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The Effects of the Increasing Oil Price Returns and its Volatility on Four Emerged Stock Markets

By

Andreas Ektor Lake, Constantinos Katrakilidis
Aristotle University of Thessaloniki

Abstract:

The current paper attempts to explore the effects of oil price returns and oil price volatility on the Greek, the US, the UK and the German stock markets. More specifically, the research focuses on the interactions among oil prices, its volatility, and the stock market returns as well as on the futures indices of each index. The volatility of the employed indices has been quantified by applying EGARCH models and the relationship between the variables has been examined by means of structural equation models (SEM).

Keywords: *stocks, volatility, returns.*

JEL classification: *C22, C50, C53.*

1. Introduction

Theory supports that the oil price volatility affects the national economies and hence the stock market returns. In this paper we focus on four emerged stock markets which operate in countries with different economic properties. Namely, we examine the Greek, the US, the UK and the German stock markets. Most of the studies concern the relation among stock indices (Drimbetas, Sariannidis and Porfiris, 2007; Sariannidis, Drimbetas and Konteos, 2006, Thalassinos, 2006, and 2008). We analyze the influence of the oil price returns and its volatility on the stock market returns, the futures index returns and their respective volatilities in the cases of Greece, US, UK and Germany . The volatilities of the stock indices and the oil price have been measured by applying EGARCH models, while the existence of possible causal relationships between the variables has been examined in the context of structural equation models (SEM).

The period between 9/1999 and 3/2007 has been characterized by increasing commodity prices and uncertainty about the corporate gains and hence uncertainty about the stock market returns (Lake, 2006). Oil price increases as well as, oil price volatility increases cause negative impacts on national economies and hence on the stock market returns (Hamilton, 1983; Davies and Haltiwanger, 2001; Finn, 2000).

2. Literature Review

Oil price returns and its volatility has a major impact on the economic activity and hence on futures and spot stock market returns. If oil price affects real GNP, it will affect the earnings of companies for which oil is a direct or indirect operational cost. Thus, an increase in oil prices will possibly cause expected earnings to decline, and this will bring about an immediate decrease in stock prices if the stock market efficiently capitalizes the cash flow implications of the oil price increase. If the stock market is not efficient, there may be a lag in the adjustment to oil price changes. Jones and Kaul (1992; 1996), find that oil price movements do indeed affect U. S. stock returns. In particular, their first study examines the effect of oil prices on stock prices. They detect significant effects of oil prices on aggregate real stock returns, including a lagged effect, in the period from 1947 to 1991. Their work has a macroeconomic focus, using quarterly data and employing the Producer Price Index for fuels to proxy the oil price index. In the second study they use quarterly data to test whether the reaction of international stock markets to oil shocks can be justified by current and future changes in real cash flows and hence the changes in expected returns. Using a standard cash-flow dividend valuation model they find that the reaction of Canadian and U.S. stock prices to oil price shocks can be completely accounted for the impact of these shocks on the real cash flows. The results for Japan and the U.K. are, however, not as strong. Sadorsky (1999) has attempted to examine the relationship between oil price volatility, stock market returns and the economic activity by using an unrestricted vector autoregression model. Sadorsky focused on the American economy and covered the period 1947:1-1996:1. The results confirm that both the oil prices and the oil price volatility play an important role in affecting economic activity. The results also reveal that changes in oil prices affect the economic activity even though changes in the economic activity have little impact on oil prices. The impulse response functions show that oil price movements are important in explaining movements in the stock returns. Positive shocks to oil prices depress real stock returns while shocks on stock returns have positive impact on the interest rates. There is evidence that oil price volatility shocks have asymmetric effects on the economy.

Huang, Masulis and Stoll (1996), investigate the impact of oil price shocks on the U.S. equity market from a financial markets perspective. Within the framework of a vector autoregression (VAR) model, they examine the dynamic interactions between daily oil futures returns and stock returns. Although they find evidence of Granger causal effects from oil futures to stocks of individual oil companies, they detect no impact on a broad-based index like the S&P 500. Based on this result, it has been concluded that the much-touted influence of oil price shocks on the aggregate economy is more of a myth than reality. Moreover, a study by Maghyereh (2004), reveals that oil shocks have no important effect on stock index returns. Maghyereh examines the dynamic linkages between crude oil

price shocks and stock market returns in 22 emerging economies. The vector autoregression (VAR) analysis is carried out by using daily data covering the period between 1/1/1998 and 30/4/2004. This study utilized the generalized approach to forecast error variance decomposition and impulse response analysis in favor of the more traditional orthogonalized approach. Inconsistent with prior research on developed economies, the findings imply that oil shocks have no significant impact on stock index returns in emerging economies. The results also suggest that stock market returns in these economies do not rationally signal shocks in the crude oil market. Some studies have also dealt with the lead-lag relationship between spot and futures for the oil market. Bopp and Sitzer (1987), tested the hypothesis that futures prices are good predictors of spot prices in the heating oil market, and found that, even when crude oil prices, inventory levels, weather, and other important variables were accounted for, futures prices still made a significant positive contribution to describing past price changes.
Furthermore, Papapetrou (2001) presents evidence that oil prices are important in explaining stock price movements, in the case of Greece. Papapetrou attempts to shed light into the dynamic relationship among oil prices, real stock prices, interest rates, real economic activity and employment in Greece, by employing a multivariate vector autoregression (VAR) approach. The empirical evidence suggests that oil price changes affect real economic activity and employment while stock returns do not lead to changes in real activity and employment. Hwang et al. (2004), after modeling the oil price volatility with the aid of a GARCH model, constructed a VAR model and they examined the Granger causal effects between oil price volatility, exchange rates, stock market returns, inflation and industrial production. The focus is set on Canada, Italy, Germany, U.S., U.K. and Japan. It has been concluded that the volatility of oil price changes leads to negative stock returns in three out of six cases, while it affects the industrial production in just two cases. Hamilton (1983) argues that oil price shocks were responsible, at least partly, for every U.S. recession in the post-World War II period. Other studies, such as Loungani (1986), Gisser and Goodwin (1986), Mork (1989) and Lee, Ni and Ratti. (1995), report similar conclusions using different data and econometric approaches.

The arising interest for the relationship between financial markets and oil price movements is revealed from both the investigation of the relationship between oil price movements and stocks returns and between spot and futures prices. However, only little attention has been paid on the relationship between oil spot prices and the reactions of the Greek, the US, the UK and the German Stock Market Index movements. This paper attempts to fill this gap by examining the causal relationship between oil price returns and the Athens Stock Exchange General Index, the Dow Jones index, the FTSE100 and the DAX index movements.

3. Data and Empirical Results

For the empirical analysis of the research monthly data has been used covering the period between 9/1999 and 3/2007. The data has been collected from the International Financial Statistics (IFS) data bank, the International Energy Organization and the Reuters database. The FTSE-ASE index and the futures FTSE 20 index is used for the construction of the Athens stock exchange returns series and the futures index returns series, respectively. The Dow Jones index and the respective futures index are used for the construction of the US stock exchange returns series and the futures index series respectively. For the UK and the German stock market returns and their futures returns we use the FTSE 100 index, the DAX index and their respective futures indices. Finally the oil price returns are constructed with the aid of the crude oil price index traded in the London commodities market.

The stock market returns, the futures returns and the oil price returns are used in logarithmic form and denoted as RGS, RUSS, RUKS, RGERS, RGF, RUSF, RUKF, RGERF and ROIL respectively. The stock market returns volatility and the futures returns volatility for the case of Greece are denoted by VOLRGS and VOLRGF respectively. For the US case they are denoted by VOLRUSS and VOLRUSF, for the UK case they are denoted by VOLRUKS and VOLRUKF and finally for the German case they are denoted as VOLRGERS and VOLRGERF. Finally the oil price returns volatility is denoted by VOLROIL.

The calculation of the stock market returns and the futures index returns for Greece, USA, UK and Germany are presented at equations (1) – (8). The oil price returns have been calculated with the aid of equation (9).

$$RGS_i = \log\left(GS_i \big/ GS_{i-1} \right) \quad (1)$$

$$RGF_i = \log\left(GF_i \big/ GF_{i-1} \right) \quad (2)$$

$$RUSS_i = \log\left(USS_i \big/ USS_{i-1} \right) \quad (3)$$

$$RUSF_i = \log\left(USF_i \big/ USF_{i-1} \right) \quad (4)$$

$$RUKS_i = \log\left(UKS_i \big/ UKS_{i-1} \right) \quad (5)$$

$$RUKF_i = \log\left(UKF_i \big/ UKF_{i-1} \right) \quad (6)$$

$$RGERS_i = \log\left(GERS_i \big/ GERS_{i-1} \right) \quad (7)$$

$$RGER_i = \log\left(GERF_i \big/ GERF_{i-1} \right) \quad (8)$$

$$ROIL_i = \log\left(OIL_i \big/ OIL_{i-1} \right) \quad (9)$$

The first step in the empirical analysis is the modelling of the volatility of the stock market returns, the futures index returns and the oil price index returns. A particularly important preliminary problem in the empirical analysis is the selection choosing of a proxy for the market volatility since estimates are highly sensitive to the measure of volatility adopted. Since ARCH/GARCH modelling techniques are used by the majority of the researchers as the most adequate measure of volatility, this methodology is also adopted in this paper.

Numerous studies have provided evidence that the variance of the stock and oil price returns are time varying and heteroscedastic (Bollesev, Chou and Kroner, 1992; Mandelbort, 1963). This implies that if one ignores the time dependent nature of volatility then any inference regarding the impact on volatility may be misleading. Nelson (1999), proposes the exponential GARCH (EGARCH) model as an extended version of the GARCH model. The EGARCH model allows for the asymmetry in the responsiveness of the volatility variables to the sign of the shocks. Secondly, the EGARCH model, specified in logarithms, does not impose the non-negativity constraints on parameters. Finally, the use of logarithms hampers the effects of outliers on the estimation results. We employ log likelihood ratio tests on a EGARCH (p,q) model in order to specify the most parsimonious EGARCH representation of the conditional variance of returns. The EGARCH representation of the conditional variance of the stock price returns and the oil price returns at time t_i is of the following form:

$$Logh_t^2 = \beta_0 + \beta_1 |\varepsilon_{t-1}| / h_{t-1} + \beta_2 \varepsilon_{t-1} / h_{t-1} + \beta_3 Logh_{t-1}^2 \qquad (10)$$

It should be mentioned that $|\varepsilon_{t-1}|/h_{t-1}$, $\varepsilon_{t-1}/h_{t-1}$ and the log of the lagged value of the conditional variance (h^2_t) is used to explain the behaviour of the conditional variance. More specifically, volatility proxies are constructed using the conditional variance of returns, which has been retrieved from the maximum likelihood estimation of a EGARCH (0,1) model.

$$RGS_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i RGS_{t-1} + \varepsilon_{p,i}, \qquad \varepsilon_i \,|(\varepsilon_{t-1}, \varepsilon_{t-2}, \ldots) \sim N(0, h_i) \qquad (11)$$

$$RGF_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i RGF_{t-1} + \varepsilon_{p,i}, \qquad \varepsilon_i \,|(\varepsilon_{t-1}, \varepsilon_{t-2}, \ldots) \sim N(0, h_i) \qquad (12)$$

$$RUSS_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i RUSS_{t-1} + \varepsilon_{p,i}, \qquad \varepsilon_i \,|(\varepsilon_{t-1}, \varepsilon_{t-2}, \ldots) \sim N(0, h_i) \qquad (13)$$

$$RUSF_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i RUSF_{t-1} + \varepsilon_{p,i}, \qquad \varepsilon_i \,|(\varepsilon_{t-1}, \varepsilon_{t-2}, \ldots) \sim N(0, h_i) \qquad (14)$$

$$RUKS_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i RUKS_{t-1} + \varepsilon_{p,i}, \qquad \varepsilon_i \,|(\varepsilon_{t-1}, \varepsilon_{t-2}, \ldots) \sim N(0, h_i) \qquad (15)$$

$$RUKF_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i RUKFGS_{t-1} + \varepsilon_{p,i}, \qquad \varepsilon_i \,|(\varepsilon_{t-1}, \varepsilon_{t-2}, \ldots) \sim N(0, h_i) \qquad (16)$$

$$RGERS_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i RGERS_{t-1} + \varepsilon_{p,i}, \qquad \varepsilon_i \,|(\varepsilon_{t-1}, \varepsilon_{t-2}, \ldots) \sim N(0, h_i) \qquad (17)$$

$$RGERF_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i RGERF_{t-1} + \varepsilon_{p,i}, \qquad \varepsilon_i \,|(\varepsilon_{t-1}, \varepsilon_{t-2}, \ldots) \sim N(0, h_i) \qquad (18)$$

$$ROIL_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i ROIL_{t-1} + \varepsilon_{p,i}, \qquad \varepsilon_i \mid (\varepsilon_{i-1}, \varepsilon_{i-2}, \ldots) \sim N(0, h_i) \qquad (19)$$

where ε is the error term and equations (11)-(19) denote the conditional mean equations of the respective returns.
The estimates of the above EGARCH model are presented in Tables 1-9.

Table 1: Volatility of the Greek Stock Market Returns

	Coefficient	St. Error
Constant term	0,83564	0,522
RGS(-1)	0,0079731	0,004932
RGS(-2)	0,0067508	0,004427
Parameters of the conditional heteroscedastic equation		
	Coefficient	Asymptotic error term
Constant term	4,207	0,25198
(E/H)(-1)	0,33464	0,16954
ABS(E/H) (-1) –MEU	0,29044	0,23436
D.F. of t-dist.	4,9936	2,532

Table 2: Volatility of the Greek Futures Index Returns

	Coefficient	St. Error
Constant term	0,37223	0,2455
RGF(-1)	0,71849	0,44
RGF(-2)	0,069394	0,0481
RGF(-3)	0,16216	0,104
RGF(-4)	0,19436	0,7
Parameters of the conditional heteroscedastic equation		
	Coefficient	Asymptotic error term
Constant term	3,9568	0,17
(E/H)(-1)	0,22519	0,11734
ABS(E/H) (-1) –MEU	0,3316	0,2058
D.F. of t-dist.	3,3456	2,324

Table 3: Volatility of the US Stock Market Returns

	Coefficient	St. Error
Constant term	0,50579	0,201
RGS(-1)	0,013766	0,00793
Parameters of the conditional heteroscedastic equation		
	Coefficient	Asymptotic error term
Constant term	2,9577	1,2286
(E/H)(-1)	0,07306	0,017051
ABS(E/H) (-1) –MEU	0,27839	0,14942
D.F. of t-dist.	5,7033	3,2101

Table 4: Volatility of the US Futures Index Returns

	Coefficient	St. Error
Constant term	0,79384	0,053
RGF(-1)	0,56343	0,306
RGF(-2)	0,30652	0,1823

RGF(-3)	0,080707	0,0305
Parameters of the conditional heteroscedastic equation		
	Coefficient	Asymptotic error term
Constant term	3,0334	0,35634
(E/H)(-1)	0, 4015	0,22183
ABS(E/H) (-1) –MEU	0,96294	0,40941
D.F. of t-dist.	4,0803	1,7797

Table 5: Volatility of the UK Stock Market Returns

	Coefficient	St. Error
Constant term	.76993	0,029
RGS(-1)	0,54888	0,3632
Parameters of the conditional heteroscedastic equation		
	Coefficient	Asymptotic error term
Constant term	2,8293	0,26124
(E/H)(-1)	0,37789	0,17879
ABS(E/H) (-1) –MEU	0,51945	0,26436
D.F. of t-dist.	4,9353	2,4251

Table 6: Volatility of the UK Futures Index Returns

	Coefficient	St. Error
Constant term	0,92009	0,017
RGS(-1)	0,012141	0,00793
Parameters of the conditional heteroscedastic equation		
	Coefficient	Asymptotic error term
Constant term	3,242	0,40941
(E/H)(-1)	0,10406	0,18353
ABS(E/H) (-1) –MEU	0,64021	0,28178
D.F. of t-dist.	3,5403	1,4432

Table 7: Volatility of the German Stock Market Returns

	Coefficient	St. Error
Constant term	0,97092	0,109
RGS(-1)	0,026321	0,01358
Parameters of the conditional heteroscedastic equation		
	Coefficient	Asymptotic error term
Constant term	3,7277	0,23962
(E/H)(-1)	0,50965	0,20332
ABS(E/H) (-1) –MEU	0,15534	0,10163
D.F. of t-dist.	4,5041	1,8594

Table 8: Volatility of the German Futures Index Returns

	Coefficient	St. Error
Constant term	0,67006	0,236
RGS(-1)	0,15978	0,115

Parameters of the conditional heteroscedastic equation	Coefficient	Asymptotic error term
Constant term	3,6246	0,21138
(E/H)(-1)	0,43587	0,1918
ABS(E/H) (-1) –MEU	0,43554	0,11024
D.F. of t-dist.	6,8043	3,5418

Table 9: Volatility of the Oil Price Returns

	Coefficient	Probability
Constant term	1,1641	0,201
ROIL(-1)	2,4649	0,784
ROIL(-2)	9,34141	0,309

Parameters of the conditional heteroscedastic equation	Coefficient	Asymptotic error term
Constant term	3,2691	0,14518
(E/H)(-1)	0,27226	0,11378
ABS(E/H) (-1) –MEU	0,4007	0,278844
D.F. of t-dist.	4,3422	2,0202

The stationarity of the series is examined with the aid of the augmented Dickey – Fuller test (ADF). Tables 10 and 11, present the results obtained from the ADF tests applied on the log levels and then on the first differences of the variables[1].

Table 10: ADF Test Results on Returns[2]

Variables	κ	With constant and no time trend	With constant and time trend
LGS	1	-2,2613	-2,2281
LUKS	1	-1,7087	-1,3185
LGERS	1	-1,8499	-1,6482
LUSS	1	-1,8762	-1,893
LUKF	1	-1,6074	-1,1718
LGERF	1	-1,7315	-1,1415
LUSF	1	-1,2315	-1,7577
LGF	1	-1,7623	-1,6188

Table 11: ADF Test Results on Levels

Variables	κ	With constant and no time trend	With constant and time trend
RGS	1	-5,519	-4,904

[1] The critical value at the 5% level of significance is -2.895, whereas when the time trend is not accounted the critical value is -3.4622.
[2] The optimal lag length has been defined by means of the Akaike Information Criterion

RUKS	1	-3,9942	-4,1462
RGERS	1	-3,5564	-3,6164
RUSS	1	-3,9932	-3,9928
RUKF	1	-4,2301	-4,4134
RGERF	1	-4,3013	-4,3875
RUSF	1	-4,6769	-4,6723
RGF	1	-2,8081	-3,8938

Next, following Kyriakou and Sarno (1999), the dynamic relationship between stock market returns, oil market returns, stock market volatility and oil price volatility in the framework of a Structural Equation Model (SEM) is examined. The majority of the relevant empirical literature considers a VAR model with only lagged values of the right-hand-side variables in each equation, which is estimated by ordinary least squares (OLS). Furthermore it performs Granger causality tests (Granger, 1969) by posing zero restrictions on subsets of lagged parameters in each equation of the VAR in order to investigate lead-lag relationships between the variables in question (Chatrath, Ramchander and Song, 1995). However, if the error terms exhibit significant contemporaneous correlation across the equations of the system then the OLS estimates may be inefficient (Chan and Chung, 1993).

The SEM model used in this paper, which is presented below, is likely to provide relatively more reliable Granger causality tests, if the endogenous variables are found to have instantaneous explanatory power in each equation of the SEM. Actually, previous studies reporting Granger causality tests from conventional VARs may not be so reliable, since most of them are based on a mispecified model (i.e. the current values of the endogenous where not involved., (Davidson and Mackinon, 1993). For each one of the examined country cases we examine the following SEM specification.

$$RS_{t,i} = \alpha_0 + \sum_{j=1}^{k}\beta_j RS_{t-j,i} + \sum_{j=0}^{k}\gamma_j RF_{t-j,i} + \sum_{j=0}^{k}\delta_j VOLRS_{t-j,i} + \sum_{j=0}^{k}\varepsilon_j VOLRF_{t-j,i} + \sum_{j=0}^{k} z_j ROIL_{t-j} + \sum_{j=0}^{k}\eta_j VOLROIL_{t-j} + e_i \quad (20)$$

$$RF_{t,i} = \alpha_0 + \sum_{j=0}^{k}\beta_j RS_{t-j,i} + \sum_{j=1}^{k}\gamma_j RF_{t-j,i} + \sum_{j=0}^{k}\delta_j VOLRS_{t-j,i} + \sum_{j=0}^{k}\varepsilon_j VOLRF_{t-j,i} + \sum_{j=0}^{k} z_j ROIL_{t-j} + \sum_{j=0}^{k}\eta_j VOLROIL_{t-j} + e_i \quad (21)$$

$$VOLRS_{t,i} = \alpha_0 + \sum_{j=0}^{k}\beta_j RS_{t-j,i} + \sum_{j=0}^{k}\gamma_j RF_{t-j,i} + \sum_{j=1}^{k}\delta_j VOLRS_{t-j,i} + \sum_{j=0}^{k_4}\varepsilon_j VOLRF_{t-j,i} + \sum_{j=0}^{k} z_j ROIL_{t-j} + \sum_{j=0}^{k}\eta_j VOLROIL_{t-j} + e_i \quad (22)$$

$$VOLRF_{t,i} = \alpha_0 + \sum_{j=0}^{k}\beta_j RS_{t-j,i} + \sum_{j=0}^{k}\gamma_j RF_{t-j,i} + \sum_{j=0}^{k}\delta_j VOLRS_{t-j,i} + \sum_{j=1}^{k}\varepsilon_j VOLRF_{t-j,i} + \sum_{j=0}^{k} z_j ROIL_{t-j,i} + \sum_{j=0}^{k}\eta_j VOLROIL_{t-j} + e_i \quad (23)$$

Where i stands for Greece, US, UK and Germany, β_j, γ_j, δ_j, ε_j, z_j and η_j stand for the parameters and κ stands for the number of lags. κ has been chosen on standard statistical methods and e_{1i} stands for the standard error.

The SEM method is used in order to encounter for current values. The most common technique is the SURE methodology. Initially the SURE method results for each one of the endogenous variables are presented at tables 1-16 at the appendix. The results presents are based on a “General to specific” approach and hence we removed the non statistical significant variables. These estimates, next, are used to investigate the existence of the causal effects by means of the WALD test.

The Wald tests applied to detect the possible existence and direction of the causal impacts between the variables for the case of Greece, US, UK and Germany are presented in tables 12, 13, 14, 15 respectively.

Table 12: Wald Test for the Case of Greece

Dependant Variables	Independent Variables					
RGS	RGS	RGF	VOLRGS	VOLRGF	ROIL	VOLROIL
	-	**76.85 (0.000)**	**12.1598 (0.016)**	1.4769 (0.688)	**10.5582 (0.014)**	**5.8535 (0.054)**
RGF	RGS	RGF	VOLRGS1	VOLRGF1	ROIL	VOLROIL
	69.5348 (0.000)	-	**9.3954 (0.054)**	**9.4699 (0.024)**	5.8499 (0.211)	6.7152 (0.152)
VOLRGS	RGS	RGF	VOLRGS	VOLRGF	ROIL	VOLROIL
	123.766 (0.000)	**11.8261 (0.008)**	-	6.3564 (0.273)	**17.3718 (0.001)**	3.1313 (0.536)
VOLRGF	RGS	RGF	VOLRGS	VOLRGF	ROIL	VOLROIL
	38.0123 (0.000)	**9.1784 (0.057)**	**23.345 (0.000)**	-	**13.2002 (0.004)**	**8.8491 (0.012)**

Table 13: Wald Test for Case of the USA

Dependant Varibales	Independent Variables					
RUSS	RUSS	RUSF	VOLRUSS	VOLRUSF	ROIL	VOLROIL
	-	**55.9734 (0.000)**	**17.5642 (0.004)**	**17.5642 (0.004)**	**6.5910 (0.037)**	**12.8411 (0.012)**
RUSF	RUSS	RUSF	VOLRUSS	VOLRUSF	ROIL	VOLROIL
	4.1926 (0.651)	-	3.2298 (0.520)	6.6463 (0.355)	**7.0316 (0.071)**	3.9387 (0.140)
VOLRUSS	RUSS	RUSF	VOLRUSS	VOLRUSF	ROIL	VOLROIL
	48.8810 (0.000)	**16.4213 (0.006)**	-	**9.8835 (0.020)**	1.5996 (0.659)	0.035526 (0.982)
VOLRUSF	RUSS	RUSF	VOLRUSS	VOLRUSF	ROIL	VOLROIL
	6.2237 (0.101)	**62.1173 (0.000)**	**11.4076 (0.022)**	-	3.3292 (0.504)	1.8268 (0.768)

Table 14: Wald Test for the Case of the UK

Dependant Variables	Independent Variables					
RUKS	RUKS	RUKF	VOLRUKS	VOLRUKF	ROIL	VOLROIL
	-	**292.2494 (0.001)**	**13.1724 (0.022)**	**10.4669 (0.033)**	0.39271 (0.822)	1.8403 (0.3998)
RUKF	RUKS	RUKF	VOLRUKS	VOLRUKF	ROIL	VOLROIL
	309.3655 (0.000)	-	**23.6538 (0.000)**	**16.6712 (0.002)**	2.5640 (0.633)	3.3711 (0.338)
VOLRUKS	RUKS	RUKF	VOLRUKS	VOLRUKF	ROIL	VOLROIL
	14.7952 (0.002)	3.0895 (0.213)	-	**28.2356 (0.000)**	**20.0889 (0.000)**	1.2305 (0.746)
VOLRUKF	RUKS	RUKF	VOLRUKS	VOLRUKF	ROIL	VOLROIL
	5.9371 (0.430)	**13.4730 (0.009)**	**10.831 (0.028)**	-	2.9125 (0.573)	2.9787 (0.561)

Table 15: Wald Test for the Case of the Germany

Dependant Variables	Independent Variables					
RGERS	RGERS	RGERF	VOLRGERS	VOLRERF	ROIL	VOLROIL
	-	**168.0677 (0.000)**	**8.3500 (0.080)**	5.2538 (0.262)	2.2692 (0.518)	2.3165 (0.509)
RGERF	RGERS	RGERF	VOLRGERS	VOLRERF	ROIL	VOLROIL
	176.8955 (0.000)	-	**14.3706 (0.026)**	**8.5110 (0.075)**	5.0084 (0.171)	3.0247 (0.388)
VOLRGERS	RGERS	RGERF	VOLRGERS	VOLRERF	ROIL	VOLROIL
	1213.4 (0.000)	**38.0826 (0.000)**	-	**24.5760 (0.000)**	3.9969 (0.136)	**6.8627 (0.076)**
VOLRGERF	RGERS	RGERF	VOLRGERS	VOLRERF	ROIL	VOLROIL
	51.4933 (0.000)	**62.6247 (0.000)**	**39.7923 (0.000)**	-	8.1430 (0.17)	1.8674 (0.600)

4. Conclusions

The impact of the oil price returns on the stock market returns of the under examination countries varies. In the majority of the literature the reasons behind the effects are mainly interpreted regarding the macroeconomic characteristics of each country. From our analysis the results obtained reveal that the Greek stock market index returns and the US stock market index returns are both sensitive to the oil price returns movements while the German and the UK stock market returns are not affected at all.

The General Index and the Dow Jones Index, which have been used as proxies for the ASE and the US stock exchange respectively, perform similar decomposition priorities in the sense that the oil companies' participation in both indices is low while consumer goods companies heavily participate in both indices. On the other hand, there is no oil company participation in the composition of the German index. At this point, it should be noted that although oil companies heavily participate in the UK stock market index there are no effects running from the oil price returns to FTSE100 index. The reason seems to be the fact that UK is much less dependent on oil imports compared to US and Greece. Taking a step further it may be noticed that in both the cases of Greece and the US, where oil price returns do not affect the stock market returns, there are not causal impacts running from oil price returns on any other variable. This probably reveals that if the participation of the oil companies in the composition of the indices is low then there is no evidence of significant causal effects running from oil price returns to the futures markets and their underlying indices.

In the US case, it seems that the effects of the oil price returns had a major effect since investors used the futures market to either hedge their position or speculate on the prices of the stock market. Although the effects of the oil price returns are common in both in the US and Greece, the investment community in Greece did not use the futures market to hedge its positions against oil prices.

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