OPEC Announcement and Stock Market

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ABSTRACT

The purpose of this research is to analyze the relationship between OPEC announcement and its impact to crude oil's stock market returns for the US market and Texas companies. OPEC is a twelve country alliance that has as much as sixty percent of the global market share for crude oil. Naturally, investors in the oil industry would speculate what impact of the OPEC announcements of oil supply would have on the price of oil and the returns of the companies that operate in this sector. This research builds on the existing literature of using event study methodology to investigate the effects of OPEC's announcements on crude oil stock market returns. We examine the OPEC announcement during Jan. 2001- Dec. 2015 and its impact on and crude oil's stock market returns for the US market and Texas companies. Our results are showing that OPEC's announcements do manipulate the market by speculators anticipating the change the supply of oil and that there is a negative correlation present between the announcements and crude oil stock returns.

Keywords: OPEC, Crude oil price, Stock market， Announcement， WTI

INTRODUCTION

The world's crude oil market has had a long history of volatility. Economic factors, wars, and natural disasters are looked at as a few of the main causes for the volatility in this industry. Another major factor that many are unaware of is the cartel like influence of the Organization of the Petroleum Exporting Countries or OPEC. OPEC is a twelve country alliance that meet in Austria for conferences to set production quotas for the supply side of the market. What many people do not realize is that OPEC has as much as sixty percent of the global market share for crude oil. With such a huge percent of the market share, in theory, they can manipulate the supply of oil. Since OPEC holds so many conferences throughout the year they often announce their production decision at the close of the conference. Because of these announcements many investors in the oil industry begin to speculate what effects these announcements will have on the price of oil and the returns of the companies that operate in this sector. Since the speculation seems to effect the industry the objective of this paper is to determine whether OPEC's production announcements have a negative or positive effect on stock market returns for the United States and Texas region during Jan. 2001- Dec. 2015 and whether they can manipulate the market with these announcements. This paper will provide important research to add to the existing literature over event study methodology and also about the correlation between OPEC's announcements and crude oil's stock market returns for the US market and Texas companies. Discovering this information from the research can hopefully show the negative or positive effect from OPEC's announcement decisions towards United States and local communities during Jan. 2001- Dec. 2015. With this knowledge oil dependent community leaders can then decide if diversifying the industries the community rely on is in the best interest of the city.

LITERATURE REVIEW

Since the beginning of the 21st century many scholars have continued conducting a multitude of studies on the effects that the announcements by the Organization of the Petroleum Exporting Countries has had on the global financial markets. Some researchers have even studied the overall effect OPEC has on the financial market, if any manipulation occurs at all (Kaufmann et al. 2004). One of these literary articles discusses the use of a Co-integrating Relation for real oil prices. By using variables (quota, cheat, etc.) that represent market conditions they can estimate a model for real oil prices. The results found in this study by using Co-integrating Relation was that OPEC did in fact have considerable power over price because of decisions about quotas, production, and operable capacity. But because OPEC has power doesn't mean that they exercise this power the same way each and every time. Their behavior is manipulated by market conditions at the time and the decisions they make may not be able to be represented by a single model according to Kaufmann et al. 2004. The second one of these articles discusses whether or not crude oil price volatility is because of a cyclical effect or actual market manipulation by OPEC. This examination into the topic concludes that when OPEC continues production they can make prices fall but they when they do this it is because they are merely protecting their market share in this industry and not manipulating prices. The research conducted shows that supply and demand of the market at hand plays the main factor in price volatility and because of OPEC's low overhead for extraction of oil they are able to continue production even when non-OPEC countries flood the supply of oil in the market.

The most beneficial literature in the research over this topic is the work done with event study methodology over the impact of announcements by OPEC to the financial markets (Loutia et al. 2016; Mensi et al. 2014; Schmidbauer and Rosch 2012; Guidi et al. 2006; Lin and Tamvakis 2010; Demirer and Kutan 2010). Among all of these case studies there are slight differences between them but they all investigate whether or not the announcements coincide with a change in volatility. For instance, in Guidi et al. (2006) they decided to split the period of the study into two groups, non-conflict years and conflict years, to study if the US and UK stock markets are efficient when OPEC makes a decision to "cut", "maintain", or "hike". In doing this they find that in non-conflict periods the stock market for both countries is efficient with US proving to be more efficient than the UK. But during conflict periods they have an asymmetric reaction to OPEC's announcements, which shows a lack of efficiency during these times.

The next article that resulted in important information was Demirer and Kutan's (2010) research where they looked at US Strategic Petroleum Reserve (SPR) and OPEC announcements and how the coincided with spot and future prices between 1983-2008. In doing so they found positive significant abnormal return (CAR) differences when OPEC cut production after an announcement, some significant abnormal return (CAR) difference when OPEC maintained production and no significant abnormal return when OPEC increased production. Also they found no correlation between the announcements of the SPR and abnormal returns. In the same year Lin and Tamvakis (2010) also had an event study where they compared OPEC's announcements on a diversity of different oil grade qualities. Although they did not find any difference between the different grades of oil their research did find that the evidence showed that the effect of the announcements depended upon production quotas and price trends. In this study they didn't use any model to calculate abnormal returns but instead used average daily returns, which is similar to what my research study will use.

Two years later Schmidbauer and Rosch (2012) would use GARCH to determine if the effect of the decisions by OPEC was before or after the event date. In their study over the years of 1986-2009 they conclude that investors in the markets can be anticipated because data shows a positive effect before the event date with an asymmetric effect on expected returns after the decision is announced. After another two years a group of scholars would enrich the knowledge compiled since the millennium.

Mensi et al. (2014) would study an event study methodology by using ARMA-GARCH to accommodate for structural breaks in crude oil markets over the period in question. From the years of 1987-2012 they investigated the impact of announcements on volatility for the WTI and Brent markets. What they found in their research was that OPEC 's "cut" or "maintain" decisions are anticipated and the volatility that is recorded can be diminished once we account for the structural breaks. Also because of the anticipation there are opportunities to take advantage of but they will bring on speculation by investors every time OPEC makes an announcement.

Most recently Loutia et al. (2016) completed another type of event study. They also used a GARCH type model but theirs was an EGARCH to accommodate the high volatility of oil prices and the facts about the 2008 sharp fluctuations of this volatility. Doing this they divided 1991-2015 into two periods starting period two in 2005 since the second period was much more turbulent. After completing this research they contributed to literature that OPEC has a major role in the oil prices of the financial markets. What they found was that OPEC was less influential during periods when oil prices are high. But keeping the oil prices low would hurt their member's revenues. Since OPEC has some countries that need the price to stay high to earn they have conflict between members on what decisions to make. Also it was found that oil prices

respond differently to quota changes. When they cut production they have a significant abnormal return but vice versa when the increase production. These decisions also have a different effect when price is already high or low.

Through out all these scholar's researches it seems that most of them all depend on what decisions are made by OPEC (cut, maintain, or increase) and the Brent crude oil index, which determines the global effects on crude oil by OPEC. For the purposes of this research we have limited the data down to United States and Texas areas by using historical data over WTI crude oil spot price and oil companies that operate mainly in Texas to create indices. These indices will help narrow down and compare crude oil stock return for United States and Texas regions.

METHODOLOGY

The data gathered for this research was from a number of reputable sites. The first data collected was being obtained on OPEC's official site for the announcement day history located in the OPEC bulletin. Through the digital version of the OPEC Bulletin each time a conference was held they had an article in the corresponding issue that would sum up the production decision that was agreed upon. Then we would make a log in a journal that would keep track of the decision and the date of the announcement. The next site used was the United States Energy Information Administration for the historical WTI crude oil spot price since there was no historical index available for WTI crude oil. We also used Yahoo Finance for the historical data on each company's stock prices. The companies selected were Anadarko, Pioneer, Apache, Haliburton and Occidental since each one of these companies operates primarily within Texas and are headquartered inside of Texas's boarders.

The data of oil price is from the Energy Information Administration, and we calculate an index return for the United States by using the WTI spot price.

Formula for Indices: ((NEW Spot Price - Old Spot Price)/ Old Spot Price)=Stock Return Data

We located the five Texas companies discussed earlier on Yahoo Finance that are headquartered and operate mainly in Texas and used the price-weighted method to create the index for the Texas region. To calculate the price-weighted index we summed up the value of the five companies per day to get an index value. Then using the same formula implemented for WTI we then calculate the return for the Texas region.

With both indices complete for the period of January 2001-December 2015 we pinpoint and mark each announcement day that was logged in a journal and record whether the announcement decision by OPEC was to cut, maintain, or increase production.

Similar to Lin and Tamvakis (2010) we use a 20-day event window to calculate average return. The reason we use a 20-day event window is because if you extend the day much more then you start to pick up on other speculative behavior that affects the crude oil industry. We apply this window by summing up the daily returns for ten days before and summing up returns for ten days after the OPEC announcement. Then we calculate average return for before announcement by dividing the before sum by 10 and also calculate the after announcement by dividing the after sum by 10. This process will be done for both the WTI returns and the Texas returns.

After finding the average returns for both indices we then organize the newly acquired data into three separate variables depending on cut, maintain, or increase announcements. After sorting out the production decision into the three groups we then organize the data into ascending order by date. We also organize the data into four categories that include 10 days before the announcement return data and 10 days after the announcement return data for both the United States index and Texas index.

Finally we then calculate a cumulative average return to determine whether OPEC's production announcements have a negative or positive effect on stock market returns for the United States and Texas region during Jan. 2001- Dec. 2015.

In completing the creation of both indices and using the event study methodology we can assess the magnitude that OPEC's announcements have on daily returns during the period of Jan. 2001- Dec. 2015. It is also important to realize that this project did not examine stock market return changes based off of the amount of production change that was announce but just the direction of the change (Cut, Maintain, Increase).

RESULTS

During the period of January 2001-December 2015 the price for crude oil have fluctuated for a number of reasons including but not limited to wars, natural disasters, human errors, etc. Even with these factors the stock market will always continue to operate. In this study we are solely focused on the market returns on crude oil for the United States region and Texas sub-region of the industry when an Organization of the Petroleum Exporting Countries (or OPEC) announcement is made. As discussed in the method portion of this paper we calculate an index for both the United States and Texas area.

Announcement Date	TEXAS Before	TEXAS After	US Before	US After
12/12/02	0.756766805	-0.322953112	0.184965574	1.507154955
1/13/03	-0.364981647	-0.12930289	-0.278026854	0.232733749
6/3/04	0.221088331	0.76083008	-0.020745264	-0.134317904
9/15/04	0.450764035	0.633947791	0.558731982	1.237174071
3/16/05	0.072658962	0.082609677	0.642769412	-0.098205894

6/15/05	0.579076806	0.128945905	0.584796379	0.316650364
9/20/05	0.658498477	-0.296120719	0.081564781	-0.367289314
9/11/07	0.357194895	0.592754896	0.862310856	0.391519791
(Increase) Total Avg	0.341383333	0.181338954	0.327045858	0.385677477

After running the calculations, we find that when OPEC makes an announcement to increase production of crude oil supply the actual direction of return movement is not always constant. But when looking at the total average returns from before the announcement is made cause a 16 percent drop to the sub-region of Texas, as seen in Figure 1. This 16 percent drop means that on average when OPEC announces that they will increase production, Texas companies' stock prices tend to drop. As simple economics explains when the supply of a commodity is increased the demand isn't there to find equilibrium and prices must drop to naturally settle. Because of the new low cost in crude oil and the high price of overhead to produce crude oil in Texas these companies suffer like the data shows. But inversely when the announcement for and increase is made the companies that are more diversified out of Texas' oil shell area in the United States gain value to their stock price on average of 5.9 percent, as seen in Figure 1. This diversification is normal with large companies like Exxon and Chevron that have locations in Texas but also have locations in Africa, South America, North Sea and etc. Since these large companies are operating in other areas around the world when these announcements are made the impact of the potential over supply doesn't affect them as much because they have places where they can drill for crude oil with less overhead on operation.

Increase Announcements (Figure 1)

Next we observe the occasions when OPEC decides to announce a cut in production. When this production announcement is made we can see a significant increase in stock prices for oil companies in both the United States and the Texas sub-region. For instance, in Figure 2 the Texas index total average shows an 8 percent increase. This increase is quite a significant jump in the return for Texas. The reason for this jump is the opposite effect that happens when an increase is announced. Since the announcement indicates a cut in the global supply of crude oil the price for oil will increase since a shortage is likely to occur. Because of the increase in crude oil price the overhead for Texas companies does not cut into the profits as much, which keeps the margin at a better level for business to operate. While Figure 2 also shows that the United States index shows a 40 percent increase after an announcement is made. This increase is a huge jump compared to all the other return calculations, but still similar to the increase in the Texas index.

Cut Announcements (Figure 2)

Announcement Date	TEXAS Before	TEXAS After	US Before	US After
1/17/01	-0.539088966	-0.205341065	1.035890068	-3.530050612
3/16/01	0.1206712	-0.231314137	-0.432723519	-0.09404593
7/3/01	-1.261767947	-0.816107434	-0.548020025	-0.615843133

11/14/01	0.020231463	-0.251819716	-0.075894253	0.033537937
4/24/03	0.256308314	-0.233463517	0.096216937	-0.172652399
9/24/03	0.094070672	0.176861741	-0.780368337	0.499760648
2/9/04	-0.784327874	0.0927819	-0.709413402	0.864989623
3/31/04	0.100732473	0.434525869	-0.309322513	0.568052848
12/10/04	-0.477809949	0.046808223	-1.339791308	0.184232047
10/20/06	0.727201441	0.269201551	-0.235535972	0.324006041
12/14/06	-0.230402303	-0.621096948	-0.175878665	-0.257555955
10/24/08	0.30222605	1.312075586	-2.383066695	-0.206486829
12/17/08	0.995591125	0.646473061	-0.564533132	1.755406701
6/14/12	-0.161100877	-0.257243793	-0.601671634	-0.733960596
(Cut) Total Avg	-0.059818941	0.025881523	-0.501722318	-0.098614972

Maintain Announcements (Figure 3)

Announcement Date	TEXAS Before	TEXAS After	US Before	US After
6/5/01	-0.470613107	-0.912010334	-0.591309063	-0.112410473
9/27/01	-2.541976075	1.799781868	-1.918569195	0.321795977
3/15/02	0.557002306	0.26337186	1.1827334	0.929350831
6/26/02	0.674339222	-0.876464081	0.75331819	0.306929863
9/18/02	0.104025017	0.589126879	0.483122029	0.348566522
3/11/03	-0.104860886	-0.166196738	0.001083208	-0.745814605
6/11/03	-0.163397087	-0.374629543	0.841647303	-0.133237424
7/31/03	-0.171737994	0.442067616	-0.146676201	0.121047744
12/4/03	0.397814615	0.816294483	-0.322226649	0.783467503
1/31/05	0.510117005	0.452400346	-0.186983092	-0.143952915
12/12/05	0.108532421	-0.559493882	0.19327517	-0.526310712
1/31/06	0.526758456	-1.244771019	0.700401104	-1.279048718
3/8/06	-0.583884989	-0.005817645	0.079868454	0.014800454
6/1/06	-0.086507012	-0.272677527	0.297606073	-0.029752481
9/11/06	-0.552795054	-0.359884349	-0.820019154	-0.719004317
3/15/07	0.072139188	0.623820299	-5.933907797	1.416889691
12/5/07	-0.165543438	0.350585333	-0.78429621	0.436884916
2/1/08	-0.245264475	0.417561511	0.103385499	0.726360988
3/10/08	0.439608385	-0.031951279	0.618672574	-0.550921597
9/10/08	-1.551685571	0.590271202	-1.042343278	0.689232796

3/16/09	0.513015432	0.391815146	0.653421747	0.317084776
5/28/09	-0.226421605	0.655279373	0.78096236	1.134140496
9/10/09	0.240923985	0.307612373	-0.023610916	-0.86324106
12/22/09	0.78281216	0.508699828	-0.149061734	1.184618699
3/17/10	0.235245558	-0.076637921	0.272538996	0.071893105
10/14/10	0.723196729	-0.301606586	0.65696179	-0.039394685
12/13/10	0.759694168	0.117795353	0.470546893	0.319875724
6/8/11	-0.004788487	-0.112404138	0.225659174	-0.571090851
12/14/11	-0.090589423	0.530899455	0.053103602	0.500485847
12/12/12	0.102791611	-0.020375601	-0.162943186	0.523540603
5/31/13	0.287530521	0.262774411	-0.035976165	0.626283267
12/4/13	-0.226405505	-0.32585734	0.304258813	0.066390751
6/11/14	0.529524044	0.342016472	0.026059088	0.191960599
11/28/14	-0.463448192	-0.768763638	-0.442003834	-1.272746299
6/5/15	-0.141348674	-0.394140796	-0.137163273	0.098206823
12/4/15	-0.286930004	-1.40929998	0.100351096	-1.37315691
(Maintain) Total Avg	-0.014253521	0.034699761	-0.108280922	0.076936804

Finally we look at when OPEC decides to make an announcement for maintaining production. For the Texas area companies there is a 4 percent increase when a maintain announcement is made, as shown in Figure 3. This increase is similar to the effect a cut announcement has on the market. This is because when the market has no expected change the price will either stay the same or increase since a flood of supply will not be introduced to the market. Now when a maintain production announcement is made the United States index return data shows that these companies stock price will increase 17 percent, as shown in Figure 3. This increase is also similar to the United States cut production decision where a huge jump in return was present. After looking at all decisions (cut, increase, and maintain) it is shown by the data that crude oil indices follow the principles of supply and demand economics. What needs to be taken into account is the fact that no actual change in supply is happening but these changes in return are reacting to announcement of future production changes. Since the speculative nature of the stock market is present it shows that there is a correlation between OPEC announcements and stock indices returns.

CONCLUSION

This research builds on the existing literature of using event study methodology to investigate the effects of OPEC's announcements on crude oil stock market returns. While there are still many factors that can sway the price of crude oil to be a volatile commodity such as wars, natural disasters, acts of terrorism, human errors, etc. The use of the event study methodology has shown that we can measure to a degree of accuracy that OPEC's announcements do affect crude oil stock market returns. For instance, when they decide to increase production they affect the supply of crude oil globally causing a surplus, which in turn will lower prices to find a natural equilibrium.

Even though this study didn't measure actual production changes and just used the event of an announcement it was still surprising to see a correlation between returns on the indexes and announcements. According to our results, the Texas companies take a large 16 percent hit when this happens. As discussed in the result section this is most likely due to the price of operation in the area compared to companies that are more diverse with operations throughout the country and globe with cheaper overhead to extract the oil. The most interesting results are when OPEC decides to announce no change (maintain). This is intriguing because even thought the announcement is stating that the supply won't go up or down there is still an increase in the return for both Texas and the United States Indices. What should of occurred is that OPEC has not manipulated the supply side of supply and demand economics and has allowed the market to find a natural equilibrium but for whatever reason on average there was a increase in returns for both indexes. Next was the announcement when OPEC decides to make a cut in production which shows that companies in both United States index and Texas area index benefit from the announcement and see a rise in their stock returns. This is because the announcement of the cut in the global supply of crude oil causes the price to rise in anticipation of a shortage in supply.

After running the results it is showing that OPEC's announcements do manipulate the market by speculators anticipating the change the supply of oil and that there is a negative correlation present between the announcements and crude oil stock returns. With this knowledge it is apparent that since OPEC has a cartel-like sway on the crude oil sector that communities should look into diversifying their town. After implementing this recommendation into the community these cities will have a better chance of withstanding downturns caused by the manipulation of OPEC's announcements. We believe that while this research conducted does show the effects of OPEC's announcements on the crude oil market further research should be looked into to account for both wars in the Middle East, the Great Recession of 2008, and natural disasters that affected large portions of the population. Because of these other factors mentioned the time period chosen seemed to show a lot of volatility. Once we account for these factors we can gain a better understanding of the effect that OPEC has on the crude oil market. But to do this we would need a more complex model to follow but there would be huge benefits for local communities in Texas. In closing with the model of average returns used in this research we found that OPEC does have the ability to manipulate returns for the United States crude oil market and the crude oil market for the sub-region of Texas.

REFERENCES

Conference Notes. OPEC Bulletin (From January 2001 to December 2015).

Demirer, R., & Kutan, A. M. (2010). The behavior of crude oil spot and futures prices around OPEC and SPR announcements: An event study perspective. Energy Economics, 32(6), 1467-1476.

Energy Information Administration: WTI Spot Prices. (n.d.). Retrieved from https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=RWTC&f=D

Guidi, M. G., Russell, A., & Tarbert, H. (2006). The effect of OPEC policy decisions on oil and stock prices. OPEC Review, 30(1), 1-18.

Kaufmann, R.K, S. Dees, P. Karadeloglou, and M. Sanchez (2004). Does OPEC matter? an econometric analysis of oil prices The Energy Journal 25(4):67-90.

Lin, S. X., & Tamvakis, M. (2010). OPEC announcements and their effects on crude oil prices. Energy Policy, (38), 1010-1016. Retrieved from www.elsevier.com/locate/enpol.

Loutia, A., Mellios, C., & Andriosopoulos, K. (2016). Do OPEC announcements influence oil prices? Energy Policy, 90, 262-272.

Mensi, W., Hammoudeh, S., & Yoon, S. (2014). How do OPEC news and structural breaks impact returns and volatility in crude oil markets? Further evidence from a long memory process. Energy Economics, 42, 343-354.

Schmidbauer, H., & Rösch, A. (2012). OPEC news announcements: Effects on oil price expectation and volatility. Energy Economics, 34(5), 1656-1663.

Yahoo Finance - Business Finance, Stock Market, Quotes, News. (n.d.). Retrieved from http://finance.yahoo.com/