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The Moderating Effect of OPEC and Non-OPEC on the Relationship Between Oil Price Volatility and Accrual Earnings Management in the Oil and Gas Industry

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ABSTRACT

This study is an empirical examination on the relationship between oil price volatility and earnings management in the oil and gas industry, moderated by dominant-firm, OPEC (Organization of Petroleum Exporting Nations), and fringe competition of Non-OPEC countries. This study tests current and non-current accruals as the proxy of accrual earnings management. A total sample of 209 firm-year observations from 2008 to 2018 of listed oil and gas firm collected from the Thomson Data stream database. To proxy the moderation effect, the samples divided into two sub-groups, OPEC and Non-OPEC. The initial results show that, overall, the interaction effect between OPEC/Non-OPEC and oil price volatility is significant to discretionary and income-decreasing discretionary accrual. This study contributes to existing earnings management literature regarding political cost, which remains a significant concern to oil and gas companies worldwide.

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1. Introduction

Oil price volatility and its significant effect on the oil market has been an essential subject of academic interest. Many macroeconomic factors trigger oil price volatility, such as oil supply- oil demand, market speculation, geopolitical events, natural disasters (Kaufman et al.,2008; Florini and Sovacool, 2009; Martina et al., 2011). One of the frequently cited macroeconomic factors is the influence of OPEC (Organization of Petroleum Exporting Countries) as a unified group, widely viewed as the market power and Non-OPEC oil producers as the fringe competitors in the oil market (Rolf Golombek et al.,2018; Fattouh,2012; Bremond et al., 2012).

OPEC member countries generate about 40 percent of the world's crude oil, and their oil exports roughly represent 60 percent of the total oil exported in the world (Energy Information Administration, 2019). The extent of OPEC's available production and spare capacity generally used as an indicator of influence on crude oil prices (Energy Information Administration, 2019). Given OPEC's market significance and geopolitical events deemed to cause potential loss of crude oil production can produce a sharp increase in oil prices (Energy Information Administration,2019). Meanwhile, non-OPEC oil producers only respond to market prices rather than attempting to influence prices by managing production. As a result of their independent decision, they are unable to control the market as they need to produce at full capacity. (Energy Information Administration, 2019). From the mid-2014 to early-2015, the price of Brent crude oil per barrel significantly dropped to $46. This downfall attributed to the USA's increased shale production and OPEC's decision to keep its crude oil production stable.

Therefore, these current issues on the influence of OPEC and Non-OPEC on the crude oil market do raise serious questions about oil price volatility impact on the financial performance of oil and gas firms. Thus, this creates a motivation to analyze accrual earnings management in the oil and gas industry. Unlike cooking of the books, earnings management conforms to accounting standards procedures (Rahman & Ali, 2006). Our research seeks to analyze the moderating effect of a dominant firm (OPEC) and fringe competitor (Non-OPEC) on the relationship between oil price volatility and accrual earnings management.

2. Literature Review

2.1 Political Cost Theory

The theory states that companies at heightened political scrutiny will engage in accounting choices that decreases reported earnings, as an attempt to reduce political sensitivities such as taxes or penalties (Watts and Zimmerman, 1978). After Watts and Zimmerman (1978), empirical studies have suggested a more extensive range of measures to proxy for political cost such as geopolitics, profits, rates of return, risk, capital intensity, industry concentration, industry membership, effective tax rates, number of employees, number of shareholders, labour intensity, press coverage, and even social responsibility disclosures (Zmijewski and Hagerman, 1981; Holthausen and Leftwich, 1983; Watts and Zimmerman, 1986; Deegan and Hallam,1991; Panchapakesan and McKinnon, 1992; Deegan and Carroll, 1993; Lemon and Cahan,1997; Han and Wang, 1998; Byard et al.,2007; Hsiao et al., 2016). In short, earnings are reduced downwards when there are political reasons to do so: e.g., firms in a politically sensitive industry such as the oil and gas industry are vulnerable to environmental concerns, antitrust allegations, and public perceptions of "excess profitability" (Ammr Kurdi, 2010). Significantly, the problem is complicated further by global geopolitical instability that causes crude oil supply disruptions, such as production cuts by OPEC (Ammr Kurdi, 2010).

Most previous studies on the oil industry examine the effect of a positive change in oil prices. Studies on the Persian Gulf crisis (Han and Wang, 1998), hurricanes Katrina and Rita (Byard, Hossain and Mitra, 2007), and the Arab Spring (Hsiao, Hu, and Lin, 2016) signal to income decreasing earnings management following several oil price shocks. Byard, Hossain, and Mitra (2007) and Han and Wang (1998) attribute their findings to the political cost hypothesis (Watts and Zimmerman, 1986). Cormier and Magnan (2002) analyze Canadian oil and gas firms for 12 years (1985-1996) using oil price volatility, found some evidence of systematic earnings management through nondiscretionary accruals. These studies signal that oil companies are willing to engage in earnings management, but their research is based on a specific country, e.g., North America. Thus, there is a significant gap in the works of literature as to how they would react to oil price volatility caused by the influence of OPEC as a dominant firm and Non-OPEC as the fringe competitor.

2.2 Dominant- Competitive Fringe Theory

In a traditional Hotelling model of dominant-competitive fringe (1931), the crude oil market is positioned as a non-cooperative oligopoly market dominated by a few large suppliers with several small producers (David Newberry, 1981; R.Golombek et al., 2018). In the crude oil market, non-OPEC oil production driven by competitive behavior, and they are inelastic to oil price changes (Dées et al. 2007). Non-OPEC producers are typically reflected as the price taker, and thus produce at near full capacity with limited spare capacity (R.Golombek et al.2018). An increase in non-OPEC production will cause the oil price to decrease, and a decrease in their output causes the global aggregate output to fall.

On the other hand, OPEC plays the market balancing role and has the incentive to exercise market power and to reduce or increase crude oil production based on the market needs (von der Fehr, Nils-Henrik M., 2010; McKinsey Energy Insight, 2018). OPEC's behavior can be explained further by target revenue theory coined by (Ezzati,1976; Cremer and Isfahami, 1980; Teece, 1982), suggesting that target revenue is determined by the organization's ability to constraint production and maintain the production ceiling based on its reserves.

The theory ties with a study conducted by Dées et al. (2007), reveals that OPEC's behavior based on spare capacity utilization that significantly affects crude oil prices. Additionally, OPEC's price-setting ability depends on the elasticity of crude oil demand and supply, interest rates, and reserve level (Reza, 1984).

3. Methodology

3.1 Data and Sampling

Our sample is extracted from the Datastream- Public listed oil and gas companies covering the period of 2008 to 2018 through the Thomson Reuters Database. The sample followed two fundamental rules of thumb as per accordance with Sekaran (2003, p.295). Firstly, sample sizes should be larger than 30 and less than 500 firms. Secondly, a minimum sample size of 30 for each variable is necessary for sub-sampling. The initial sample of this study consists of 242 firm-year observations. Companies included in the final sample of 131 firm-year observations followed the conditions of (1) All financial data needed for the analysis are available (2) Meets the Jarque-Bera and Skewness/Kurtosis (3) No multicollinearity problems (4) White's test of Heteroscedasticity. Table 1 shows the final sample consists of listed oil and gas companies from Canada, Croatia, France, Indonesia, Netherlands, Thailand, the US, Gabon, Kuwait, Nigeria, and Saudi Arabia. These companies are divided into two separate dummy groups of OPEC and Non-OPEC based on reserves to production ratio of each selected countries.

Table 1: Distribution of listed oil and gas companies across countries

groupdummy = NONOPEC

Domicile Country	Freq.	Percent	Cum.
Canada	12	13.04	13.04
Croatia	8	8.70	21.74
France	10	10.87	32.61
Indonesia	7	7.61	40.22
Netherlands	10	10.87	51.09
Thailand	7	7.61	58.70
US	38	41.30	100.00

Total	92	100.00

groupdummy = OPEC

Domicile Country	Freq.	Percent	Cum.
Gabon	2	5.13	5.13
Kuwait	8	20.51	25.64
Nigeria	11	28.21	53.85
Saudi	18	46.15	100.00
Total	39	100.00	

4. Earnings management measurement

In this study, total discretionary, current, and non-current accruals are used as the primary proxy of accruals earnings management following a previous earnings management study (Hsiao et al., 2016). We apply Han and Wang's and Byard's model for the computation of accruals as it captures the actual attributes and the industry specificity of oil and gas firms compared to other earnings management model (Hsiao et al.2016; Byard et al., 2007; Han and Wang, 2005). Specifically, discretionary, income decreasing, current and non-current accruals are calculated as follows:

a) Discretionary accrual measurement: $TTAC_{i,t}/TA_{i,t} = \beta_0 + \beta_1 (\Delta REV_{i,t}/TA_{i,t}) + \beta_2 (PPE_{i,t}/TA_{i,t}) + \beta_3 (lnSize_{i,t}) + \beta_4 (ROA_{i,t}) + \beta_5 (Leverage_{i,t}) + \beta_6 (Market\ to\ Book\ ratio_{i,t}) + \varepsilon_{it}$

b) Income decreasing discretionary accrual measurement: $TTAC_{i,t}/TA_{i,t-1} = \beta_0 + \beta_1 (\Delta REV_{i,t} - \Delta REC_{i,t} /TA_{i,t-1}) + \beta_2 (PPE_{i,t}/TA_{i,t-1}) + \beta_3 (CF_{i,t}/TA_{i,t-1}) + \beta_3 (lnSize_{i,t}) + \beta_4 (ROA_{i,t}) + \beta_5 (Leverage_{i,t}) + \beta_6 (Market\ to\ Book\ ratio_{i,t}) + \varepsilon_{it}$

c) Current accrual measurement: $CAC_{i,t}/TA_{i,t-1} = \beta_0 + \beta_1 (REV_{i,t} - REC_{i,t} /TA_{i,t-1}) + \beta_2 (CF_{i,t}/TA_{i,t-1}) + \beta_3 (lnSize_{i,t}) + \beta_4 (ROA_{i,t}) + \beta_5 (Leverage_{i,t}) + \beta_6 (Market\ to\ Book\ ratio_{i,t}) + \varepsilon_{it}$

d) Non-current accrual measurement: $NCAC_{i,t}/TA_{i,t-1} = \beta_0 + \beta_1 (PPE_{i,t}/TA_{i,t-1}) + \beta_2 (CF_{i,t}/TA_{i,t-1}) + \beta_3 (lnSize_{i,t}) + \beta_4 (ROA_{i,t}) + \beta_5 (Leverage_{i,t}) + \beta_6 (Market\ to\ Book\ ratio_{i,t}) + \varepsilon_{it}$

Thus, our current study result should be consistent with prior earnings management studies (Hsiao et al.,2016; Byard et al.,2007; Kothari et al., 2005; Asbaugh et al.,2003; Cormier and Magnan,2002; Han & Wang, 1998). Hence, we use the following model to analyze whether OPEC or Non-OPEC affects the relationship between oil price volatility and accrual earnings management.

$DACC_{it} = \beta_1 + \beta_2 (OPV_{t-1}) + \beta_3 (group\ dummy) + \beta_4 (int\_groupdummy\_OPVT) + \beta_5 (NEG\_CFO) + \beta_6 (LOSS) + \beta_7 (MeetBeat) + \beta_8 (CurrentRatio) + \beta_9 (Price) + \beta_{10} (EBITDA\ margin) + \beta_{11} (FCF) + \beta_{12} (Sales\ Growth) + \beta_{13} (Growth) + \varepsilon_{it}$

$DACCiit = \beta 1 + \beta 2\ (OPV_{t-1}) + \beta 3\ (\text{group dummy}) + \beta 4\ (\text{int\_groupdummy\_OPVT}) + \beta 5\ (\text{NEG\_CFO}) + \beta 6\ (\text{LOSS}) + \beta 7\ (\text{MeetBeat}) + \beta 8\ (\text{CurrentRatio}) + \beta 9\ (\text{Price}) + \beta 10\ (\text{EBITDA margin}) + \beta 11\ (\text{FCF}) + \beta 12\ (\text{Sales Growth}) + \beta 13\ (\text{Growth}) + \varepsilon_{it}$

$CACCiit = \beta 1 + \beta 2\ (OPV_{t-1}) + \beta 3\ (\text{group dummy}) + \beta 4\ (\text{int\_groupdummy\_OPVT}) + \beta 5\ (\text{NEG\_CFO}) + \beta 6\ (\text{LOSS}) + \beta 7\ (\text{MeetBeat}) + \beta 8\ (\text{CurrentRatio}) + \beta 9\ (\text{Price}) + \beta 10\ (\text{EBITDA margin}) + \beta 11\ (\text{FCF}) + \beta 12\ (\text{Sales Growth}) + \beta 13\ (\text{Growth}) + \varepsilon_{it}$

$NCACCiit = \beta 1 + \beta 2\ (OPV_{t-1}) + \beta 3\ (\text{group dummy}) + \beta 4\ (\text{int\_groupdummy\_OPVT}) + \beta 5\ (\text{NEG\_CFO}) + \beta 6\ (\text{LOSS}) + \beta 7\ (\text{MeetBeat}) + \beta 8\ (\text{CurrentRatio}) + \beta 9\ (\text{Price}) + \beta 10\ (\text{EBITDA margin}) + \beta 11\ (\text{FCF}) + \beta 12\ (\text{Sales Growth}) + \beta 13\ (\text{Growth}) + \varepsilon_{it}$

Where[1]

Total Accrual	(Net result – Operating Cash Flow) / Total Assets
Discretionary Accrual	Modified Jones Model Cross Sectional
Current Accrual	(Income before extraordinary items + depreciation and amortization minus operating cash flow/beginning of the year total assets)
Non- Current Accrual	Total Accrual- Current Accrual
Price	Indicator variable that equals one if the oil price is above USD50 for the current year and zero, otherwise
LOSS	Indicator variable that equals one if the Net result is negative in the current year and zero, otherwise
NEG_CFO	Indicator variable that equals one if operating cash flow is negative in the current year and zero, otherwise
EBITDA margin	The EBITDA margin for firm i, at the end of the fiscal year. (Extracted from Datastream)
Current Ratio	Current Asset divided by Current Liability
Meet/Beat	Indicator variable that equals one if the firm's income before extraordinary income at the time t equals or greater than the previous year and zero, otherwise
Group dummy	Dummy variable that indicates OPEC is equaled to 1 and Non-OPEC is equaled to 0 based on ratio to production ratio yearly
Oil price volatility	Oil Price volatility is converted into annual data of (Dubai, WTI, and Brent). Secondly, it is calculated using Ln (Current year/ Previous year). Finally, it is computed using the standard deviation of T-1 (Previous year to current)
Growth	Entity I's total assets in the year t divided by the total assets in year t-1

Sales Growth	Entity I's sales in the year t divided by the sales in year t-1
Market to Book ratio	Market capitalization divided by the book value of Equity. Book value of equity is computed using the formula (Total assets minus Total liabilities minus Intangible assets minus Preferred Stock)
Ln Size	Firm size is computed using a log value of total assets in year t

5. Descriptive statistics and correlation results

Table 2a and 2b present the descriptive statistics and T-test statistics for model variables. Table 2a shows summary statistics for all the oil and gas listed companies, divided by OPEC and Non-OPEC firms. OPEC and Non-OPEC firms have 39 and 92 listed firms respectively. As presented in Table 2a, that Non-OPEC firms are larger in size (measured by Growth) compared to OPEC firms. They also have a significant mean value for Current Ratio (1.214) as compared to OPEC firms (1.119).

For the test of differences in Table 2b, all stated t-test values of each variable are two-sided. The results show that firms in the OPEC have higher discretionary (t-value = -4.1370) and current accruals (t-value = -3.6972) compared to Non-OPEC indicates that there is a high number of small oil and gas firms within the sample. Meanwhile, T-stat reveal that income decreasing (T-value= 4.2695) and non-current discretionary accruals (T-value= 6.0828) is highly associated with large-size Non-OPEC firms. The rest of the results are presented below.

Table 2a: Descriptive Statistics

i) OPEC

Variable	Obs	Mean	Std. Dev.	Min	Max
DACCi	39	-.0346691	.0664695	-.2202415	.167804
CACCi	39	.0184406	.0264222	-.0577226	.0634416
NCACCi	39	-.0601063	.0752331	-.2431977	.1445365
OPVT1	39	.3691973	.2787955	.0184871	.7616988
NEG_CFO	39	.1025641	.3073547	0	1
LOSS	39	.0512821	.2234559	0	1
MeetBeat	39	.4615385	.5050354	0	1
CurrentRatio	39	1.11917	.7126017	.2673075	4.142798
Price	39	.8461538	.3655178	0	1
EBITDAMargin	39	.1535128	.1466889	.002	.581
FCF	39	.0074219	.0616038	-.1160168	.1598501
SalesGrowth	39	.0273189	.2932285	-.8275258	.5141564
Growth	39	1.050815	.1181631	.6853893	1.42528

ii) Non- OPEC

Variable	Obs	Mean	Std. Dev.	Min	Max
DACCi	92	.0125481	.0538858	-.129971	.175115
CACCi	92	-.0030575	.0319569	-.1043114	.067966
NCACCi	92	.0118151	.0553577	-.1426652	.1721547
OPVT1	92	.3484187	.2645081	.0184871	.7616988
NEG_CFO	92	0	0	0	0
LOSS	92	.1521739	.3611576	0	1
MeetBeat	92	.5326087	.5016695	0	1
CurrentRatio	92	1.254024	.7162283	.3853866	4.333069
Price	92	.9021739	.2987072	0	1
EBITDAMargin	92	.2875652	.2250335	-.069	.802
FCF	92	.0144935	.0578205	-.1713978	.1716925
SalesGrowth	92	-.0309035	.3034702	-.7777702	.4883773
Growth	92	1.066921	.1445025	.7644978	1.571944

Table 2b: T-Test of differences comparing OPEC and Non-OPEC

Variables	OPEC		NON-OPEC		Test of Differences
	N	Mean	N	Mean	T-Stat
DACC	39	0.02184	92	-0.01315	-4.1370***
DACCi	39	-0.03466	92	0.01254	4.2695***
CACCi	39	0.01844	92	-0.003057	-3.6972***
NCACCi	39	-0.06010	92	0.011815	6.0828***
OPVT1	39	0.3692	92	0.3484	-0.4046
NEG_CFO	39	0.1026	92	0.00	-3.2177***
LOSS	39	0.05128	92	0.1522	1.6163
MEETBEAT	39	0.4615	92	0.5326	0.7399
CURRENT RATIO	39	1.1192	92	1.2540	0.9869
PRICE	39	0.8462	92	0.9022	0.9166
EBITDA MARGIN	39	0.1535	92	0.2876	3.4208***
FCF	39	0.00742	92	0.0145	0.6277
SALES GROWTH	39	0.02731	92	-0.03090	-1.0140
GROWTH	39	1.051	92	1.067	0.6140

*** Significant at a two-tailed ≤ 0.01

Table 3 represents the contemporaneous accrual correlations between oil price volatility and accrual earnings management. As seen in Table 3, Non-OPEC exhibits a high correlation at a five and ten percent percent confidence for discretionary, income decreasing and non-current accrual. Meanwhile, OPEC is not correlated with discretionary, income decreasing accrual, current, and non-current accrual.

Table 3: Contemporaneous accrual correlation at 5 percent confidence level

Discretionary Accrual and OPVT1		Income Decreasing Discretionary Accrual and OPVT1		Current Accrual and OPVT1		Non-Current Accrual and OPVT1	
OPEC	NON-OPEC	OPEC	NON-OPEC	OPEC	NON-OPEC	OPEC	NON-OPEC
0.0337	0.2436**	-0.0782	-0.2386**	0.1623	-0.1054	-0.0995	-0.1816*
-	0.0193	-	0.0220	-	-	-	0.0832

**,* Significant at a two-tailed $\leq$ 0.05,0.10

Before running the primary regression, we have made sure that we ran several tests such as the Jarque-Bera normality test, skewness, and kurtosis test of normality, White's test of heteroscedastic and Variance Inflation Factor for multi-collinearity. All the results revealed that our data is free from outliers, and they are normally distributed, homogenous, and free from multi-collinearity. The results are enclosed in the Appendix.

6. Empirical Results

We hypothesize that OPEC and Non-OPEC are able to moderate the relationship between oil price volatility and accrual earnings management. We test the hypothesis using the models as discussed in Section 4. We follow the similar research methods steps from Hsiao et al., (2016); Byard et al.,(2007); Cormier et al., (2003); Han and Wang (1998) to estimate earnings management equations. We find that it is reasonable to examine the firm-level earnings management behavior based on market grouping as there is a significant difference in terms of geopolitical effect between OPEC and Non-OPEC in the crude oil market.

As shown in Column (a) and (b) of Table 4, the coefficient estimate of OPEC's moderation effect with oil price volatility with discretionary accrual (coefficient= -0.0658) and income decreasing discretionary accrual (coefficient= 0.753) is significant at one and five percent level indicates that OPEC firms predict higher negative discretionary accruals compared to Non-OPEC firms during crude oil price volatility. These findings are fair with the dominant-competitive fringe theory. Hochman and Zilberman (2011) explain that OPEC is seen as the dominant price-setter with high proven crude oil reserves compared to Non-OPEC firms, and able to impose production quotas to its member countries and also non-member countries. OPEC are able to target revenue-based through spare capacity utilization compared to Non-OPEC, who required to produce at full capacity in order to bring production costs lower (Kaufman et al., 2008; R.Golombek et al.2018). Thus, this strengthens the notion that OPEC firms engage in negative and income decreasing accruals higher compared to Non-OPEC firms to manage oil price volatility as Non-OPEC firms produce at full capacity to reduce production costs. This analysis also provides substantial evidence that oil price volatility is highly significant with accrual earnings management behavior amongst oil and gas firms as a whole. The majority of predicted control variables are relatively significant in explaining the strength of the accruals method used.

Table 4: Regression result of Accruals

a) Discretionary Accrual		b) Income Decreasing Discretionary Accrual	c) Current Accrual	d) Non-Current Accrual
Variables	P-value	P-value	P-value	P-value
OPVT1	0.003***	0.003***	0.073*	0.022**
Groupdummy-OPEC	0.003***	0.003***	0.202	0.000***
Groupdummy_OPEC*OPVT1	-0.008***	0.048**	0.149	0.143
Groupdummy_NONOPEC*OPVT1	0.008***	-0.048**	-0.149	-0.143
NEG_CFO	0.027**	0.574	0.000***	0.004***
LOSS	0.000***	0.003***	0.001***	0.001***
MeetBeat	0.533	0.700	0.081*	0.285
Current Ratio	0.481	0.818	0.001***	0.352
Price	0.030**	0.793	0.762	0.874
EBITDA Margin	0.000***	0.000***	0.003***	0.000***
FCF	0.000***	0.015**	0.130	0.008***
Sales Growth	0.166	0.075*	0.002***	0.347
Growth	0.000***	0.181	0.169	0.783

***.**.* Significant at a two-tailed p-value $\leq$ 0.01, 0.05, 0.10

7. Conclusion

This paper examines the use of discretionary, income decreasing discretionary, current and non-current accruals as a proxy of accrual earnings management to explain earnings management prevalence to manage oil price volatility. This study also looks into the geopolitical effect by introducing group classification of OPEC and Non-OPEC as the moderator effect. Specifically, most of the prior earnings management works of literature are based on the notion that earnings management is merely focused on a firm and industry level. Thus, the study initially posits that firms in either OPEC or Non-OPEC have an inverse moderating effect on the relationship between oil price volatility and earnings management and vice versa. This research, therefore, provides a basis for accepting the null hypothesis that presumed that OPEC or Non-OPEC is significant in strengthening or weakening the effect of oil price volatility and earnings management for the discretionary and income-decreasing discretionary accrual model. Meanwhile, the rest of the accruals model is insignificant in affecting the relationship.

Additionally, it must be noted that we are only using the reserve to production ratio as a proxy for OPEC and Non-OPEC, a country level variable rather than a firm-level variable to explain the effect of OPEC and Non-OPEC. We agree that additional indicators required to capture the true essence of the impact of OPEC and Non-OPEC, for instance, supply and demand for crude oil and interest rate exchange (Reza,1984). Extending with the prior research conducted by Hsiao et al., (2016), this study provides evidence that oil and gas firms in OPEC and Non-OPEC have an inverse relationship in explaining the association between oil price volatility and earnings management via current accruals. The rest of the control variable results are in line with previous studies (Hsiao et al., 2016; Ammr Kurdi, 2010; Byard et al., 2007; Han and Wang, 1998)

The findings of this paper contribute to the earnings management research that examines the political cost hypothesis by showing how OPEC and Non-OPEC group classification affects the relationship between oil price volatility and accrual earnings management. These results are of interest to regulators that are interested in understanding how oil and gas companies manage oil price volatility through reported earnings.

8. Limitation of research

This research is limited by sample constraints while engaging in a comparison study. There was a limited number of listed firms in the OPEC region, and they are moderately small in size in terms of market capitalization as compared to Non-OPEC firms. Therefore, results may significantly limit the generalization of the presented results per the group classification of OPEC and Non-OPEC. Further research needed with an equal extensive sample to model all known and relevant variables for the moderation effect of OPEC and Non-OPEC.

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Appendix

i. Test of Normality:

a) Jarque-Bera Normality test

Jarque-Bera normality test: 3.173 Chi(2) .2047
Jarque-Bera test for Ho: normality:

b) Shapiro-Wilk W test for normality

Variable	Obs	W	V	z	Prob>z
residstd	131	0.98437	1.620	1.086	0.13872

c) Skewness/Kurtosis tests for Normality

		------ joint ------			
Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
residstd	131	0.0717	0.5859	3.61	0.1645

ii. **Heteroskedasticity test**:

White's test for Ho: homoskedasticity
against Ha: unrestricted heteroskedasticity

chi2(113) = 129.25
Prob > chi2 = 0.1408

Cameron & Trivedi's decomposition of IM-test

Source	chi2	df	p
Heteroskedasticity	129.69	113	0.1348
Skewness	32.38	15	0.0057
Kurtosis	5.14	1	0.0233
Total	167.22	129	0.0133

iii. Test of Multi-Collinearity Variance Inflation Factor

a) DACC

Variable	VIF	1/VIF
OPVT1	2.03	0.492256
1.groupdummy	3.23	0.309812
groupdummy#| c.OPVT1 | 1	3.87	0.258172
NEG_CFO	1.19	0.838222
LOSS	1.32	0.757647
MeetBeat	1.57	0.635057
CurrentRatio	1.11	0.898744
Price	1.43	0.697584
EBITDAMargin	1.42	0.705273
FCF	1.64	0.611518
SalesGrowth	1.59	0.630412
Growth	1.52	0.658003
Mean VIF	1.83	

b) DACCi (INCOME DECREASING)

Variable	VIF	1/VIF
OPVT1	2.03	0.492256
1.groupdummy	3.23	0.309812
groupdummy#| c.OPVT1 | 1	3.87	0.258172
NEG_CFO	1.19	0.838222
LOSS	1.32	0.757647
MeetBeat	1.57	0.635057
CurrentRatio	1.11	0.898744
Price	1.43	0.697584
EBITDAMargin	1.42	0.705273
FCF	1.64	0.611518
SalesGrowth	1.59	0.630412
Growth	1.52	0.658003
Mean VIF	1.83	

c) CACCi (Current Accrual)

Variable	VIF	1/VIF
OPVT1	2.03	0.492256
1.groupdummy	3.23	0.309812
groupdummy#| c.OPVT1 | 1	3.87	0.258172
NEG_CFO	1.19	0.838222
LOSS	1.32	0.757647
MeetBeat	1.57	0.635057
CurrentRatio	1.11	0.898744
Price	1.43	0.697584
EBITDAMargin	1.42	0.705273
FCF	1.64	0.611518
SalesGrowth	1.59	0.630412
Growth	1.52	0.658003
Mean VIF	1.83	

d) <u>Non-Current Accrual</u>

Variable	VIF	1/VIF
OPVT1	2.03	0.492256
1.groupdummy	3.23	0.309812
groupdummy#| c.OPVT1 | 1	3.87	0.258172
NEG_CFO	1.19	0.838222
LOSS	1.32	0.757647
MeetBeat	1.57	0.635057
CurrentRatio	1.11	0.898744
Price	1.43	0.697584
EBITDAMargin	1.42	0.705273
FCF	1.64	0.611518
SalesGrowth	1.59	0.630412
Growth	1.52	0.658003
Mean VIF	1.83	

iv. Regression result

a) OLS Regression Discretionary Accrual

```
      Source |       SS       df       MS      Number of obs   =       131
-------------+------------------------------   F(12, 118)     =     13.41
       Model |  .165264108    12  .013772009   Prob > F        =    0.0000
    Residual |  .121208647   118  .001027192   R-squared       =    0.5769
-------------+------------------------------   Adj R-squared   =    0.5339
       Total |  .286472755   130  .002203637   Root MSE        =    .03205

------------------------------------------------------------------------------
        DACC |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       OPVT1 |    .045287   .0149533     3.03   0.003     .0156753    .0748987
  groupdummy |
       OPEC  |   .0337326   .0110024     3.07   0.003     .0119449    .0555203
groupdummy#c.OPVT1 |
       OPEC  |  -.0658289   .0243925    -2.70   0.008    -.1141326   -.0175251
     NEG_CFO |   .0398014   .0177767     2.24   0.027     .0045988    .075004
        LOSS |  -.0377784   .0098247    -3.85   0.000     -.057234   -.0183229
    MeetBeat |   .0043971   .0070296     0.63   0.533    -.0095233    .0183176
CurrentRatio |   .0029296   .0041464     0.71   0.481    -.0052814    .0111407
       Price |  -.0230734    .010529    -2.19   0.030    -.0439238   -.0022231
EBITDAMargin |  -.0906461   .0156876    -5.78   0.000    -.1217117   -.0595804
         FCF |  -.4731177    .061109    -7.74   0.000    -.5941301   -.3521053
SalesGrowth |  -.0164058   .0117805    -1.39   0.166    -.0397345    .0069229
      Growth |  -.1000676   .0253051    -3.95   0.000    -.1501786   -.0499566
       _cons |   .1307974    .030816     4.24   0.000     .0697733    .1918215
------------------------------------------------------------------------------
```

b) **OLS Regression Income Decreasing Discretionary Accrual**

```
      Source |       SS       df       MS      Number of obs   =       131
-------------+------------------------------   F(12, 118)     =      6.99
       Model |  .204848064    12  .017070672   Prob > F        =    0.0000
    Residual |  .288341723   118  .002443574   R-squared       =    0.4154
-------------+------------------------------   Adj R-squared   =    0.3559
       Total |  .493189787   130  .003793768   Root MSE        =    .04943

------------------------------------------------------------------------------
       DACCi |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       OPVT1 |  -.0704997   .0230635    -3.06   0.003    -.1161716   -.0248277
  groupdummy |
       OPEC  |  -.0521169   .0169696    -3.07   0.003    -.0857214   -.0185124
```

```
groupdummy#c.OPVT1 |
          OPEC |   .0753092   .0376221     2.00   0.048     .0008072    .1498112
       NEG_CFO |   .0154469   .0274181     0.56   0.574    -.0388484    .0697421
          LOSS |    .045242   .0151533     2.99   0.003     .0152344    .0752496
      MeetBeat |   .0041877   .0108421     0.39   0.700    -.0172826    .0256581
  CurrentRatio |   .0014786   .0063953     0.23   0.818    -.0111858    .0141431
         Price |   .0042796   .0162396     0.26   0.793    -.0278792    .0364385
  EBITDAMargin |   .1277528    .024196     5.28   0.000     .0798383    .1756674
           FCF |   .2338003   .0942523     2.48   0.015      .047155    .4204455
   SalesGrowth |   .0326858   .0181699     1.80   0.075    -.0032956    .0686671
        Growth |   .0525543   .0390297     1.35   0.181    -.0247352    .1298437
         _cons |  -.0729058   .0475295    -1.53   0.128    -.1670272    .0212156
------------------------------------------------------------------------------
```

c) OLS Regression of Current Accrual

```
      Source |       SS       df       MS      Number of obs   =       131
-------------+------------------------------   F(12, 118)     =      9.72
       Model |  .065663331    12  .005471944   Prob > F        =    0.0000
    Residual |  .066457061   118  .000563195   R-squared       =    0.4970
-------------+------------------------------   Adj R-squared   =    0.4458
       Total |  .132120392   130  .001016311   Root MSE        =    .02373

------------------------------------------------------------------------------
        CACCi |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
        OPVT1 |  -.0200047   .0110724    -1.81   0.073    -.0419311    .0019216
  groupdummy |
        OPEC |   .0104569   .0081468     1.28   0.202    -.0056761    .0265899
groupdummy#c.OPVT1 |
        OPEC |   .0262416   .0180618     1.45   0.149    -.0095256    .0620088
     NEG_CFO |   -.053405   .013163     -4.06   0.000    -.0794712   -.0273387
        LOSS |  -.0253809   .0072748    -3.49   0.001    -.039787    -.0109748
    MeetBeat |  -.0091595   .0052051    -1.76   0.081    -.0194671    .001148
CurrentRatio |   .0100951   .0030703     3.29   0.001     .0040151    .0161751
       Price |   .0023661   .0077964     0.30   0.762    -.0130729     .017805
EBITDAMargin |  -.0357216   .0116161    -3.08   0.003    -.0587246   -.0127186
         FCF |   .0689445    .045249     1.52   0.130    -.0206608    .1585498
 SalesGrowth |   .0282565   .0087231     3.24   0.002     .0109825    .0455306
      Growth |   .0259492   .0187375     1.38   0.169    -.0111562    .0630546
       _cons |  -.0196802   .0228181    -0.86   0.390    -.0648664    .0255059
------------------------------------------------------------------------------
```

d) OLS Regression of Non- Current Accrual

```
      Source |       SS       df       MS      Number of obs   =       131
-------------+------------------------------   F(12, 118)     =      9.26
       Model |  .308215915        12  .02568466   Prob > F      =    0.0000
    Residual |   .32740781       118  .002774642   R-squared     =    0.4849
-------------+------------------------------   Adj R-squared   =    0.4325
       Total |  .635623726       130  .004889413   Root MSE      =    .05267

------------------------------------------------------------------------------
      NCACCi |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       OPVT1 |   -.057028   .0245762    -2.32   0.022    -.1056957   -.0083604
 groupdummy |
       OPEC  |  -.0758829   .0180827    -4.20   0.000    -.1116916   -.0400742
groupdummy#c.OPVT1 |
       OPEC  |   .0591088   .0400898     1.47   0.143     -.02028    .1384975
    NEG_CFO |   .0860821   .0292165     2.95   0.004     .0282256    .1439387
       LOSS |   .0571229   .0161472     3.54   0.001     .0251471    .0890987
   MeetBeat |   .0124028   .0115533     1.07   0.285    -.0104759    .0352814
CurrentRatio |  -.0063708   .0068148    -0.93   0.352     -.019866    .0071243
      Price |   .0027508   .0173048     0.16   0.874    -.0315174    .0370189
EBITDAMargin |   .1381052    .025783     5.36   0.000     .0870479    .1891626
        FCF |   .2731661   .1004345     2.72   0.008     .0742785    .4720537
SalesGrowth |   .0182807   .0193617     0.94   0.347    -.0200607    .0566221
     Growth |    .01148   .0415897     0.28   0.783     -.070879     .093839
      _cons |   -.033463   .0506471    -0.66   0.510    -.1337579     .066832
------------------------------------------------------------------------------
```

i. <u>Pearson Correlation</u>

```
             |     DACC    DACCi    CACCi   NCACCi    OPVT1 groupd~y   NEG_CFO     LOSS MeetBeat
-------------+---------------------------------------------------------------------------------
        DACC |   1.0000
       DACCi |  -0.5809*  1.0000
       CACCi |  -0.1366  -0.0842   1.0000
      NCACCi |  -0.5352*  0.9184* -0.3999*  1.0000
       OPVT1 |   0.1647  -0.1824* -0.0211  -0.1487   1.0000
  groupdummy |   0.3422* -0.3519*  0.3095* -0.4721*  0.0356   1.0000
     NEG_CFO |   0.3123* -0.1218  -0.1245  -0.0122  -0.0038   0.2726*  1.0000
        LOSS |  -0.1181   0.1825* -0.4205*  0.2701* -0.0740  -0.1409  -0.0662   1.0000
    MeetBeat |  -0.1278   0.1104  -0.0071   0.1277   0.1818* -0.0650  -0.1816* -0.1485
1.0000
CurrentRatio |  -0.1011   0.0706   0.2833* -0.0132   0.0075  -0.0866  -0.0482  -0.1122
-0.0440
       Price |  -0.2518*  0.1335   0.1337   0.0809  -0.4629* -0.0804  -0.0755  -0.1587  -
0.0157
```

EBITDAMargin | -0.3769* 0.4843* -0.2780* 0.4514* -0.0237 -0.2884* -0.1861* 0.0573 0.1349
FCF | -0.3305* 0.0354 0.2576* 0.0583 0.0536 -0.0552 -0.0998 -0.1159 0.2393*
SalesGrowth | -0.1582 0.1446 0.2629* 0.0696 0.2110* 0.0889 0.0826 -0.2607* 0.4458*
Growth | -0.1144 0.1029 0.0984 -0.0012 0.1187 -0.0540 0.0316 -0.2755* 0.0420

| CurrentRatio Price EBITDAMargin FCF SalesGrowth Growth
---+---
CurrentRatio | 1.0000
Price | 0.0298 1.0000
EBITDAMargin | 0.0262 0.0590 1.0000
FCF | 0.2284* 0.0297 -0.3284* 1.0000
SalesGrowth | 0.0276 0.1035 0.1126 0.1411 1.0000
Growth | 0.0182 0.0446 0.2635* -0.3513* 0.2720* 1.0000