OPEC news and predictability of energy futures returns and volatility: evidence from a conditional quantile regression

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Abdelkader Derbali
Department of Administrative and Financial Sciences and Techniques, Community College, Taibah University, Al Medinah, Saudi Arabia

Shan Wu
Department of Finance, Southwestern University of Finance and Economics (SWUFE), Chengdu, China, and

Lamia Jamel
Department of Finance and Economics, College of Business Administration, Taibah University, Al Medinah, Saudi Arabia

Abstract

Purpose – This paper aims to provide an important perspective to the predictive capacity of Organization of the Petroleum Exporting Countries (OPEC) meeting dates and production announcements for energy futures (crude oil West Texas Intermediate (WTI), gasoline reformulated gasoline blendstock for oxygen blending (RBOB), Brent oil, London gas oil, natural gas and heating oil) market returns and volatilities.

Design/methodology/approach – To examine the impact of OPEC news on energy futures market returns and volatilities, the authors use a conditional quantile regression methodology during the period from April 01, 2013 to June 30, 2017.

Findings – From the empirical findings, the authors show a conditional dependence between energy futures returns and OPEC-based predictors; hence, the authors can find clear the significance of relationship in the process of financialization of the OPEC announcements and energy futures in the case of this paper. From the quantile-causality test, the authors find that the effect of OPEC news is important to energy futures. Specifically, OPEC announcements dates predict the quantiles of the conditional distribution of energy futures market returns.

The authors contributed to the paper in the following ways: corresponding author, data curation (equal), formal analysis (equal), funding acquisition (equal), methodology (equal), project administration (equal), validation (equal) and writing-review and editing (equal); funding acquisition (equal), investigation (equal), methodology (equal) and validation (equal); conceptualization (equal) and software (equal). The authors thank anonymous referees and the editor for helpful comments and suggestions.

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Originality/value – The authors confirm the presence of unidirectional nexus between OPEC news and energy commodities futures in the long term.

Keywords Energy futures markets, Returns and volatility, OPEC announcements, Quantile regression

Paper type Research paper

1. Introduction

In recent years, oil prices have fluctuated dramatically. As far back as some of us can remember, the price of gasoline has tended to increase at a steady rate. The price gradually stabilized at around $100 per barrel until the economic crisis of 2008. However, the recovery was quick, culminating in the price never seen before.

Here we are in 2015, threatened again by a major financial crisis. Meanwhile, oil prices have devalued to the lowest level since 2008. Organization of the Petroleum Exporting Countries (OPEC) continues to try to stabilize prices. Canada, known for the reliability and stability of its economy, has come under national pressure due to this uncertain economic situation. The Bank of Canada has even said that "the decline in Canada's terms of trade will also help to reduce the country's wealth." Besides, according to a Statistics Canada report, the country's GDP (gross domestic product) is declining for the first time since 2011.

The lower value of oil prices affects customer incomes and, in turn, insurance premiums. As production and revenues decline, the risks associated with the oil industry change, leading to the recognition that it is now time to adjust premiums, to slow down capital projects (estimated at $7bn) and reduce social spending. CIBC (Canadian Imperial Bank of Commerce) world markets recently predicted that the unemployment rate in Alberta will rise from 2.5 to 6.5% this year alone – an expected loss of about 60,000 jobs. The layoffs in Alberta's energy industry (EI) are an example of the impact of this phenomenon on the country's economy. With layoffs, unemployed workers are making more use of EI while cutting spending, while the capacity of the insurance markets is at its highest level.

In the past, OPEC was used to reacting to price fluctuations by adjusting oil production. This proved useful until Saudi Arabia decided to increase its production level, which notably fell in 2014. With oversupply from Canada and the USA (producers not part of the cartel), Saudi Arabia's export market shares have declined. Contrary to their tactics of the past, a temporary solution for OPEC could be to encourage self-sufficiency on the part of member countries. This market strategy would aim to refocus their regulatory efforts on themselves rather than on pricing.

Recently, energy futures have emerged as an extremely popular asset class for investors and fund managers (Andreasson *et al.*, 2016). The quickness in the financialization of commodity markets has also considerably augmented the numeral of market participants. In addition to being employed for hedging and speculative purposes, energy futures can also expand away from the risk of diversified stock/bond portfolios, mainly throughout financial and economic crises and bearish equity markets. Consequently, knowledge of the factors that define energy futures markets is probable to compose precious information for investors and managers.

Amongst the different commodities, crude oil is maybe the majority significant given its important responsibility in the world economy relative to other energy commodities, mainly in conditions of causing crisis (Hamilton, 1983, 2008, 2009, 2013). Moreover, crude oil is crucial for transportation, industrial and agricultural sectors, whether used as feedstock in production or as a surface fuel in consumption (Mensi *et al.*, 2014b).

Besides, crude oil market volatilities are extensively recognized to spillover to other commodity markets (Kang and Yoon, 2013; Kang *et al.*, 2016, 2017; Mensi *et al.*, 2013; Mensi *et al.*, 2014b; Mensi *et al.*, 2015; Chebbi and Derbali, 2015; Chebbi and Derbali, 2016a; Chebbi and Derbali, 2016b) and financial markets (Balcilar and Ozdemir, 2013; Balcilar *et al.*, 2016, 2017; Balli *et al.*, 2017; Gupta and Wohar, 2017; Bekiros and Uddin, 2017; Bekiros *et al.*, 2017; Berger and Uddin, 2016; Kang *et al.*, 2016; Lahmiri *et al.*, 2017; Mensi *et al.*, 2015; Narayan and Gupta, 2015).

Currently, there have been only a few studies on the impact of a surprise component in the inventory announcement on price movement and volatility. Chang *et al.* (2009) used analysts' forecasts from Bloomberg to explore the reactions of intraday crude oil futures returns to unexpected inventory changes. They find an immediate response to crude oil returns to inventory news. Moreover, they argued that the reaction is larger when the survey was made by analysts with forecast accuracy in the past.

Gay *et al.* (2009) find that the unexpected changes in Energy Information Administration (EIA) natural gas inventory reports have a significant impact on intraday futures returns immediately after a given announcement. By using a generalized autoregressive conditional heteroskedasticity (GARCH) model, Hui (2014) attempts to assess the impact of the unexpected inventory changes in the EIA report on daily crude oil returns and volatility. He finds that inventory shocks harm returns but suggests that there is no evidence of an effect on return volatility.

Chiou-Wei *et al.* (2014) examine the dynamics of US natural gas futures and spot prices around the weekly announcements by the EIA report. Results highlight an inverse relation between the unexpected inventory changes and changes in futures prices. Also, the authors find no evidence of the effect of inventory shocks other than on the date when the EIA report is released.

Halova *et al.* (2014) look at intraday data to investigate the impact of the unexpected part in EIA's crude oil inventory reports on both return and volatility. They find that energy returns respond more strongly to unexpected changes in inventory levels during the injection season than during the withdrawal season.

Recently, Ye and Karali (2016) use intraday data to study the response of crude oil returns and volatility to inventory releases by the American Petroleum Institute (API) and EIA over the short August 2012-December 2013 time period. The document that inventory shocks in both API and EIA reports exerting an immediate inverse impact on returns and a positive impact on volatility.

Miao *et al.* (2018) investigate the effect of the unexpected part of weekly crude oil inventory in EIA reports on oil futures and options prices. They show that prices strongly react to the inventory surprise on announcement day. Moreover, they find that futures return significantly decrease with positive surprises and increase with negative surprises.

Additionally, as Shrestha (2014) comments, one can anticipate price detection to occur mainly in the energy futures markets because futures prices react to new announcements quicker than spot prices have known lower transaction expenses and better ease of small selling related to energy futures contracts. Furthermore, it is supposed that the futures market volatilities predict spot market volatilities for crude oil (Baumeister and Kilian, 2014, 2015; Baumeister *et al.*, 2014, 2017). Therefore, determining the factors that drive the crude oil markets and, especially, the crude oil futures market, is of dominant significance for together investors and policymakers, which is our objective for this study through investigation of the significance of news from OPEC announcements and meeting dates.

Some previous works analyze the effect of information on OPEC production decisions on the crude oil market (Kaufmann and Ullman, 2009; Loutia *et al.*, 2016; Mensi *et al.*, 2014a; Schmidbauer and Rösch, 2012; Wirl and Kujundzic, 2004). These works suppose that this nexus is linear and test the significance of the effect. Therefore, it should be noted that one could have also used nonlinear causality tests (Diks and Panchenko, 2005, 2006; Hiemstra and Jones, 1994) to examine the influence of OPEC news and meeting date information on energy futures returns and volatility.

However, these tests rely on conditional mean-based estimation and, hence, fail to capture the entire conditional distribution of returns and volatility – something that our investigation can complete. In the process, our test is a supplementary general process to notice causality in both returns and volatility at each quantile of their conditional distributions. Consequently, we are capable to capture the presence or non-presence of causality in various energy futures, in the crude oil West Texas Intermediate (WTI), gasoline reformulated gasoline blendstock for oxygen blending (RBOB), Brent oil, London gas oil, natural gas and heating oil futures markets.

In our paper, we use a GARCH (1, 1) model, which is based on the empirical findings of Sadorsky (2006), who concludes that GARCH (1, 1) fits very well with crude oil price return and volatility. The use of the GARCH to capture the conditional volatilities of the energy futures shows the presence of a high significance of conditional movements, which can demonstrate us to distinguish the nature of the volatility dependency between OPEC news and predictability of energy futures returns and volatility. This can find clear the significance of relationship in the process of financialization of the OPEC announcements and energy futures in the case of this paper.

Besides, the use of the conditional quantile regression confirms the persistence of volatility in the conditional dependence between the OPEC news and energy future. There is one important justification, which makes that such persistence goes along with the financialization of OPEC news and energy commodities. This result is confirmed by the causality tests.

The rest of the paper is organized as follows. Section 2 lays out the basics of the econometric methodology. Sections 3 and 4 present the data and results. Section 5 concludes the paper.

2. Econometric methodology

This section describes the conditional quantile regression-based methodology. To formally study the effect of OPEC shocks on energy futures markets, we use the GARCH family of statistical processes (Bollerslev, 1986; Engle, 1982) to jointly model the conditional mean and variance of price returns.

As previously mentioned, this approach is robust to extreme values in the data and captures general nonlinear dynamic dependencies. Let Y_t denote energy futures returns (crude oil WTI, gasoline RBOB, Brent oil, London gas oil, natural gas and heating oil) and x_t denote the predictor variable. In our paper, the dummies used, in turn, correspond to OPEC meeting dates and production decisions made on those dates involving a cut, maintain or increase decision (Brock *et al.*, 1996; Hurvich and Tsai, 1989).

Then, we consider Y_t as a real-valued random variable with a cumulative distribution function $F_Y(y) = P(Y \leq y)$. The τth quantile of Y is given by:

$$Q_Y(\tau) = F_Y^{-1}(\tau) = \inf\{y : F_Y(y) \geq \tau\} \tag{1}$$

where $\tau \in [0, 1]$.

Define the loss function as $\rho_\tau(y) = y(\tau - P_{(y<0)})$, where P is an indicator function. A specific quantile can be found by minimizing the expected loss of $Y - u$ with respect to u:

$$\min_{u} E(\rho_\tau(Y-u)) = \min_{u}\left\{(\tau-1)\int_{-\infty}^{u}(y-u)dF_Y(y) + \tau\int_{u}^{\infty}(y-u)dF_Y(y)\right\} \tag{2}$$

This can be shown by setting the derivative of the expected loss function to 0 and letting q_τ be the solution of:

$$0 = (1-\tau)\int_{-\infty}^{q_\tau} dF_Y(y) - q_\tau\int_{q_\tau}^{\infty} dF_Y(y) \tag{3}$$

This equation reduces to:

$$0 = F_Y(q_\tau) - \tau \tag{4}$$

Then, the equation to:

$$F_Y(q_\tau) = \tau \tag{5}$$

Hence, q_τ is τth quantile of the random variable Y.

The notion of causality introduced by Wiener in 1956, Granger in 1969 and Sims in 1980, appears to be the basis of the analysis of dynamic relationships between time series (Li and Racine, 2004; Jeong *et al.*, 2012).

Given that Mensi *et al.* (2014a) show the effect of OPEC news on the volatility of the oil spot market, we choose to analyze the effect of this OPEC news on the volatility of energy commodities futures by first recovering a measure of conditional volatility from a GARCH (1, 1) model and then using the causality-in-quantiles test to this assess of volatility. The basics of GARCH (1, 1) model is presented as follows:

$$y_t = \mu + \varepsilon_t \tag{6}$$

$$h_t = \omega + \alpha\varepsilon_{t-1}^2 + \beta h_{t-1} \tag{7}$$

Where y_t measures the energy commodities futures return series and ε_t is the stochastic disturbance term that is assumed to be normally distributed with zero mean. The conditional variance h_t depends on the mean volatility level (ω), the lagged error (ε_{t-1}^2) and the lagged conditional variance (h_{t-1}). The decision to use a GARCH (1, 1) model is based on the empirical findings of Sadorsky (2006), who concludes that GARCH (1, 1) fits very well with crude oil price return and volatility.

3. Data

This objective of this paper is to analyze the predictive capacity of OPEC meeting dates and production announcements for six energy commodities futures (crude oil WTI, gasoline RBOB, Brent oil, London gas oil, natural gas and heating oil) market returns and GARCH-based volatility using a conditional quantile regression methodology during the period from April 01, 2013 to June 30, 2017.

Our daily data consist of OPEC variables used in predicting returns and volatilities of six energy commodities futures (crude oil WTI, gasoline RBOB, Brent oil, London gas oil, natural gas and heating oil) market. Energy futures data are sourced from Datastream of Thomson Reuters, with returns calculated as the daily logarithmic change of energy futures settlement prices multiplied by 100 to convert the returns into percentages.

OPEC news announcements are made during OPEC conferences, which occur at least double a year. The dummy variable arises constructed in terms of the type of production decisions undertaken and included them in the analysis. The data were obtained from the OPEC website (http://www.opec.org). There were 65 announcements during our period of consideration (April 01, 2013 to June 30, 2017).

Table 1 summarizes the descriptive statistics of the returns of six energy commodities futures (crude oil WTI, gasoline RBOB, Brent oil, London gas oil, natural gas and heating oil) over the period from April 01, 2013 to June 30, 2017. From this table, we can remark that on average the higher return is for crude oil WTI followed, respectively, by gasoline RBOB, Brent oil, heating oil, London gas oil and natural gas.

For the two statistics of skewness (asymmetry) and kurtosis (leptokurtic), we can remark that the two variables used in our study are characterized by non-normal distribution. The negative sign of the skewness coefficients indicates that the variable is skewed to the left and it is far from being symmetric for all variables. Also, the Kurtosis coefficients confirm that the leptokurtic for all variables used in this paper shows the existence of a high peak or a fat-tailed in their volatilities.

Based on the positive sign of estimate Jarque–Bera coefficients, we can reject the null hypothesis of the normal distribution of the variables used in our study. Then, the high value of Jarque–Bera coefficients reflects that the series is not normally distributed at the level of 1%.

Additionally, Table 2 reports the descriptive statistics of the conditional volatility of the energy futures over the period from April 01, 2013 to June 30, 2017. Then, we can remark that in means the higher conditional volatility is for London gas oil followed, respectively, by natural gas, heating oil, crude oil WTI, Brent oil and gasoline RBOB.

Table 1. Descriptive statistics of the returns of energy futures over the period from April 01, 2013 to June 30, 2017

Statistics	Crude oil WTI futures	Gasoline RBOB futures	Brent oil futures	London gas oil futures	Natural gas futures	Heating oil futures
Mean	0.023859	0.000843	0.006063	0.000190	−0.001303	0.000262
Median	0.004320	0.000549	0.000792	0.000127	0.000000	0.000000
Maximum	2.012110	2.015609	2.989895	3.008068	2.023857	2.998405
Minimum	−2.008380	−2.007232	−3.004220	−3.011824	−2.029023	−2.997241
Std. dev	0.408074	0.442137	0.472735	0.479061	1.200520	0.502125
Skewness	−0.168788	−0.007011	−0.027161	−0.003708	−0.016946	−0.013400
Kurtosis	9.182568	10.36711	11.22941	12.08568	2.291499	11.35522
Jarque–Bera	1,714.033*	2,426.522*	3,027.920*	3,690.654*	22.49376*	3121.107*
Probability*	0.000000	0.000000	0.000000	0.000000	0.000013	0.000000
Observations	1,073	1,073	1,073	1,073	1,073	1,073

Notes: This table reports the returns of the energy futures (crude oil WTI, gasoline RBOB, Brent oil, London gas oil, natural gas and heating oil), over the period of study from April 01, 2013 to June 30, 2017. Statistical significance at the 1% level is denoted by*
Source: Own elaboration

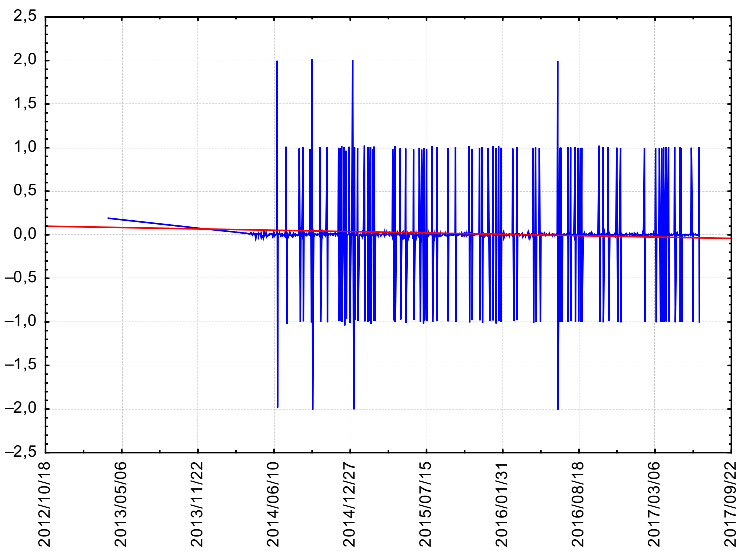
Table 2.
Descriptive statistics of the conditional volatilities of energy futures over the period from April 01, 2013 to June 30, 2017

Statistics	Crude oil WTI futures	Gasoline RBOB futures	Brent oil futures	London gas oil futures	Natural gas futures	Heating oil futures
Mean	0.224920	0.202788	0.203877	1.450375	0.253481	0.226089
Median	0.120076	0.104748	0.104522	1.501029	0.142713	0.117483
Maximum	4.366355	2.036215	2.063271	1.915823	4.033767	4.401629
Minimum	0.117797	0.083400	0.083408	0.018251	0.125083	0.110723
Std. dev	0.327739	0.261505	0.265991	0.287328	0.331635	0.349105
Skewness	6.128089	4.432570	4.444322	−2.737581	6.390406	7.303020
Kurtosis	56.17645	26.87798	26.96459	12.07254	58.25295	74.75871
Jarque–Bera	133,139.1	29,004.48	29,208.39	5,020.227	143,792.6	239,755.1
Probability*	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Observations	1,073	1,073	1,073	1,073	1,073	1,073

Notes: This table reports the conditional volatilities of the energy futures (crude oil WTI, gasoline RBOB, Brent oil, London gas oil, natural gas and heating oil), over the period of study from April 01, 2013 to June 30, 2017. Statistical significance at the 1% level is denoted by*
Source: Own elaboration

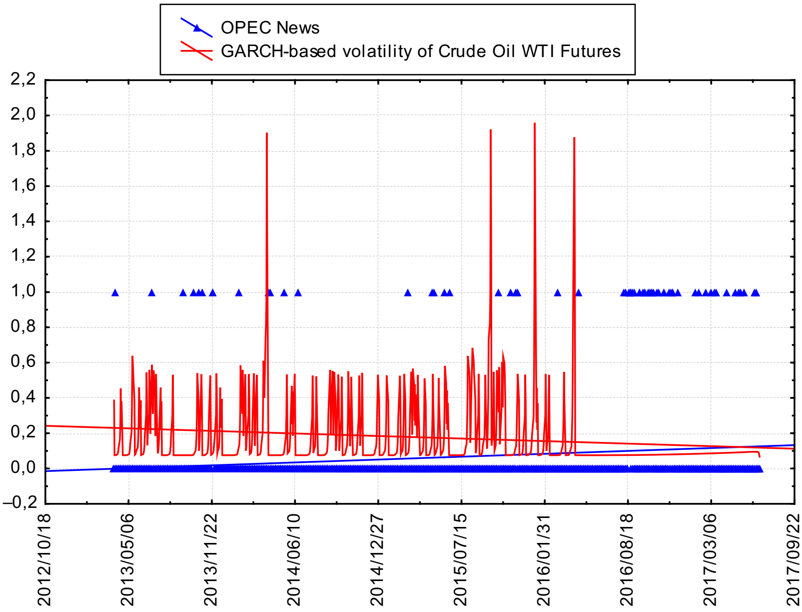
For the conditional volatility prediction by the GARCH (1, 1) model, we can find that the biggest weekly, monthly and yearly prediction is for the energy commodities followed by the energy commodities.

Figures 1-12 present the evolution of the returns and the conditional volatility prediction by GARCH (1, 1) specification of six energy commodities futures (crude oil WTI, gasoline RBOB, Brent oil, London gas oil, natural gas and heating oil) and the OPEC news over the period from April 01, 2013 to June 30, 2017.



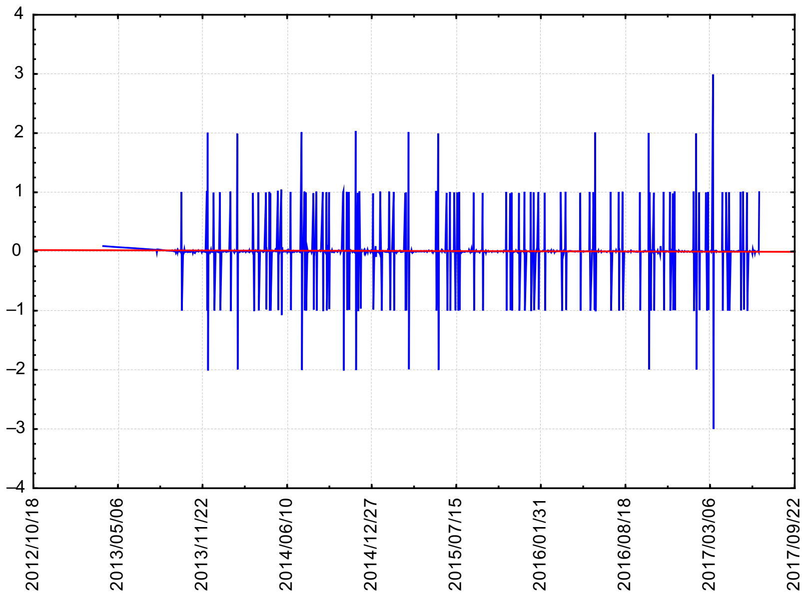
Source: Own elaboration

Figure 1. The return of the crude oil WTI futures over the period from April 01, 2013 to June 30, 2017



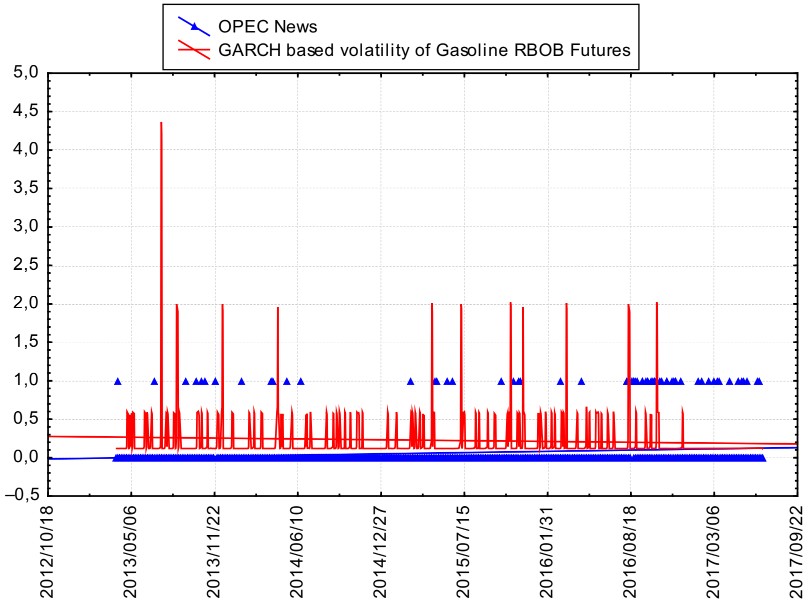
Source: Own elaboration

Figure 2.
The conditional volatilities of the crude oil WTI futures in the presence of OPEC news over the period from April 01, 2013 to June 30, 2017



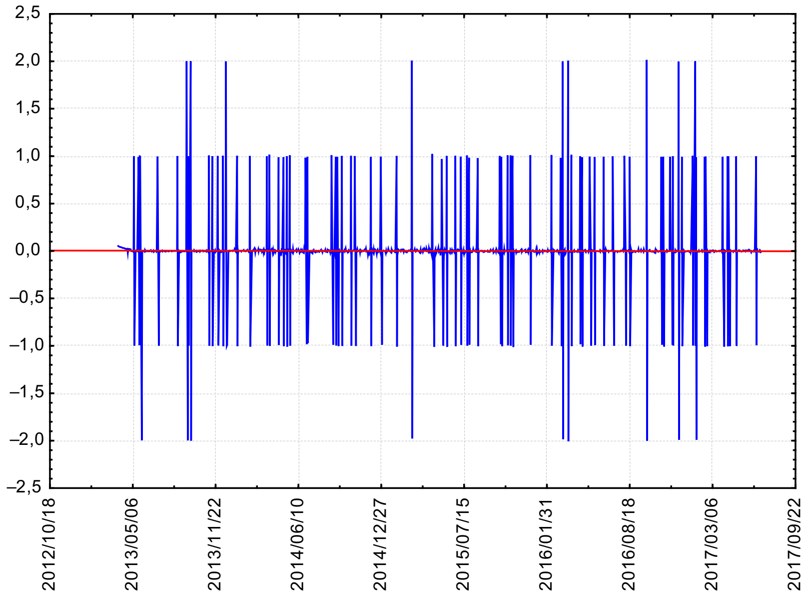
Source: Own elaboration

Figure 3.
The return of the gasoline RBOB futures over the period from April 01, 2013 to June 30, 2017



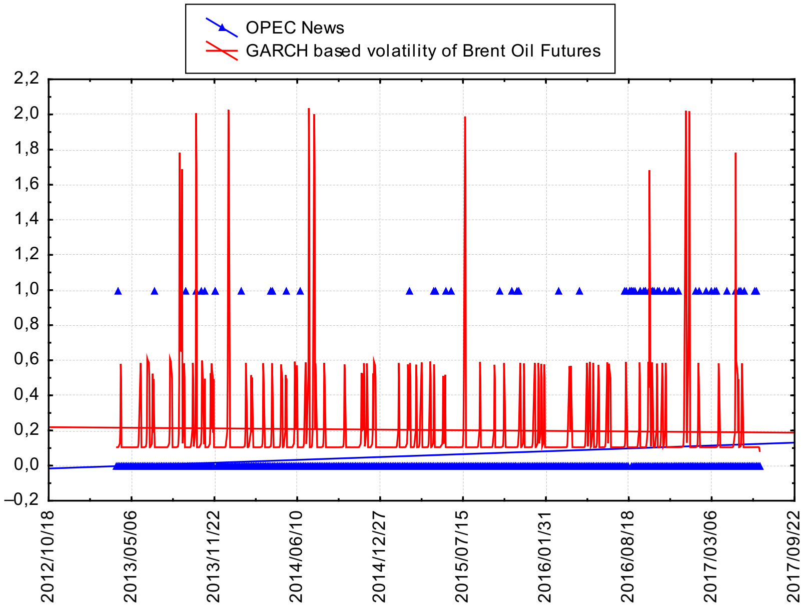
Source: Own elaboration

Figure 4.
The conditional volatilities of the gasoline RBOB futures in the presence of OPEC news over the period from April 01, 2013 to June 30, 2017



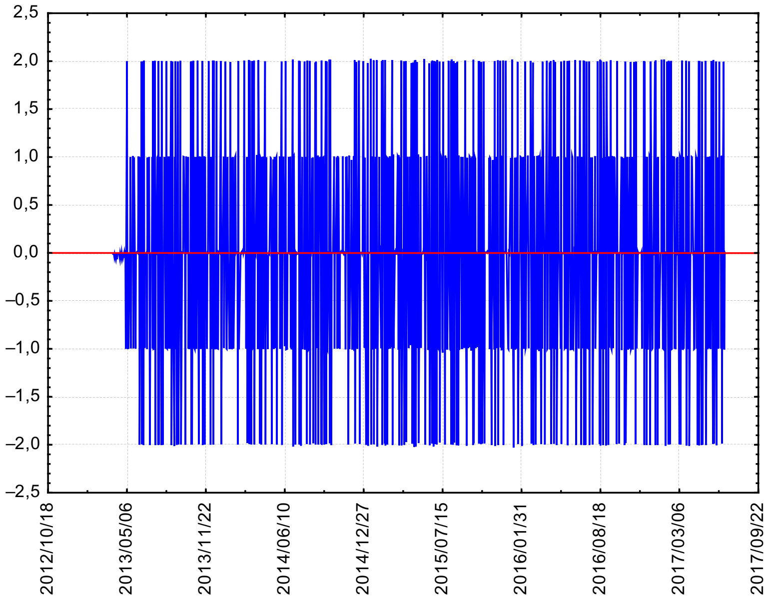
Source: Own elaboration

Figure 5.
The return of the Brent oil futures over the period from April 01, 2013 to June 30, 2017



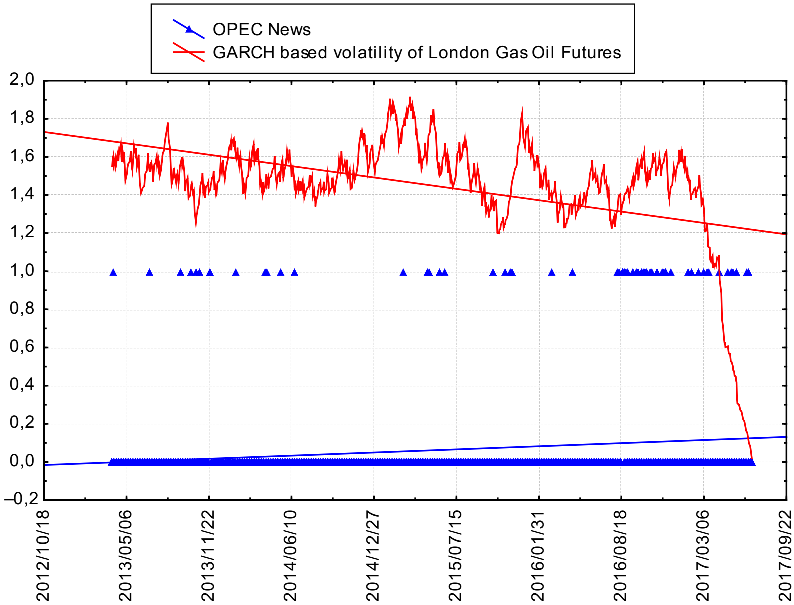
Source: Own elaboration

Figure 6.
The conditional volatilities of the Brent oil futures in the presence of OPEC news over the period from April 01, 2013 to June 30, 2017



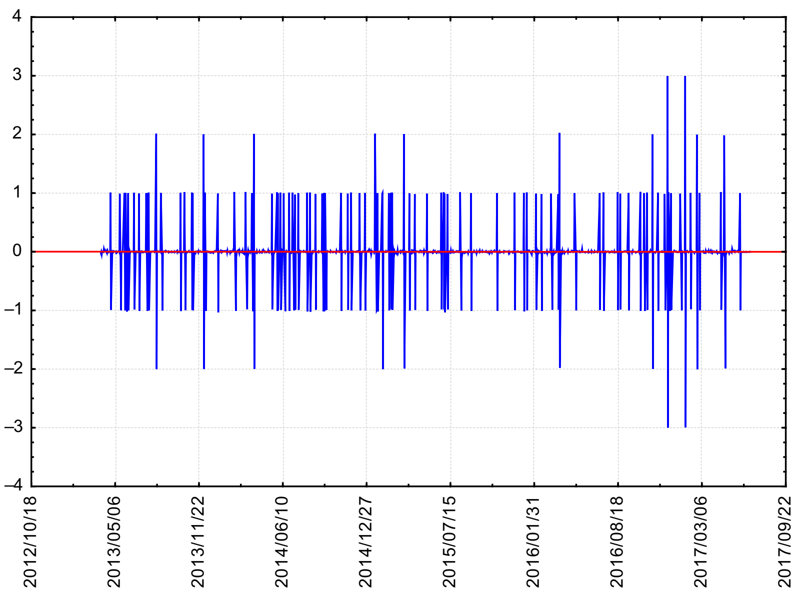
Source: Own elaboration

Figure 7.
The return of the London gas oil futures over the period from April 01, 2013 to June 30, 2017



Source: Own elaboration

Figure 8.
The conditional volatilities of the London gas oil futures in the presence of OPEC news over the period from April 01, 2013 to June 30, 2017



Source: Own elaboration

Figure 9.
The return of the natural gas futures over the period from April 01, 2013 to June 30, 2017

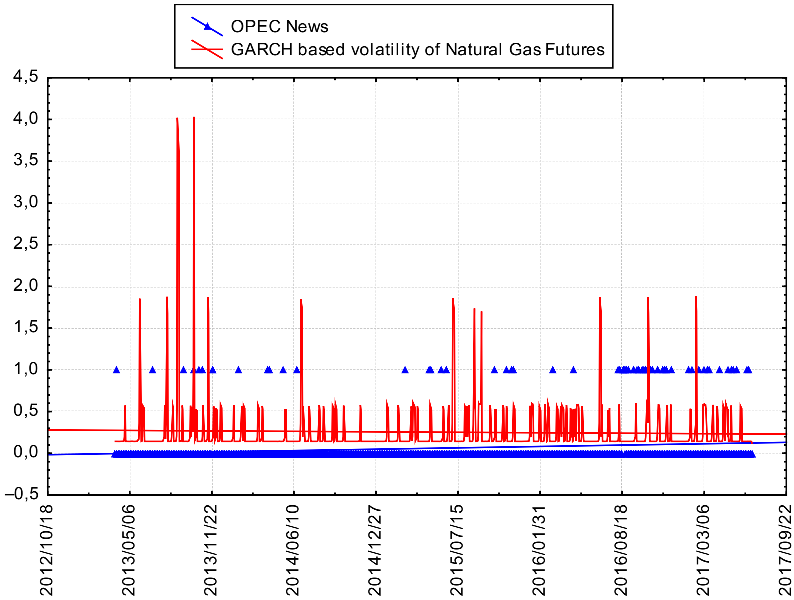


Figure 10.
The conditional volatilities of the natural gas futures in the presence of OPEC news over the period from April 01, 2013 to June 30, 2017

Source: Own elaboration

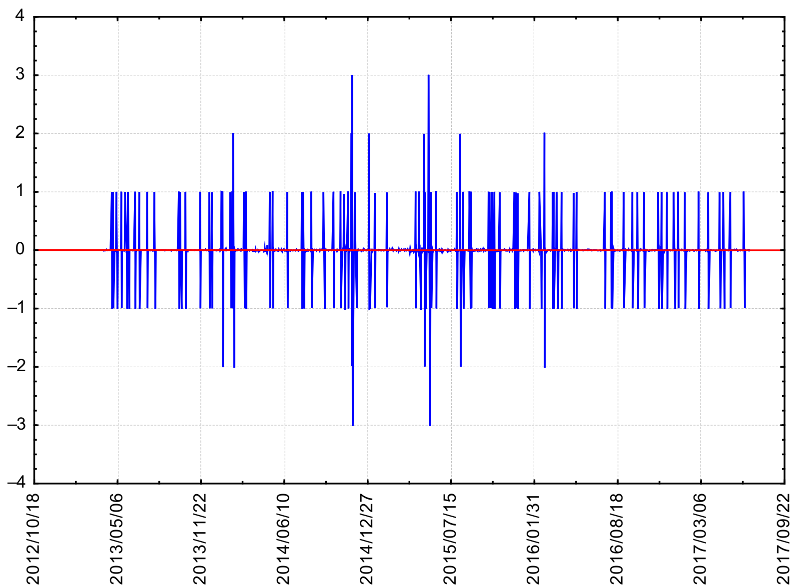
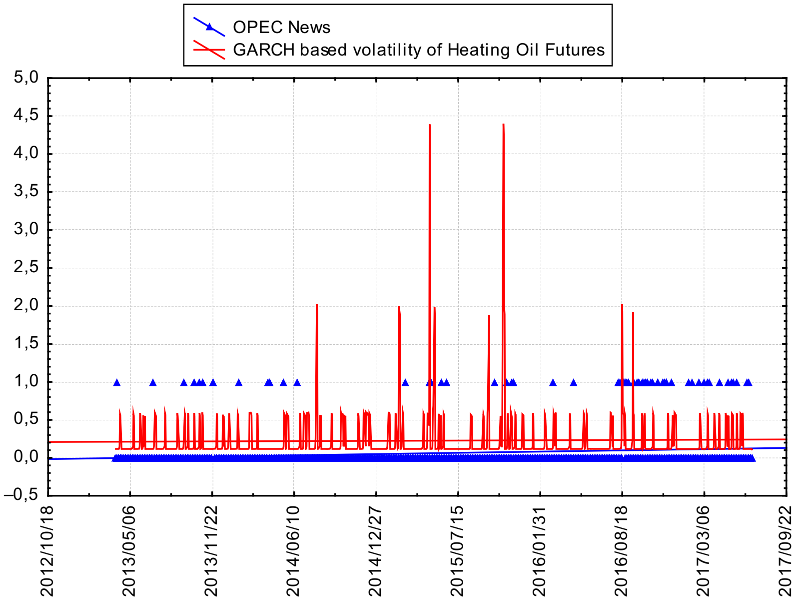


Figure 11.
The return of the heating oil futures over the period from April 01, 2013 to June 30, 2017

Source: Own elaboration



Source: Own elaboration

Figure 12. The conditional volatilities of the heating oil futures in the presence of OPEC news over the period from April 01, 2013 to June 30, 2017

According to these figures, we can observe that the conditional volatility prediction of the chosen series returns characterized by high volatilities, especially after any OPEC announcements. Also, the considered period is coinciding with the presence of an international financial and political instability followed by international liquidity and banking crises in developing and developed countries.

4. Empirical results

In this section, we investigate empirically the impact of OPEC news on energy commodities futures (crude oil WTI, gasoline RBOB, Brent oil, London gas oil, natural gas and heating oil) market returns and volatility using a conditional quantile regression methodology and causality test during the period from April 01, 2013 to June 30, 2017.

From the results of the quantile regression presented in Table 3, we can conclude that OPEC news has an important impact on energy futures. From Table 3, we can show that the OPEC news influence crude oil WTI, Brent oil, London gas oil, natural gas and heating oil futures at a level of 1%. This result implies that the presence of the OPEC news in date t affects the energy futures in date $(t + 1)$ by increasing or decreasing the value of 1%. However, for gasoline RBOB futures, we remark that the impact of OPEC news is at the level of 5%. Additionally, the quantile regression measures the impact of OPEC news on energy commodities futures in the short term.

Figures 13-18 present the evolution of the quantile process estimates for OPEC news on the energy commodities futures (crude oil WTI, gasoline RBOB, Brent oil, London gas oil, natural gas and heating oil) and the OPEC news over the period from April 01, 2013 to June 30, 2017.

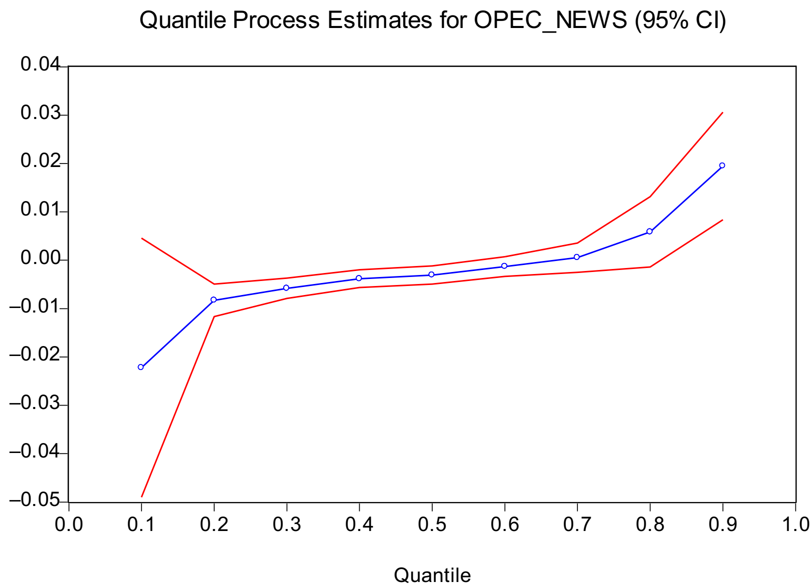
According to these figures, we can confirm the relationship between OPEC announcements and energy futures. The close dynamic dependence among daily co-movements of OPEC news and energy commodities futures, which have persisted regularly uninterrupted since the outbreak of the Iraq war, the financial crisis of 2007 and the sovereign crisis, has frayed.

For the causality test, we use this test to justify the presence of an impact of OPEC news on energy commodities futures (crude oil WTI, gasoline RBOB, Brent oil, London gas oil, natural gas and heating oil) market returns and volatilities in long term. From Table 4, we can confirm the existence of an important causality between OPEC news and energy

Table 3. Estimation results of conditional quantile regression for the energy futures over the period from April 01, 2013 to June 30, 2017

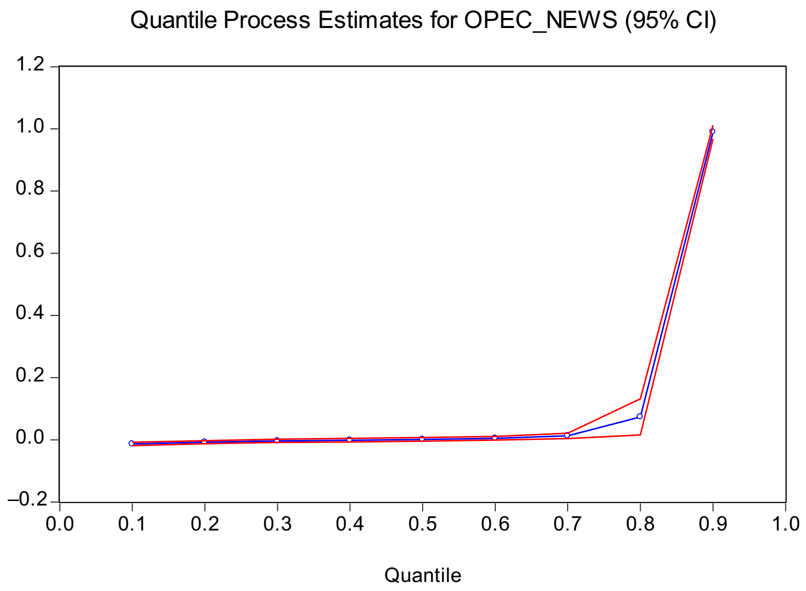
Independent variable	Energy futures	*t*-statistic	Prob.
OPEC news	BRENT_OIL_FUTURES	−3.208769*	0.0014
	CRUDE_OIL_WTI_FUTURES	−3.478114*	0.0000
	GASOLINE_RBOB_FUTURES	−2.248421**	0.0248
	HEATING_OIL_FUTURES	−5.216409*	0.0000
	LONDON_GAS_OIL_FUTURES	−3.332541*	0.0000
	NATURAL_GAS_FUTURES	−3.002135*	0.0000

Notes: This table reports estimated coefficients from conditional quantile regression. To empirically test this model, we use daily return series of six energy futures (crude oil WTI, gasoline RBOB, Brent oil, London gas oil, natural gas and heating oil) and the OPEC news over the period of study from July 22, 2010 to June 30, 2017. Statistical significance at the 1 and 5% levels is denoted by * and **, respectively.
Source: Own elaboration



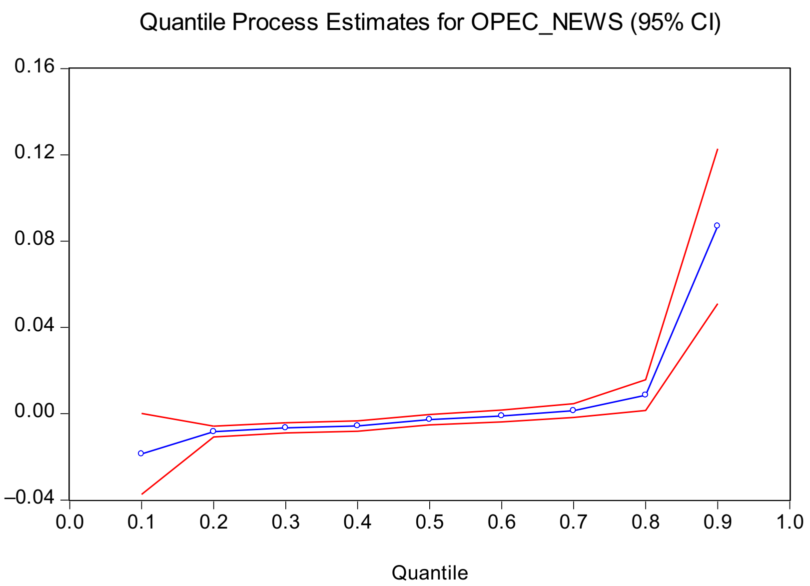
Source: Own elaboration

Figure 13. The quantile process estimates for OPEC news on the Brent oil futures over the period from April 01, 2013 to June 30, 2017



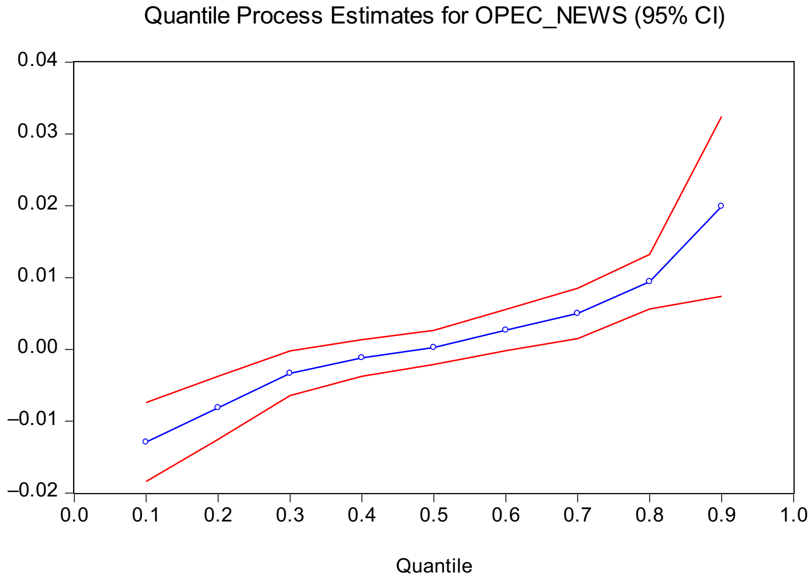
Source: Own elaboration

Figure 14.
The quantile process estimates for OPEC news on the crude oil WTI futures over the period from April 01, 2013 to June 30, 2017



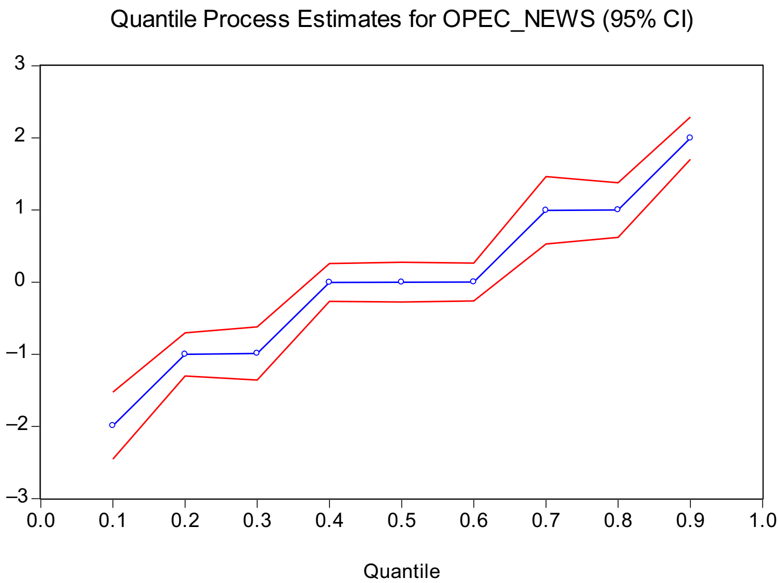
Source: Own elaboration

Figure 15.
The quantile process estimates for OPEC news on the gasoline RBOB futures over the period from April 01, 2013 to June 30, 2017



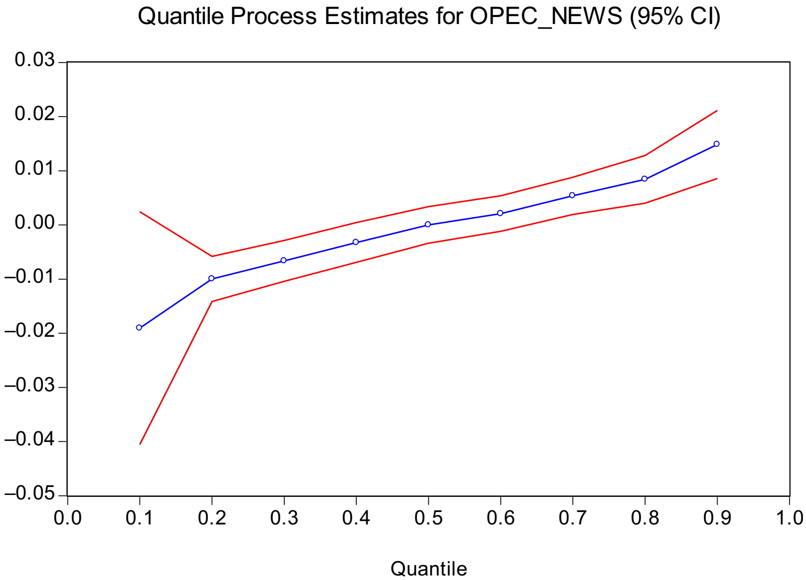
Source: Own elaboration

Figure 16.
The quantile process estimates for OPEC news on the heating oil futures over the period from April 01, 2013 to June 30, 2017



Source: Own elaboration

Figure 17.
The quantile process estimates for OPEC news on the London gas oil futures over the period from April 01, 2013 to June 30, 2017



Source: Own elaboration

Figure 18.
The quantile process estimates for OPEC news on the heating oil futures over the period from April 01, 2013 to June 30, 2017

Null hypothesis	Obs	F-statistic	Prob
NATURAL_GAS_FUTURES does not Granger cause OPEC_NEWS	1,071	1.15315	0.3160
OPEC_NEWS does not Granger cause NATURAL_GAS_FUTURES		5.37526*	0.0000
LONDON_GAS_OIL_FUTURES does not Granger cause OPEC_NEWS	1,071	2.30123	0.1006
OPEC_NEWS does not Granger cause LONDON_GAS_OIL_FUTURES		4.13189*	0.0000
HEATING_OIL_FUTURES does not Granger cause OPEC_NEWS	1,071	0.87632	0.4166
OPEC_NEWS does not Granger cause HEATING_OIL_FUTURES		4.24030*	0.0000
GASOLINE_RBOB_FUTURES does not Granger cause OPEC_NEWS	1,071	0.50636	0.6028
OPEC_NEWS does not Granger cause GASOLINE_RBOB_FUTURES		5.59009*	0.0000
CRUDE_OIL_WTI_FUTURES does not Granger cause OPEC_NEWS	1,071	1.32987	0.2649
OPEC_NEWS does not Granger cause CRUDE_OIL_WTI_FUTURES		5.42626*	0.0000
BRENT_OIL_FUTURES does not Granger cause OPEC_NEWS	1,071	0.08951	0.9144
OPEC_NEWS does not Granger cause BRENT_OIL_FUTURES		5.74415*	0.0000

Notes: This table reports estimated coefficients from causality tests. To empirically test this model, we use daily return series of six energy futures (crude oil WTI, gasoline RBOB, Brent oil, London gas oil, natural gas and heating oil) and the OPEC news over the period of study from July 22, 2010 to June 30, 2017. Statistical significance at the 1% is denoted by*
Source: Own elaboration

Table 4.
Estimation results of the causality test between the OPEC news and the energy futures over the period from April 01, 2013 to June 30, 2017

futures. We observe the presence of a unidirectional relationship between OPEC news and energy commodities futures at a level of 5%. This result implies that the OPEC announcements influence the returns and volatilities of the energy futures in the long term.

Finally, the above findings lend empirical support to the hypothesis that OPEC information surprises are likely to be an important determinant of energy commodity prices. In fact, with a one-day window, our results also contribute to the growing literature on asymmetrical responses of energy market prices to inventory news. We document also that the response of these markets depends crucially on the size of the study window through which announcements may affect the return. Finally, we find novel evidence of the heterogeneity in the responsiveness of futures price volatility to inventory surprises.

5. Conclusion

This paper provides an important perspective to the predictive capacity of OPEC news dates and production announcements for energy commodities futures (crude oil WTI, gasoline RBOB, Brent oil, London gas oil, natural gas and heating oil) market returns and GARCH-based volatility using a conditional quantile regression methodology and causality tests over the period from April 01, 2013 to June 30, 2017.

From the empirical results, we conclude a conditional dependence between energy futures returns and OPEC-based predictors; hence, we can find clear the significance of relationship in the process of financialization of the OPEC announcements and energy futures in the case of this paper.

From the quantile-causality test, we find that the effect of OPEC news is important to energy futures. Specifically, OPEC announcements dates predict the quantiles of the conditional distribution of energy futures market returns.

Finally, we confirm the presence of unidirectional nexus between OPEC news and energy commodities futures (crude oil WTI, gasoline RBOB, Brent oil, London gas oil, natural gas and heating oil) in long term.

The findings are expected to entail important practical and policymaking implications for several reasons. For policymakers, the link between OPEC news and energy futures markets need to be taken into account. Moreover, the results provide useful insights for producers and consumers of energy whose prices are being affected by unexpected inventory levels. The findings are also useful for dynamic portfolio choice, as part of the fluctuations in the commodity futures prices corresponds to the variation in the surprises. Understanding the dynamics of energy volatility and their major determinants, namely, inventory announcements, can be beneficial for traders in their arbitrage opportunities given that volatility is a key in the pricing of derivatives (Lee and Zyren, 2007).

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Corresponding author
Abdelkader Derbali can be contacted at: derbaliabdelkader@outlook.fr