsolescent (Al-Fayoumi, 2009).

2.2 Empirical Results

Series of research examines the impact of oil shocks by distinguishing time, industry or market. Some finds that the links between oil price shocks and stock market performance are clearly and systematically time-varying (Cong et al., 2008; Le & Chang, 2015), industry-varying (El-Sharif et al., 2005; Odusami et al., 2011; Fillis & Broadstock, 2014), market-varying (Robays & Peersman, 2012; Koh, 2016). In addition, some examined if asymmetric effect exist (Zeng and Lee, 2011; Park and Ratti, 2008).

2.2.1 Oil Price Shocks and Stock Market Fluctuations in Oil Importing Economies

Some researchers find significant inverse relationship between oil-importing countries' economy (but not for US) and oil shocks (Gracia & Cunado, 2014; Gracia & Cundo, 2014). A reverse relationship may be able to directly conclude that oil prices do not favour economic growth or stock market return. Due to the low elastic demand of oil, an increasing trend in oil price will negative impact all the oil-consuming industry, lead to the effect such as decline their output or rate of profit.

For developed countries such as European and US, Gracia and Cundo (2014) find oil shocks depress the stock market performance and the specific impact of oil shocks is depend on its underlying causes. For example, if the oil prices increase is lead from Iranian revelation, the stock reaction to oil shocks is significant negative, while if oil prices increase is result from global oil demand,then the stock return tend to react not negative. Moreover, oil supply shocks are more important than oil demand shocks in European market. The oil shocks measures by world oil prices show a significant negative impact on European. The results of oil shocks measures by volatility, however, showing a significant negative impact on European. For most European countries,the oil prices shocks can explain median 6% of the volatility in stock market return. As for US, the oil shocks measures by world oil prices show a significant negative impact (Park & Ratti, 2008).

There are several studies arguing that when rising oil prices are driven by a rise in global demand, the economy will prosper and businesses will thrive as stock prices behave in line with oil price shocks. In effect, the resulting economic growth counters the negative impact of increasing oil prices (Gupta & Modise, 2013; Koh, 2016). Other studies by Gracia and Cunado (2014) and Miller and Apergis (2009) failed to find strong evidence to substantiate the effect of global demand shocks on the European stock market.

As for developing countries, Cong et al. (2008) show a not significant impact of oil shocks on Chinese stock market due to the speculation exist, in some ‘‘important’’ oil price shocks depress oil company stock prices. Sadorsky and Basher (2012) first use a multi-factor model that allows capturing both conditional risk and unconditional risk factor to analyse oil shocks on 21 emerging countries’ stocks. Those countries except Russia, others are net importer of fossil fuels. The find strong evidence to prove that predictability of oil shocks on emerging market is strong and the stock markets in most countries show a negative reaction to oil prices increase.

In addition, some studies hold the viewpoint that the correlation between oil price shocks and stock return is non-linear (Rebeca, 2013). Le and Chang (2015) find that Japan as a net oil-importer, the stock market performance varies both depend on its underlying cause and depend on the specific characteristics of the economy.

2.2.2 Oil Price Shocks and Stock Market Fluctuations in Oil Exporting Economies

For oil-exporting countries, more likely to share a positive relationship between stock market returns and oil price increase (Nandha et al., 2011; Wang et al., 2013) . Because oil-exporters are likely to experience wealthy and income effects when the oil price increase, and this wealthy is transferred from net oil-importing countries. The increased revenue which generated from seal oil is used to enhance other sectors include oil industry, which will bring a positive prospect to economy meanwhile reflect to stock markets. Besides, stock performance improvement if this revenue is used to purchase services goods from domestic markets.

Some research support wealthy transfer effect. Bjørnland (2009) and Park and Ratti (2008) investigate the Norway’s market. The results suggest there are wealthy transfer effects in oil-exporting countries when oil price increase dramatically, and a positive relationship between oil-exporter and stock markets. Effiong (2014) finds the wealthy transfer in Nigeria, oil-exporting countries. While the wealthy transfer effect only occurs when oil shocks is driven by expansion in global economies activities or uncertainty in future oil supplies. The evidence from Effiong suggests that oil-demand shocks that driven by expansion in global economies activities or uncertainty in future oil supplies are positively related to higher stock prices, but the oil supply shocks lead to an insignificant negative impact. Daly and Fayyad (2011) examine Gulf Corporation Countries (GCC) countries. The results support that oil prices have tripled generating cash flows for GCC countries meanwhile creating increased deficit troubles for the current account of the importing countries (UK and the USA).

However, some results are inconsistent. Arouri and Rault (2012) suggest that oil prices raise not definitely brings positive impact on stock market in GCC. Oskooe (2012) suggest that there are no relationship between volatility of international oil prices and volatility of Iran stock market.

3. Data and Methodology

3.1 Data

This study investigate whether oil shocks have influence on real stock market return in the India and other 6 European countries over the period from January 1979 to January 2016. This study will employ a vector autoregressive model (VAR) in order to explore complex and dynamic relationship between variables, which including consumer prices, short-term interest rates and industrial production, those variables is believed may have the links between oil price shocks and real stock returns.

According to Fama (1981), Park and Ratti (2008) and Chang and Le (2015), this study uses consumer prices index as proxy variable of inflation rate, and use industrial production as well as short-term interest rate to measure the economic activity, these three variables were used in the VAR model as baseline control variables.

This study examines the monthly data (Kilian, 2009; Narayan & Narayan, 2010) from 1979:1 to 2016:1 for Stock Prices Index, World Oil Prices, Consumer Price Index, Industrial Production Data and Short-term Interest Rate. Stock prices indices for Spain are from Ministry of the Economy and Finance, for Finland and the UK are from Reuters, for India are from CSO, for France are from OECD, for Italy are from Borsa Italiana, for Norway are from Statistics Norway. World oil price are from IMF and values are expressed in U.S. dollars. Industrial production data are from national institute statistics for the European countries and from IMF for India. Consumer prices index is from national institute statistics for the European countries, from CSO for India. Short-term interest rates (measure as Treasury-bill rates) are from IMF, OECD for France, the UK and Spain, from Reserve Bank of India for India, from Ministry of Economy and Finance for Italy, from IMF for Norway and Finland. U.S. producer prices index are from IMF. The specific detail is showed in Table 1.

Table 1. The Data

Name	Description
Stock prices index	OMXH index for Finland, ISEQ index for Ireland, IGBM index for Spain, Oslo stock exchange Benchmark Index for Norway, FTSE All-Share Index for UK, COMIT index for Italy, SBF250 for France, BSE-100 for India.
Short-term interest rate	3-month Treasury bill yield, percentage change
Industrial production	Industrial production index, seasonal adjustment
Consumer prices index	Consumer prices index for all item, seasonal adjustment
U.S. Procedure prices index	Procedure prices for all commodities, seasonal adjustment
World oil prices	Average of UK Brent (light), Dubai (medium), and West Texas Intermediate (heavy), equally weighted.

3.2 Variable Definition

For each country, real stock price return are defined as differences between the continuously compounded return on the stock prices and the inflation rate (proxies by the log difference in the CPI) (Gracia & Cunado, 2014; Kilian, 2009).

This study defined world real oil prices as a ratio that nominal oil prices deflated by the U.S. procedure prices index (Yang et al., 2013).

Real industrial production is defined as the nominal IPI deflated by the CPI of each country (Ratti & Park, 2008; Gracia & Cunado, 2014).

And the entire variable take the logarithm (except stock prices), because interest rate are percentage form, interest rates are defined as ln (1+ir/100). Then first difference those logarithm variables (Wang et al., 2013).

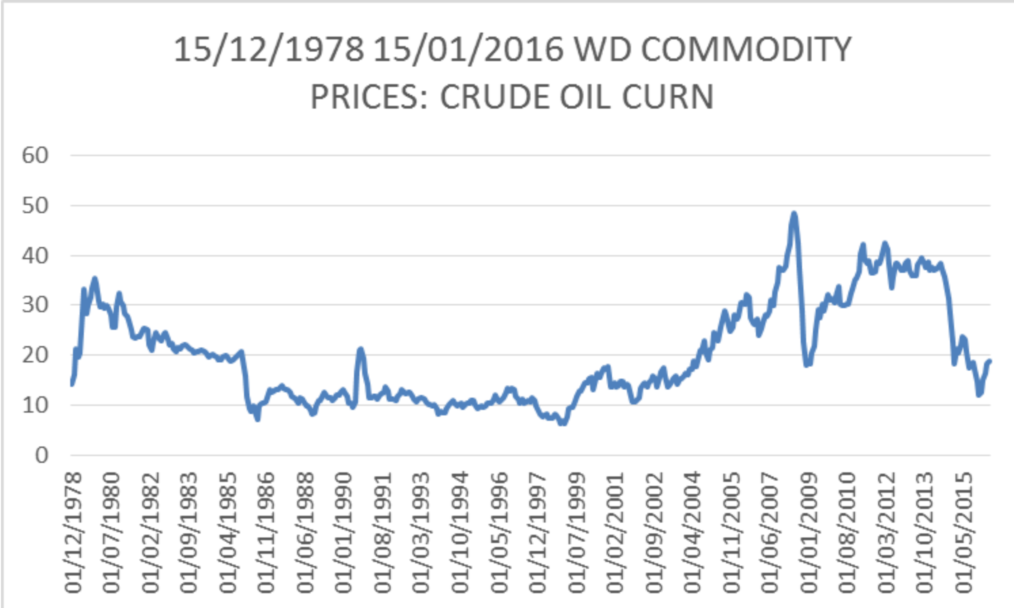
In order to make those variables as simple as possible to remember, the following notation will be employed:

sr: $\ln(\text{stock prices}/\ \text{stock prices}_{-1}) - \ln(CPI/CPI_{-1})$

op: $\ln(worp) - \ln(worp_{-1})$

ip: $\ln(ripd) - \ln(ripd_{-1})$

r: $\ln(1+ir/100) - \ln(1+ir_{-1}/100)$



Graph 1. World Real Oil Prices. (Nominal Oil Prices / PPI for All Commodities)

Note. This Graph represented the trend of oil prices that employed in this study.

3.3 Unit Root Tests

The standard step in the literature on VAR modelling is to examine the properties of variables so two unit root test have employed for double check, which include Augmented Dickey-Fuller and Phillis-Perron test. The null hypothesis of ADF test is a unit root exist in the series, H_0: $y_t \sim I(1)$, PP test is same with ADF test. We test all the variables in both logarithmic forms and log difference forms (except real stock do not have log level). The results are presented in table 2 and table 4.

As the Table 2 shows, based on ADF test, for the short-term interest rate, except the case of India and France reject the null hypothesis that have a unit root at 5% level, the null hypothesis are not rejected at 5% significant level in other countries. In the table 3, PP test suggest same results that short-term interest rate in log level in India and France reject the null hypothesis at 5% significant level. Hence, for France and India the short- term interest rate is stationary, I (0). For the first log difference level of short-term interest rate, both ADF and PP test suggest it reject the null hypothesis of a unit root at 1% significant level. Thus, the short-term interest rate in first log difference level is stationary.

For the world oil prices, in PP test and ADF test, the null hypothesis that world oil prices in log level have a unit root is not reject at 10% significant level. And for world oil prices in first log difference level, the null hypothesis that have a unit root is rejected at 1% significant level. Thus we can conclude that world oil prices in log level are I (1), and in first log difference level is I (0).

For the industrial production, the results are mixed. For the ADF test, France and Italy reject the null hypothesis that industrial production in the log level has a unit root at 5% level. For the PP test, four sevenths of country rejects the null hypothesis of I (1) at 10% significant level. Thus, we cannot conclude that industrial production has unit roots. As for its first log difference level, ADF test and PP test suggest the variable of industrial production in first log difference level is stationary.

For the real stock return, ADF test and PP test suggest it is stationary.

Therefore, we conclude that world oil prices in log level is I (1), while industrial production and short-term interest rate cannot be considered as I (1). All the variables in first log difference levels are I (0). Since not all of the variable are I (1), we cannot conduct the coinstegration test because coinstegrating relationship only exist among time series of I (1).

Table 2. ADF Unit Root Test Results

Country	Real industrial production Log level		Real industrial production First log difference		Interest rate Log level		Interest rate First log difference		Real stock return		Real oil prices Log level		Real oil prices First log difference	
	C	C&T	C	C&T	C	C&T	C	C&T	C	C&T	C	C&T	C	C&T
India	-1.74	-1.92	-20.79[a]	-20.77[a]	-6.31[a]	-6.11[a]	-14.43[a]	-14.42[a]	-16.8[a]	-16.8[a]				
Finland	-1.62	-1.62	-27.51[a]	-27.51[a]	-0.78	-3.06	-15.11[a]	-15.11[a]	-16.3[a]	-16.3[a]				
U.K.	-1.77	-4.33[a]	-4.41a	-4.41[a]	-1.02	-3.04	-20.19[a]	-20.16[a]	-20.5[a]	-20.6[a]				
France	-3.79[a]	-3.93[b]	-10.51	-10.79[a]	-3.53[a]	-3.12[b]	-15.40[a]	-15.42[a]	-18.8[a]	-18.8[a]				
Italy	-3.42[b]	-3.99[a]	-7.92[a]	-11.69[a]	-1.09	-3.46[b]	-23.01[a]	-23.02[a]	-19.0[a]	-19.1[a]				
Spain	-4.50[a]	-2.43	-3.87[a]	-27.81[a]	-0.76	-3.96[b]	-8.08[a]	-8.09[a]	-18.1[a]	-18.1[a]				
Norway	-0.67	-1.28	-16.65[a]	-19.67[a]	-0.04	-3.46[b]	-20.31[a]	-20.37[a]	-13.1[a]	-14.0[a]				
world											-2.2	-2.4	-15.9[a]	-15.8[a]

Notes. C means test if the series is stationary around a constant; T means that if the series is stationary around a trend. Superscripts a, b , and c, denote rejection of the null hypothesis of a unit root at the 1%, 5%, and 10%, level of significance, respectively.

Table 3. PP Unit Root Test Results

Country	Real industrial production Log level		Real industrial production First log difference		Interest rate Log level		Interest rate First log difference		Real stock return		Real oil prices Log level		Real oil prices First log difference	
	C	C&T	C	C&T	C	C&T	C	C&T	C	C&T	C	C&T	C	C&T
India	-3.97[a]	-5.86[a]	-34.03[a]	-34.05[a]	-9.51[a]	-9.71[a]	-94.30[a]	-95.0[a]	-16.8[a]	-16.8[a]				
Finland	-1.98	-2.04	-40.22[a]	-40.04[a]	-0.88	-2.96	-15.89[a]	-15.9[a]	-16.3[a]	-16.3[a]				
U.K.	-2.83[c]	-3.59[b]	-23.28[a]	-23.15[a]	-1.20	-3.39[c]	-20.23[a]	-20.2[a]	-20.5[a]	-20.6[a]				
France	-4.09[a]	-3.91[b]	-26.51[a]	-27.79[a]	-3.69[a]	-3.66[b]	-15.40[a]	-15.5[a]	-18.9[a]	-18.9[a]				
Italy	-3.52[a]	-3.53[b]	-27.49[a]	-27.74[a]	-0.59	-3.43[b]	-22.96[a]	-23.0[a]	-19.3[a]	-19.3[a]				
Spain	-3.87[a]	-2.451	-26.41[a]	-27.82[a]	-1.12	-4.17[a]	-26.82[a]	-26.8[a]	-18.0[a]	-18.0[a]				
Norway	-1.51	-3,41[c]	-50.97[a]	-50.32[a]	-0.12	-3.55[b]	-20.36[a]	-20.4[a]	-14.0[a]	-14.0[a]				
world											-2.0	-2.0	-15.4[a]	-15.4[a]

Notes. C means test if the series is stationary around a constant; T means that if the series is stationary around a trend. Superscripts a, b , and c, denote rejection of the null hypothesis of a unit root at the 1%, 5%, and 10%, level of significance, respectively.

4. Methodology

First to conduct unit root tests to check the time series properties of the variables, and the results suggest not all of variables in the log level are I (1), since they cannot satisfy the condition of cointegration test, We therefore same as Fowowe and Iwayemi (2011), do not use cointegration test in this case. Although vector error correction model (VECMs) or co-integrating VAR can be employed to examine the long run behaviour among variables, and its results of IRF and VDCs are expected to reflect more accurate information because of the fact that the co-integrating vectors bind the long run behaviour of variables. A class of studies have already shown that unrestricted VARs perform better in the short run than VECMs (Fowowe & Iwayemi, 2011) because its Impulse respond function (IRF) and variance decompositions nearly identical in terms of forecast variance (Engle & Yoo, 1987). Thus, we employed VAR model to examine the relationship between oil shocks and stock returns in the short run. A necessary condition for use unrestricted VAR is I (0), we employ the first log difference level of variable.

4.1 Estimate VAR

Based on Sims's (1980) VAR methodology, a VAR model consists of a system of equations that each variable in the system as a linear function of its own lagged value and lagged value of all the other variables in the system. For instance, a VAR of order p, where the order p refers to the number of lags, that includes k variables which can be expressed as below Eq (3):

$$Y_t = C + A_1 Y_{t-1} + A_2 Y_{t-2} + ... + A_p Y_{t-p} + e_t \tag{3}$$

Where the $Y_t = (Y1_t \ldots . Y_{kt})$ is a column vector of observation on the current value of all variables in the model. C is a k × 1 vector of constants (intercepts). Ai is a time-invariant k × k matrix and e_t is a k × 1 vector of error terms satisfying and a necessary condition is that all the variables (Y_t) must have the same order of integration.

Our unrestricted VAR model have four variables, all of them are I (0). The variables include first log difference industrial production (refers as ip), first log difference short-term interest rate (r), real stock return (sr) and first log difference world oil prices (op). As for lag length, due to its sensitivity, three criterions are employed in order to choice the optimal lag length. The results have been showed in sector 5.

4.2 Granger-Causality Test

The Granger-causality test (Granger, 1969) is performed once the VAR has been approximated in order to determine do different variables have been directly influenced by oil shocks. The lagged value of x is used to justify the regression of variable y on lagged values of x and y using the causality test. If a number of t-tests and f-tests on the lagged values of x offer data about future y values that are statistically significant, the time series of x is claimed to Granger-cause y. As a two-variable VAR for instance, such as Eq (4) and Eq (5) below (Fowowe & Iwayemi, 2011). Where Y_{t-k} refers to lagged value of y, Xt-k refers to lagged value of x. If b (L) =0, then x not Granger cause y. This can be generalised to the case of VAR with several variables, where x is said granger-cause y if the lagged value of variable x can be set equal to 0.

$$Y_t=a(L)Y_{t-k}+b(L)X_{t-k}+e_t \tag{4}$$

$$X_t=c(L)Y_{t-k}+d(L)X_{t-k}+v_t \tag{5}$$

It is worth noting that Granger-causality test is beneficial in cases where data can be processed using a simple 2-dimensional framework. However, on the other hand, many highlight the limitations of such regressions and emphasis the risk of specification bias using the Granger-causality method (Chang and Le, 2015). Sims (1972), for instance, in a renowned paper suggesting that money Granger-causes output whereas output does not Granger-cause money. Although this paper further argues that this effect is not maintained once interest rates are incorporated, this finding suggests that the test is somewhat unreliable if specific conditions are not maintained. In addition, if more than three variables are contained in the true relations, the outcome may be invalid. That being said, despite some limitations, the effectiveness of the test in generating valuable statistical evidence to substantiate theoretical claims must be acknowledged. This explains why we used the Granger-causality test carefully and judicially in this case.

4.3 Impulse Responses Function & Variance Decomposition Analysis

It was not possible to determine the response of the series using Granger-causality tests alone. As such, to identify the short-run dynamic relationships between variables, impulse responses function and variance decomposition analysis was performed. The aim here was to determine how each variable responded over time to the shocks stimulated by other variables within the system. IRF functions by demonstrating the effect of a single unit shock to the error of each VAR equation. VDC, on the other hand, demonstrates the ratio of forecast error variance in each variable that is attributable to internal shocks or those caused by other variables. In cases where the shocks do not justify the forecast error variance of a single variable Yt, the variable Yt is treated as an exogenous variable. In the opposite scenario, the Yt variable is treated as endogenous. However, as highlighted by Koop et al. (1996), the IRF and VDC are strongly influenced by the variable order in the VAR. Thus, it is crucial to determine the lag length.

5. Empirical results

5.1 Description the Data

The table 4-1&4-2 shows the descriptive statistics of all variables in first log difference form (it can see as daily return). From the table above we can observe that the volatility of oil (standard deviation) is the highest among markets and it reached approximately 8%. This is due to the fact that within our examination periods the crude oil prices tripled from minimum of $49.95 to around $140.

As for the stock market return, the mean of Finland stock returns (0.592%) is higher than those for India, France, Italy, Spain, Norway and the UK. This implies that Finland's stock market brings more profit than other countries. The distributional properties of stock return series seems non-normal, since all the skewness is negative except Italy, and all of series are leptokurtic distribution because the kurtosis in both European countries and India have exceeded three.

The null hypothesis of Jarque-Bera test is that returns for all the markets are normal distributed. Since all the p-value equal to 0 less than 5%, we reject the null hypothesis. So we conclude that all the variables which included industrial production return, interest rate return, stock return and world oil return are not normal distribution.

Table 4-1. Descriptive Data (Return and Volatility Measures by Percentage Change)

	r_uk	r_italy	r_india	r_norway	r_finland	r_spain	r_France
Mean	-1.87	-0.02	0.00	-0.02	-0.02	-0.02	-0.02
Std. Dev.	0.46	0.53	4.22	0.29	0.46	0.68	0.36
Skewness	1.09	0.05	1.79	0.93	1.09	0.83	1.37
Kurtosis	18.34	13.64	70.14	9.143	18.34	25.83	19.13
J-B P-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Observations	444	444	444	444	444	444	444
	ipi_uk	**ipi_italy**	**ipi_india**	**ipi_norway**	**ipi_finland**	**ipi_spain**	**ipi_france**
Mean	-0.25	-0.39	-0.18	-0.16	-0.1	-0.31	-0.24
Std. Dev.	1.28	1.88	6.47	4.85	3.67	2.17	1.39
Skewness	-0.09	0.28	-0.95	0.49	0.01	2.89	0.29
Kurtosis	9.19	7.14	6.51	14.50	4.49	37.13	5.02
J-B P-value	0	0	0	0	0	0	0
Observations	444	444	444	444	444	444	444
	sr_uk	**sr_italy**	**sr_india**	**sr_norway**	**sr_norway**	**sr_spain**	**sr_france**
Mean	0.26	0.2	0.34	0.27	0.27	0.25	0.35
Std. Dev.	4.65	6.66	7.87	4.26	4.26	6.13	5.58
Skewness	-1.2	0.03	-0.47	-2.06	-2.06	-0.51	-0.90
Kurtosis	8.02	4.06	10.26	17.14	17.14	5.67	7.18
J-B P-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Observations	444	444	444	444	444	444	444

Table 4-2. Descriptive data (Return and Volatility Measures by Percentage Change)

	Mean	Std.Dev	Skewness	Kurtosis	J-B P-value	Observations
OP	-0.06	8.12	0.21	6.65	0.00	444

5.2 Optimal Lag Length Selection

Since VAR model is sensitivity with lag length, this sector, therefore, four variables are inputted (each of variables is first log differences forms) into unrestricted VAR models with different lag lengths. Since the data frequency is monthly, an arbitrary choice of maximum 12 lag intervals is chosen. Three criterions, Schwarz criterion (SC), Akaike information criterion (AIC, Akaike, 1962) and the likelihood ration (LR) test are employed in order to determine the optimal lag length. If the minimize AIC and SC are suggest same lag length, then the LR test is not necessary.

The results of min AIC and min SC in each country have showed in Table 5, since the results suggest different optimal lag length, LR test is employed to further distinguish the optimal lag length.

Table 5. The results of AIC and SC

	India	**Finland**	**U.K.**	**France**	**Italy**	**Spain**	**Norway**
(Min) AIC	-12.087* Lag (1)	-17.319* Lag (3)	-19.922* Lag (2)	-19.656* Lag (3)	-17.965* Lag (3)	-17.526* Lag (2)	-18.570* Lag (4)
(Min) SC	-10 -10.851 Lag (2)	-16.956* Lag (2)	-19.634* Lag (1)	-19.351* Lag (1)	-17.684* Lag (1)	-17.201* Lag (1)	-18.183* Lag (2)

The results of LR test have showed in Table 6. The P-value of null hypothesis in each of case is significantly lower than 0.05, we reject the null hypothesis at 5% significant level and accept the alternative one.

Therefore, for Finland, France and Italy the lag length suggest 3. For the UK and Spain suggest lag (2). For Norway suggest lag (4) and lag (12) for India.

Table 6. Results of LR Test

Country	***Hypothesis***	***P-value***
India	H0: lag=2	0
	H1: lag=12	
Finland	H0: lag=2	0.000353
	H1: lag=3	
UK	H0:lag=1	1.14E-09
	H1:lag=2	
France	H0:lag=1	1.11E-16
	H1: lag=3	
Italy	H0: lag=1	1.14E-09
	H1: lag=3	
Spain	H0:lag=1	1.76E-12
	H1:lag=2	
Norway	H0:lag=2	1.22E-06
	H1:lag=4	

5.3 Granger-causality Test

The results of Granger-causality have employed with the corresponding lag length determined above. Results showed in table 7. As for the oil shocks, the null hypothesis that oil prices shocks granger-cause stock return obtained a neutral result. The stock return for Norway, France and Italy are reject the null hypothesis of no granger cause at 1%, 5% and 10% significant level respectively. While for India, Spain, France and the UK cannot reject the null hypothesis at 10% significant level, which means in those countries oil shocks cannot granger cause stock return. The similar results is found by Chang and Le (2015) and Cong et al., (2008).Theoretically, stock return should be influenced by oil shocks since an increasing in oil prices will depress macro-economy and then reflect on stock prices. The causality strengthen of oil prices shocks is not high, which implies a barely satisfaction predictability power in stock prices. It means the various structure shocks lead from oil shocks cannot be predict by stock prices efficiently. The reason may be explained as the inefficient stock market or investors expected a temporary oil prices increase. Nevertheless, this relatively low predictability for several other researchers is puzzling to explaining (Miller & Apergis, 2009). Besides, the empirical results suggest that there is less dependence on oil because the global basis economies shift from oil dependence to electronic technique; this may partly explain a relatively weak predictability in oil shocks.

As for the shocks of interest rate, most of case accepts the null hypothesis that interest rate shocks not granger-cause stock returns, except India reject the null hypothesis at 5% significant level. Commonly, interest rate can impact the stock prices through increasing discount rate and decreasing expected cash flow. Besides, the increasing in interest rate of deposits stimulate investors save the money in the bank, which induce them leave the financial market or depress the consumption, then depress stock prices indirectly. While this study find no evidence in European markets.

The null hypothesis that industrial production shocks not Granger-cause stock return is rejecting by Finland, France and Spain in 10%, 1% and 1% respectively. While in India, the UK, Italy and Norway not reject the hypothesis at 10% significant level. Theoretically, the industrial production represents the development of economy and investor’s prospect in the future. A positive industrial production data prompts investors to have an optimism estimate for the future, which increases the real current cash flow then affect stock return. Our results indict that industrial production shocks granger cause stock return in 3 out of 7 cases.

Table 7. Granger-Causality Tests

Hypothesis	India	Finland	UK	France	Italy	Spain	Norway
R → SR	1.459** (0.037)	0.282 (0.838)	0.693 (0.367)	0.440 (0.724)	0.8748 (0.231)	0.720 (0.488)	2.244 (0.164)
OP → SR	0.430 (0.105)	1.007 (0.389)	1.736 (0.177)	2.857** (0.037)	2.475* (0.061)	0.930 (0.3953)	1.263*** (0.002)
IP → SR	1.192 (0.286)	2.476* (0.061)	0.950 (0.388)	3.917*** (0.009)	0.391 (0.760)	9.314*** (0.000)	0..873 (0.480)

For R → SR , the null hypothesis is interest rate do not granger cause stock return; for OP → SR, the null hypothesis is world real oil prices do not granger cause stock return; for IP → SR, the null hypothesis is Industrial production do not granger cause stock return;

Besides, the values are F-statistics and the values in ( ) refers to p-value.

*, **, *** refers to 10% significant level, 5% significant level, 1% significant level respectively.

5.4 Impulse Responds Function analysis of the Short-run Dynamics

5.4.1 The Responds of Stock Return on Oil Shocks

The figure 1-3 shows the Cholesky impulse response functions of real stock returns on oil shocks, interest rate shocks and industrial shocks (not cumulative effect). The abscissa axis refers to the lag period number (unit: monthly) and the vertical axis refers to the impact of one standard deviation of oil shocks on each of variable. The dashed lines represent the 95% confidence bounds for the response of variables to the shocks.

Based on figure 1, in European countries, the stock return in Spain, Italy, France, UK and Finland are negative throughout almost the whole period. But the impulse respond in most of case are insignificant except the first and second month in Italy and the first month in France. The reaction of Italy is the most significant one as one standard deviation of oil prices shocks decreased 1.5% of stock return in the second month at 5% significant level. As for France, there is a negative reaction of stock markets in the first month at 5% significant level. Although the impact of oil shocks is insignificant in some of the case, the negative impact largely exist in European countries that are oil-importer. As a matter of fact, in the European countries, the proportion of oil consumption on total energy consumption is declining over the decades. Until recent years, in the total energy demand, oil consumption occupied 48.8%, 41%, 35%, 31%, 27% for Spain, Italy, the US, France and Finland respectively. While the oil import dependency is increasing over the period from 1990 to 2012, the oil import dependency reached 99.7%, 92.3% 36.7%, 98.5%, 100% for Spain, Italy, the US, France and Finland in 2012 respectively. The data above suggest a high level of oil dependency exist in the five oil-importing countries, this is the reason why the negative impact of oil shocks in European are largely exist in previous and recent studies.

As for the reaction of stock prices on oil shocks in Norway, its responds of stock prices to oil shocks is positive at the second month as one standard deviation of oil shocks increased maximum 1% of stock return at 5% significant level in the first and second months. This results indict that stock market of Norway prefer oil prices increase at least in the first two month, and this is consistent with previous studies who examine oil exporter. However, the increasing trend of stock return almost disappears in the second month, which means that the respond of stock return are very short-lived for Norway. Park and Ratti (2008) find the same trend in his studies (using monthly data examined the period from 1986 to 2005). Maybe the unique features of Norway's economy are indicated by these results. Norway set up national oil fund and uses the profit of oil industrial to invest oversea market. Until November 2007, the national oil fund has been reached $380 billion (OECD, 2014). And the national oil fund efficiently avoids economic overheating. This may be able to explain why there is no long-term positive impact sustained through the whole periods. In addition, there is another explanation generate that oil price increase brings an increasing in business uncertainty in oil-importer, which declines the oil demand in oil-importer and lower oil prices, thus lead to a decreasing revenues from oil-exporter and results to a positive but decreasing trend in stock return reaction.

India as an oil net-importer, the responds of stock returns on oil shocks is statistically insignificant.

5.4.2 The Responds of Stock Prices on Interest Rate Shocks

As figure 2 shows, the responds in most of case are insignificant except the first month in India, France and Italy. More specifically, the one standard deviation of interest rate shocks gives India's stock return more than -0.5% changes in first month at 5% significant level. The 10% increase in interest rate brings stock return of Italy a 0.3% decrease in the second month at 5% significant level, and it brings stock return of France a negative reaction in the second month at 5% significant level. Based above, interest rate shocks tend to bring a negative impact to stock market at least in the initial periods. Other researches (Scholtens & Yurtsever, 2012; Gracia & Cunado, 2014) find similar results that interest rate increase brings the stock returns negative impact on Finland, Italy, the UK, Spain France and India.

5.4.3 The Responds of Stock Prices on Industrial Production Shocks

As figure 3 shows, for Spain the one standard deviation of industrial production shocks increased maximum 1% of stock return within the second and third month at 5% significant level. The 10% increase of industrial production shocks brings a positive reaction in stock return for France at 5% significant level in the same month. Theoretically, industrial production is a measurement of economic activity. An increase in industrial production represents the prosperity of the economic activity meanwhile generate a positive cash flow, which improves the performance of stock markets. Further, an increasing trend of industrial production enhance the confidence of investor to future economy performance then impact stock prices through increase the real cash flow. While our results only find evidence in two European countries since other countries are statistically insignificant. As a matter of fact, for both European countries and India, the industry is occupied a significant part in its GDP, especially in India. India's industry occupied 27.6% of GDP in 2012 (IMF, 2012). However, the absence of those countries implies a puzzle.

Based on the discussion above, the finding is that the stock prices tend to react negatively to the oil prices shocks in the oil-importer, and react positively in the oil-exporter. In addition, the interest rate increases gives stock a negative impact in India, France Italy. Finally, industrial production shocks prefer brings positive impact on stock prices on Spain and France.

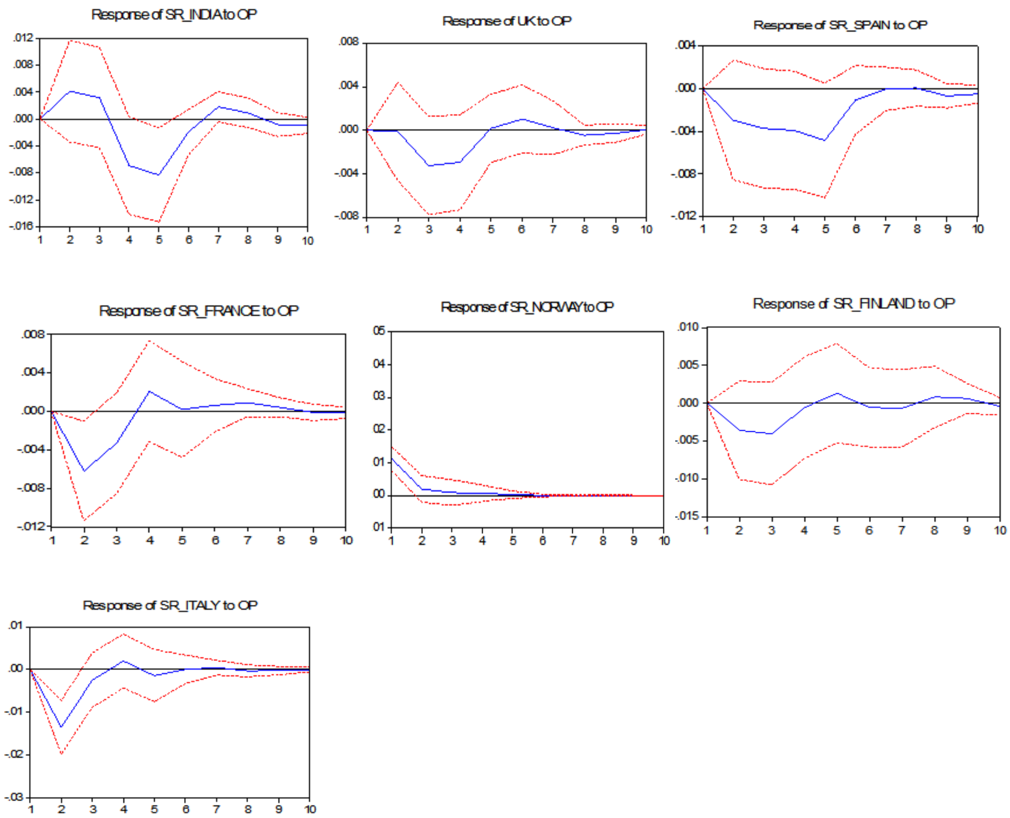


Figure 1. Reaction of Stock Return to oi Prices Shocks

Note. the first row shows India, UK and Spain respectively, the second row shows France, Norway and Finland respectively, the third row shows Italy.

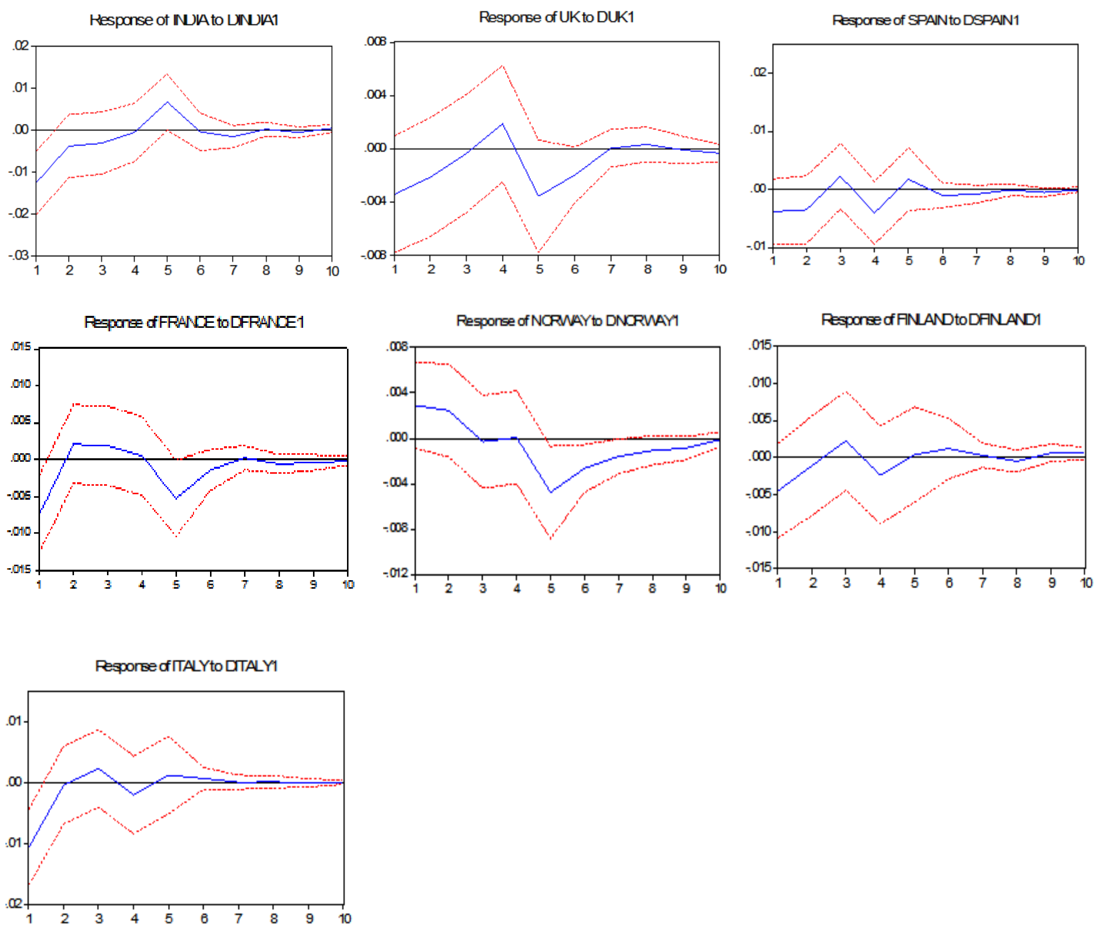


Figure 2. The Reaction of Dtocks Returns to Interest rate Shock

Note. the first row shows India, UK and Spain respectively, the second row shows France, Norway and Finland respectively, the third row shows Italy.

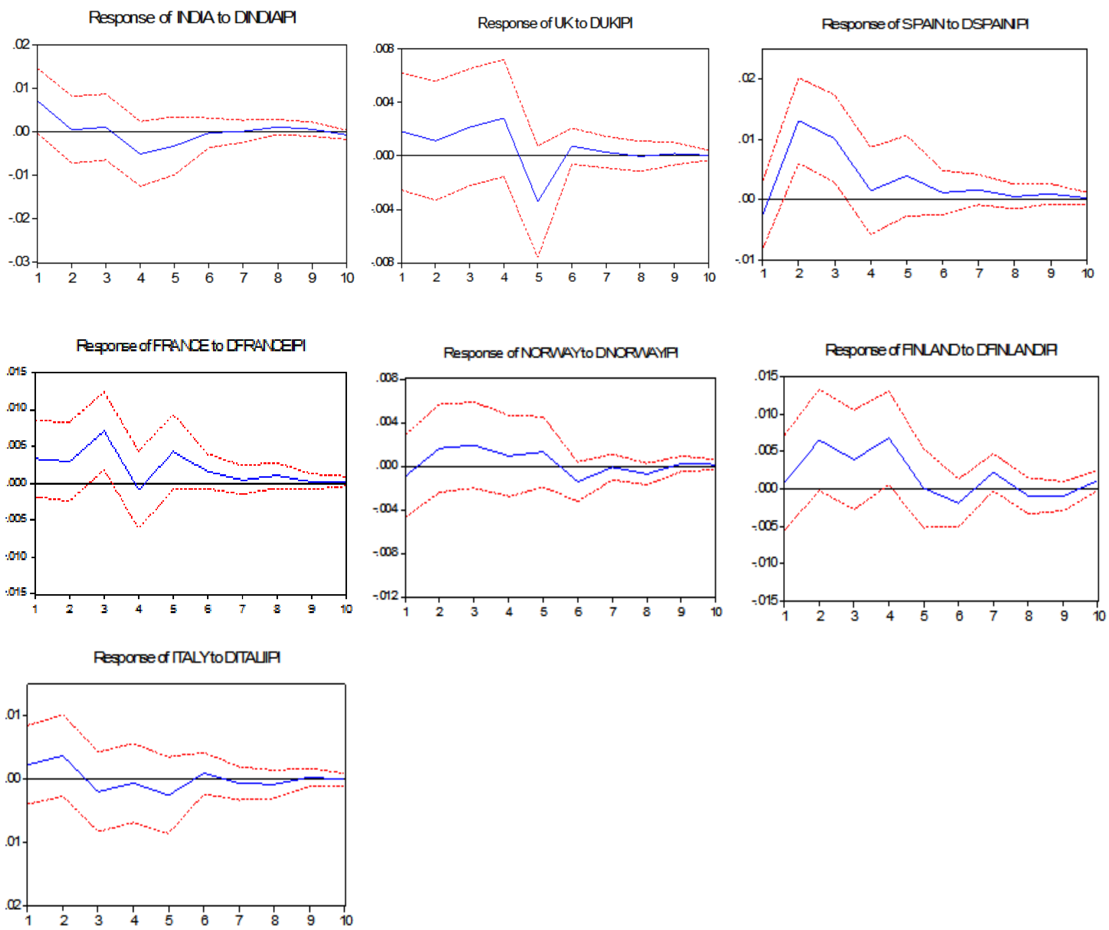


Figure 3. The Reaction of Stock Return to Industrial Production Shocks

Note. the first row shows India, UK and Spain respectively, the second row shows France, Norway and Finland respectively, the third row shows Italy.

5.5 Variance Decompositions

Finally, this study uses the variance decomposition technique to explore the contributions of oil prices shocks, interest rate shocks and industrial production shocks in stock market returns. Table 8 shows the variances decomposition results of forecast errors in stock returns of the seven examination countries, with the forecasting length of 10 months. Those three shocks in the system using to account for variations in stock return, table 8 indicts an immediately responds for stock variation after the shocks and this impact throughout the periods. It can be concluding that the impact of industrial shocks, interest rate shocks or oil shocks on stock market are permanent.

Besides, the contribution of oil prices shocks to the volatility of stock market return over the 10 month horizon ranges from minimize 0.025% for India to maximize 4.219% for Italy, with a median of around 1.8%. The results show that the explanation power of oil shocks to stock market variations of India is weaker than the six European countries. Since the oil price shocks could only explain maximum 0.31% of stock market return volatility in India, while it can explain at least 1% stock market volatility in other developed countries. Other studies who examined emerging markets (China, India) also suggest a weak explanation power of oil shocks (Chang & Le, 2015; Broadstock & Filis., 2014). Thus one viewpoint is that reaction of India (emerging market) to oil shocks not as significant as it in developed countries. The reason can be explained as bellow, which relating to the specific national situation. After 2000, the oil prices in India have increased maximum 188% while the national oil prices only increased up to 33%, this mainly lead from subsidy policy in India. Therefore, a dramatically increase in world oil prices cannot lead to the same fluctuation in national oil prices for India. In other words, world oil fluctuation have little impact on India's macro economy due to the intervention of government to adjust the national oil prices.

By contrast with oil prices shocks, the contribution of interest rate shocks to the volatility of stock market return over the examination horizon ranges from minimize 0.401% for Spain to maximize 3.570% in India with a median of approximately 1.5%. The results suggest that oil price shocks contribute more volatility in stock prices than interest rate shocks for the market of Finland, the UK, Italy, Spain and Norway. And only in France stock market find a stronger explanation power of interest rate shocks than oil prices shocks. It seems interest rate shocks have less explanation power in stock prices return volatility than oil prices shocks for European markets. These results consistent with Granger-causality test. Further, Davis and Haltiwanger (2001) consistent with that European stocks markets volatility tend to react more sensitive in oil prices shocks than interest rate shocks. However, Parke and Ratti (2008) find opposite results in France, Italy and Norway, this may can be explains as the different examination periods.

As for the industrial production shocks, the contribution to stock prices volatility ranges from 0.054% for Norway to 7.64% for Spain with a median of around 1.4%. The results indict that industrial production shocks have more predictive power than oil prices shocks for India, Finland and Spain.

Table 8. Generalized Variance Decomposition of Variance in Real Stock Returns Due to World Real Oil Price and other Aggregate Shocks (in Percentage)

	India	***Finland***	***UK***	***France***	***Italy***	***Spain***	***Norway***
	OP	OP	OP	OP	OP	OP	OP
1	0	0	0.123077793	0	0	0	0.56942
2	0.02505246	0.329009487	1.456668977	1.255543161	4.069259	1.231155	0.797635
3	0.089416154	0.3280199	1.592278801	1.568910504	4.189174	2.145645	0.790608
4	0.101544824	0.63063956	1.909200145	1.699759516	4.210397	2.133439	0.786032
5	0.277153377	1.213860246	1.905485458	1.671150824	4.216863	2.237377	1.972256
6	0.305515052	1.353241806	1.928818228	1.680228555	4.214884	2.235948	2.328003
7	0.305638085	1.353516381	1.93475117	1.705168506	4.218059	2.249347	2.45723
8	0.307937826	1.357040832	1.934972284	1.709704684	4.218063	2.25178	2.513004

9	0.30857568	1.358041278	1.942297939	1.709882284	4.218813	2.253211	2.550267
10	0.308589007	1.358265396	1.942873073	1.710663083	4.218777	2.253131	2.55052
	R	R	R	R	R	R	R
1	2.534471837	0.458681973	0.520975532	1.87370156	2.656871	0.401186	0
2	2.733647037	0.446699265	0.709699731	1.9565663	2.525262	0.732731	0.505785
3	2.875515481	0.549349373	0.708211575	2.01766902	2.637751	0.814675	0.528783
4	2.864114576	0.653925198	0.890055989	2.014761118	2.682761	1.214458	0.545032
5	3.527616321	0.652237143	1.501154151	2.837726392	2.691893	1.279322	0.798713
6	3.528672943	0.679506443	1.662918719	2.896858194	2.700562	1.303199	0.926074
7	3.563815994	0.680335168	1.662867032	2.897625527	2.699734	1.317753	0.945369
8	3.563746249	0.685080256	1.667622754	2.908184801	2.698858	1.317611	0.961295
9	3.567347328	0.692283668	1.667702057	2.913435741	2.698614	1.322869	0.961416
10	3.569680324	0.698300917	1.672142661	2.914900451	2.698602	1.322816	0.9674
	IP	IP	IP	IP	IP	IP	IP
1	0.841329123	0.014546587	0.187979752	0.370687447	0.125465	0.194364	0.05389
2	0.837547694	0.88708292	0.255648515	0.641545698	0.432564	4.716302	0.196306
3	0.856921529	1.193920003	0.469294232	2.221421746	0.514859	7.169311	0.392193
4	1.242176734	2.102930781	0.808020528	2.235410408	0.514222	7.179168	0.437275
5	1.379893932	2.089719132	1.269818462	2.761601364	0.642874	7.526991	0.51968
6	1.379737487	2.156304701	1.297326075	2.835670904	0.662784	7.551597	0.623431
7	1.379895178	2.250927696	1.300547822	2.840313334	0.670861	7.613006	0.622845
8	1.401559629	2.267853483	1.300399027	2.873471839	0.683472	7.619104	0.648951
9	1.408627154	2.286893862	1.301586873	2.874134837	0.68588	7.640995	0.651124
10	1.41455385	2.311121221	1.301652663	2.876200214	0.685899	7.642712	0.652146

5.6 The Oil Shocks on Interest Rate

In this sector, this study employed unrestricted VAR (op, r, sr, ipi) to examine if oil prices shocks affect interest rate. Interest rate increase may depress the stocks prices or result of economy recession. As a matter of fact, interest rate increase prefer following by oil prices shocks, since oil shocks will lead to macro-economic condition changing then impact interest rate. While a argue is that interest rate changing following by oil shocks is result from monetary policy behaviour rather than respect to macro economy.

Another debate is that if the Federal Reserve had no increased interest rate after oil shock, U.S's economy recession might have been largely avoid. This view is supported by BGW models; the BGW results indicated that an increase in oil prices induced Fed's increased federal funds rate and a decrease in real GDP. Meanwhile, if hold Federal fund rate constant, BGW results indicts a positive oil prices shocks increased GDP and inflation rate (Menera & Cologni, 2006). However, a group of scholars attribute the relationship between oil prices shocks and monetary police in federal reserves. They considers the changing in macro-economy can largely explained by oil shocks and the governance is inability to implement high policy to defence the impact of oil shocks (such as federal funds rate need to reduce 900 basis points) (Hamilton and Herrera, 2004). Since the debate that monetary policy rule can explaining the impact of oil shocks have insufficient evidence, and the debate mainly focus on the US rather than European or India. In addition, this case examines six European countries and India, five of them belong to European Union and do monetary decision depend upon European Central Bank (the primary objective of monetary policy states as maintaining prices stability) and India do decision depend upon Reserve Bank of India, they all be judged as mild role in monetary policy making (Manera & Cologni, 2008). Therefore, following by Park and Ratti (2008) to emphasise that interest rate in this case can be explained by oil shocks.

First employed Granger-causality test with the corresponding lag length determined above. Results showed in Table 9. The null hypothesis that world oil prices not granger cause interest rate is rejected at 5% significant level in most of the case, not surprising, the finding of oil shocks granger cause interest rate have been widely accept by researches.

According to figure 4, for each of European countries, the short-term interest rate reacts on one standard deviation of oil shocks in a positive way. This result is consistent with Park and Ratti (2008). While for India, the direction of reaction is unclear, since it fluctuates between 0.4% and -0.3%.

Based on figure 4, the responds in Finland is positive and significant within first five months. More specifically, one standard deviation of oil shocks increased maximum 0.3% of interest rate in Finland at 5% significant level. As for Spain, 10% of oil prices increase lead to 0.05% of interest rate rise in the second month at 5% significant level. For UK, one standard deviation of oil shocks increased maximum 0.1% of interest rate at 5% significant level in the second month. In Norway, oil prices shocks bring a significant positive impact on interest rate at the third and fourth month. It seems crude oil shocks tend to bring statistically positive impact in those European countries. For UK, Spain and Finland, this can be explains as a high level of oil import dependency since two of them are over than 90% and UK is around 40%. Moreover, more than half of oil consumption in those European countries are spent on transportation, thus an increasing in oil will lead to an increase in inflation and transfer to interest rate.

Since Norway is a net oil-exporting country, it seems should reaction in the opposite. However, the responds of interest rate to one standard deviation of oil shocks increased 0.04% in the third and fourth month at 5% significant level. The reason may can be explains that Norway have different policy from other net oil-export, taken Nigeria as instance, the refined petroleum products in Nigeria is heavily subsidised by governance and therefore no major transmission of higher oil prices into domestic oil prices (Effiong, 2014). While the governance of Norway mainly focus on develop new energy and decline the consumption of oil, for instance, they collect CO_2 tax to oil industry from 1990 and aim at reduce oil dependency. This explains the reason that positive react of interest rate exists in Norway.

The table 10 indicts that oil prices shocks can explain ranges from 0.019% to 2.36% stock prices volatility in the examination periods for the six European countries and India. Among them, the oil prices shocks can explain more interest rate volatility for the UK, behind the UK is Finland, Norway, Spain, Italy, France and the last one is India. The results indict that the reaction of interest rate to oil prices shocks is weaker for India than European area.

Table 9. The Results of Granger-causality Test

	India	***Finland***	***UK***	***France***	***Italy***	***Spain***	***Norway***
	OP	OP	OP	OP	OP	OP	OP
R	1.927** (0.0298)	178.65*** (3E-75)	185.713*** (5E-59)	3.363** (0.0187)	8.760*** (1E-05)	1.852 (0.1582)	4.627*** (0.0011)

Table 10. Generalized Variance Decomposition of Variance in Interest Rate Due to World Real Oil Price (in Percentage)

	India	***Finland***	***UK***	***France***	***Italy***	***Spain***	***Norway***
	OP	OP	OP	OP	OP	OP	OP
1	0	0	0	0	0	0	0
2	0.019898313	0.041726406	0.082207388	0.115801018	0.114152	0.289736	0.409056
3	0.089948856	0.145838699	0.265757735	0.363972024	0.499031	0.353584	0.884142
4	0.240554465	1.95573753	2.284691775	0.372826618	1.07995	0.615826	1.562898
5	0.294939968	1.937282906	2.271303656	0.961965819	1.451782	1.413541	1.872699
6	0.358490591	2.039588504	2.362919502	1.193834994	1.446785	1.525424	1.932375
7	0.485875784	2.052758164	2.362838676	1.195845201	1.443085	1.543569	1.932922
8	0.485313443	2.052091207	2.36086651	1.213529115	1.448071	1.543495	1.949018
9	0.485311133	2.056188299	2.36633875	1.214988646	1.454084	1.545937	1.963745
10	0.485912005	2.059263692	2.366448883	1.215274805	1.454271	1.547182	1.964867

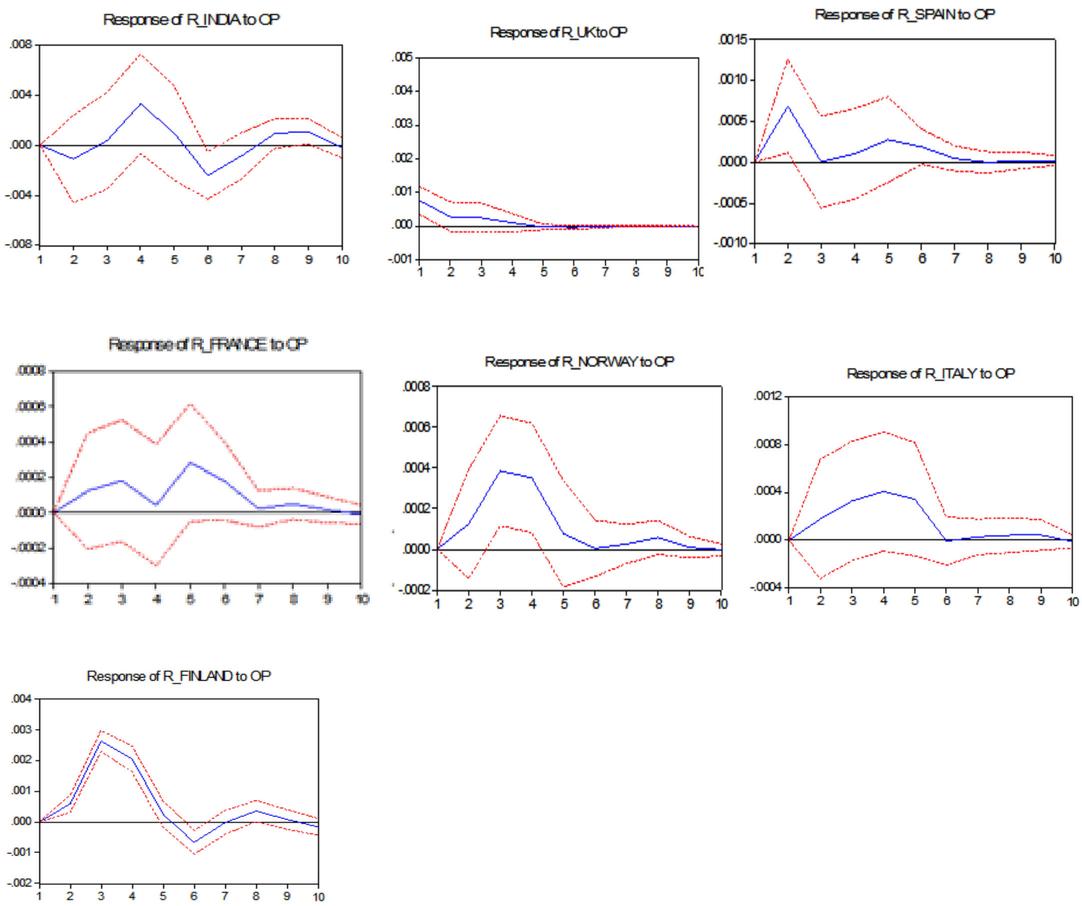


Figure 4. Response of Short-term Interest Rate to Oil Prices Shocks

Note: the first row shows India, UK and Spain respectively, the second row shows France, Norway and Italy respectively, the third row shows Finland.

6. Conclusion

This study using impulse response functions, a little evidence suggest that by contrast with Italy and Spain, Norway's stock return have different directions, durations and magnitudes of responds after one standard deviation of oil shocks. In addition, the interest rate increases brings stock a negative responds in India, France and Italy. Industrial production shocks prefer brings positive impact on stock prices in Spain and France. Based on forecasting variation decomposition, this study identifies the contribution of crude oil shocks to volatility in stock market returns. In the short-term, the impact of interest rate shocks is weaker than oil prices shocks in European countries. Overall, oil prices shocks are shown to explain about 1.4%-4.2% of stock return volatility in European countries, while only can explain approximately maximum 0.3% stock prices volatility in India. In the final analysis, this study employ the impulse responds function and variance decomposition to examine the responds of interest rate on oil shocks. The finding suggest that oil prices shocks lead to interest rate increase no matter what the country is oil-exporter or oil-importer, but depend on its specific characteristic of economy.

The results suggest that some important implications. Frist, the results indict that European countries are more responsive crude oil shocks than India when oil prices shocks measures by world oil prices, since the European markets exhibits a higher level of correlation with crude oil shocks throughout the examination periods. India as an emerging market have larger demand in crude oil by contrast with European markets, even in 2013 India become the fourth largest oil consumer with consuming 3.7 million barrels a day. While an increasing in oil shocks brings little impact on India's interest rate and stock market, this partly result from the different policy rules between European countries and India.

Second, since the reaction of stock return in Norway has different magnitudes and direction from other European countries that are oil-importer, we point out that the direction and magnitudes of responds on oil shocks differ depend on the nature of economy. In addition, the responds of interest rate on oil shocks is not affected by the country's nature of economy.

Nonetheless, our responds of variance decomposition is relatively weak by contrast with Cunado and Gracia (2014), as they find oil prices shocks can explain more than 10% stock prices volatility in European market. The reason is that we expand the examination periods, and measures oil prices shocks as world oil prices regardless national oil prices or oil prices volatility. This study has limitations like inability to investigate shock - asset price mechanisms, lack of global scope, and difficulty in direct result comparison. Further research on a global scale is needed.

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