Oil Price Crisis and Bankruptcy Risk

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ABSTRACT

This research aims to examine the effect of the oil price crisis on bankruptcy risk. The sample consists of 9 oil and gas companies listed on the Indonesian Stock Exchange 2013-2019. The analysis method uses fixed-effect regression. The result shows that the oil price crisis increases bankruptcy risk, especially for companies with higher leverage. Furthermore, the oil price crisis reduces market value for companies with higher bankruptcy risk. It indicates that the oil price crisis brings performance for oil and gas companies to generate revenue, earnings, and cash flow that leads companies to insolvency condition.

Keywords: Oil Price Crisis, Bankruptcy Risk, Companies' Value
JEL Classifications: G32, G33, H12

1. INTRODUCTION

Based on the Indonesian Economic Report by Bank Indonesia (2017), Indonesia is a developing country that is actively developing. There are several domestic structural challenges faced by the Indonesian economy, one of which is the structural challenge in achieving food, energy, and water security as input factors used in the transformation process towards industrialization. Barry (1991) states that industrialization is a strategy to advance the development process in a country. Industrialization is seen as a faster way to achieve prosperity than without going through this process. On this basis, almost all countries have or are currently implementing this strategy, although the characteristics vary from one country to another. Because of the parallelism between the course of development and industrialization, there is an identical meaning between the two so that they cannot be separated.

The industrialization that has occurred in Indonesia since the Five-Year Development Period I (*Pembangunan Lima Tahun* or PELITA I) is in line with trends in various countries, namely the decline in the contribution of the agricultural sector to the economy and an increase in the contribution of the secondary and tertiary sectors. In 1971 the agricultural sector still played a dominant role in the formation of GDP reaching 44.83 percent, while the industrial sector only reached its peak in 2004, namely 28.37 percent, and the contribution of the agricultural sector decreased to 14.9 percent. The industrial sector experienced a peak of success until 1997, namely at the beginning of the economic crisis, after the crisis occurred the condition of the industrial sector had not been able to return to its original state. The decline in the performance of the industrial sector worries the economy considering the role of the industrial sector in promoting economic growth, poverty alleviation, and job creation to reduce high levels of unemployment (Ndiaya and Lv, 2018).

The most important factor that supports employment to reduce unemployment is the investment (Oluchukwu et al., 2019). Bahadorkhah and Aminifard (2014) explain that unemployment is an important problem in macroeconomics and politics that must be faced by the economy. In general, unemployment in developing countries is higher than in developed countries. In developed industrial countries, unemployment adds to the social

and economic burden, while in developing industrial countries, unemployment involves poverty and endangers people's lives.

Najimi and Shorkar (2019) say that dependence on oil in many countries is increasing as a result of the growth of industrialization. History shows that shocks in oil prices led to the global crisis that occurred in 1973. Yan (2012) said that oil as the main global energy has a very important role in the development of modern industry and economy, therefore it is not surprising that there is much petroleum. contested by countries in the world. World oil price fluctuations have always been viewed as a measure of the world economy so that changes are often hot topics to be discussed in economic and political forums in several countries.

The demand for petroleum as a world energy source raises several problems due to the imbalance between supply and demand. Some of the factors that create this imbalance include the rapid rate of population growth and the massive industrialization of the world. This increases world energy consumption and causes depletion of energy reserves, particularly fossil energy. It is estimated that until 2030, world energy consumption will still depend on non-renewable petroleum energy (Gielen et al., 2019).

In the period between 2014 and 2016, world oil prices have experienced a sharp decline. The price of oil has decreased by 40% in June 2014 following the stability of oil prices for the past five years (Baumeister and Kilian, 2016). The price of oil which was initially around USD 115 per barrel has now become below USD 70 per barrel. Helman (2016) states fifteen big oil companies experience financial distress before they have bankrupted because of the oil price drop. It happens because companies have not enough revenues to be generated. After all, the sales price is low. This phenomenon is important to be studied because the oil industry is one of the most important basic industries to support other industries as energy suppliers (Artami and Hara, 2018).

Financial distress is seen as a bankruptcy risk. Financial distress is a condition that shows stages of deterioration in the company's financial condition that occurred before it occurred bankruptcy or liquidation (Platt and Platt, 2002). Bankruptcy is also often referred to as corporate liquidation or company closure or insolvency. Bankruptcy is defined as financial and economic failures that happened to the company (Ooghe and De Prijcker, 2008). Financial distress can also be defined as the company's inability to pay past due financial obligations (Beaver, 2010). Financial distress can be experienced by all companies, especially if economic conditions in the country where the company operates experiencing a crisis period.

The global crude oil price will be positive for oil-exporting countries and will be negative for countries that import oil from abroad because the increase in world oil prices will cause an increase in sales prices. This is supported by Riga et al. (2016) who find that if the company cannot channel the increased costs to its consumers, the share price will decrease. The research of Riga et al. (2016) concluded that there is a positive long-term

relationship between world crude oil prices and the stock price index. It means that lower oil price has an effect on reduction of the market value of the company.

The higher and more positive the results of a company's financial performance, the better the market value that the company will provide. The lower and the negative results of a company's financial performance, the lower the returns the company will give the company and it may not be given to investors. It indicates that financial distress reduces market value. This research aims to examine the effect of the oil price crisis period on financial distress and stock return of oil and gas companies on the Indonesian Stock Exchange.

2. LITERATURE REVIEW

2.1. Oil Price Crisis

On 27 November 2014, OPEC failed to reach an agreement on limiting oil production which in turn resulted in a fall in oil prices (Ansari, 2017). After OPEC held a meeting in Vienna, Abdallah Salem el-Badri said they would not support prices by reducing production. The 12 OPEC member countries finally decided to maintain their production at the amount of 30 million barrels per day as previously agreed upon in December 2011 (Baffes et al., 2015). This decline in oil prices is a harsh blow to oil-exporting countries such as Russia, Nigeria, Iran, and Venezuela. The cause of the decline in oil prices in 2014 is thought to have occurred due to seven different main factors. The seven factors are supply and demand for oil, changes in OPEC objectives, geopolitical developments, appreciation of the United States dollar, speculative demand and inventory management, the relative contribution of supply and demand factors, and finally the prospect of prices.

The fall in oil prices in 2014 also bears a resemblance to the decline in oil prices in 1985 (Baumeister and Kilian, 2016). The reason is that both were caused by the growth in oil supply from non-OPEC countries and changes in OPEC policies. The first similarity in the patterns that caused the decline in oil prices in 1985 and 2014 was the growth in oil supply from non-OPEC countries. Starting from the 1970s and early 1980s, there was an expansion of oil supplies from the North Sea and the Gulf of Mexico. The North Sea and the Gulf of Mexico have succeeded in adding 6 million barrels per day to the global market from 1973 to 1983 (Baffes et al., 2015). Furthermore, there was a change in OPEC policy in response to the 1985 decline in oil. At that time, OPEC reduced its supply to maintain high prices as it followed the top oil price in 1979. But the oil price then decreased by 20% so that OPEC began to increase its supply by 18 million barrels per day from the initial 13.7 million barrels per day (Baffes et al., 2015). There was an excess supply and a lack of demand accompanied by The slow pace of economic growth in China and Europe is the beginning of the decline in oil prices.

The decline in oil prices in 2014 certainly had a big impact on oil-exporting countries, whether it was OPEC member countries or non-member countries. The first country to be most affected by

the decline in oil prices was Russia. Russia is one of the largest oil-exporting countries, depending on 70% of its export revenue from oil (Dev and Chaubey, 2016). During the decline in oil, Russia's revenues have suffered a loss of $2 billion for every $1 drop in oil prices (Dev and Chaubey, 2016). This condition was later warned by the World Bank because it would have an impact on the economy Russia will shrink by about 0.7% in 2015 if oil prices are still unstable (Dev and Chaubey, 2016).

In the range of 2013-2016, the oil price has been decreased globally. The shock of falling oil prices occurred in 2015-2016 where prices fell to their lowest level in the last ten years. The world oil price chart can be seen in Figure 1. Based on Figure 1, oil prices fell from 2013-2016 from 104.08 USD/barrel to 42.81 USD/barrel. The decline in oil prices has had a major impact on the petroleum industry. Prices in 2015 and 2016 were 50.75 USD/barrel and 42.81 USD/barrel, which are the lowest levels since 2006. Helman (2016) stated that fifteen large oil companies went bankrupt due to the decline in oil prices. This happens because the company's revenue is not enough to generate because of the low selling price. This phenomenon is important to study because the petroleum industry is one of the most important basic industries to support other industries as energy suppliers.

Indonesia as a member of the OPEC was also affected by the decline in prices because Indonesia's oil price refers to global prices. The decline in world oil prices was followed by Indonesian oil prices from 2013-2016. In 2015-2016, Indonesia's oil price touched its lowest level in the last ten years. Indonesia's oil price chart can be seen in Figure 2. Figure 2 shows that the oil price in Indonesia fell from 105.85 USD/barrel to 40.13 USD/barrel in 2013-2016. The prices in 2015 and 2016 were USD 49.21/barrel and USD 40.13/barrel, which were the lowest levels since 2006.
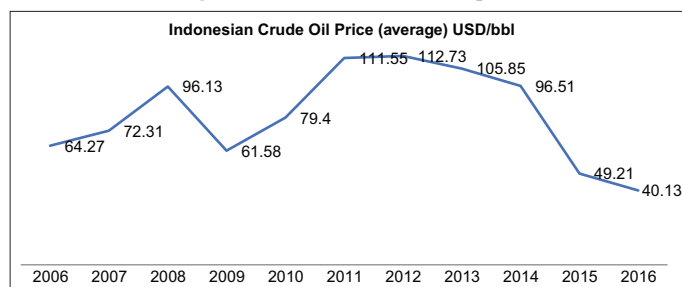
2.2. Bankruptcy Risk and Financial Distress

Figure 1: World crude oil price
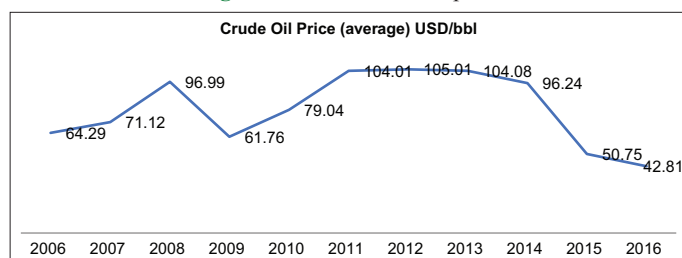
Source: Mela and Putra (2020)

Figure 2: Indonesian crude oil price

Source: Mela and Putra (2020)

Bankruptcy risk refers to the condition continuum of business difficulty where it is ranging from financial difficulty from a mild one (such as liquidity problems) to the more serious difficulty which is not solvable (debt is greater than assets) (Hanafi, 2010). Indicator of bankruptcy can be as follow (Weston and Brigham, 1981).

2.2.1. Economic distressed
Failure in that economic sense company income can no longer afford to cover the cost, which means that the rate the profit is less than the cost of capital. A related definition is that of value now than the company's cash flow is over small of its obligations.

2.2.2. Financial distressed
Insolvency takes two forms which are technical default that occur when a company fails to meet one or more conditions in terms of debt, such as ratios current assets with current liabilities set, and technical insolvency where it happens when the company is unable to fulfill its obligations at the time has been determined even though its total assets above his debt.

In certain situations, companies may have financial difficulties. If not resolved correctly, financial difficulties small can develop into larger and will come to bankruptcy. There are two the cause of the company's failure is in terms of economy and financial perspective, starting from lack of managerial experience until lack of capital. There are several alternatives to solve business difficulties such as restructuring or reorganization and liquidation.

Bankruptcy risk is associated with financial distress. Africa (2016) explains that financial distress can be used as an early warning of bankruptcy. Based on bankruptcy stages, financial distress is the last stage before companies go bankrupt (Kordestani et al., 2011). The bankruptcy stages respectively are latency stage (the return on assets will decrease), cash shortage stage (the company does not have sufficient cash resources to meet its current obligations, even though it may still have a strong level of profitability), financial distress stage (financial emergency, where this condition is approaching bankruptcy), and bankruptcy stage (if the company cannot cure the symptoms of financial distress, the company will go bankrupt) (Kordestani et al., 2011). Altman (1968) develops the model of financial distress measurement to predict bankruptcy by using financial ratios. Matturungan et al. (2017) find that the Altman (1968) model can predict bankruptcy of Indonesian companies until 87.8 percent (includes in good category). In this case, this research could use the Altman (1968) model to measure bankruptcy risk.

2.3. Oil Price Crisis and Bankruptcy Risk
The crisis period is one of the most impactable factors to make companies go bankrupt. It causes strikes, labor riots, market failure, core earnings reduction, and sharp changes in market prices (Mitroff, 2001). Previous studies have found that financial difficulties and performance reduction exist in the crisis period (Andrade and Kaplan, 1998; RizwanKhurshid, 2013; Tan, 2012).

In the context of the oil and gas industry, the oil price crash considers a crisis period. Based on bankruptcy stages (Kordestani

et al., 2011), oil price crisis makes oil selling price falls. The first stage is profitability decrease. It leads to lower revenue and earnings. Furthermore, companies cannot generate cash flow from core revenue. In the next stage of solvency stage, cash generation failure makes companies could not meet the debt payment. In the stage of financial distress, companies experience financial difficulties as a cumulative impact from profitability and solvency reduction. In this case, oil and gas companies are more likely to go bankrupt when the oil price is falling. Aguiar-Díaz and Ruiz-Mallorquí (2015) find that during the crisis period in Spain, bankruptcy rates have increased from 2.6 to 14.6 bankruptcies per 10,000 companies.

H_1: Oil price crisis increase bankruptcy risk.

2.4. Oil Price Crisis, Leverage, and Bankruptcy Risk
The second stage of bankruptcy is insolvency (Kordestani et al., 2011). Insolvency is the condition where companies cannot meet the credit term. Higher debts lead companies to a higher risk of financial difficulty. Hanafi (2010) explains that serious financial difficulty happens when total debt is bigger than total assets. When companies fail to convert assets into cash revenues or earnings, they cannot fulfill their obligation to pay the debt and/or its interests. Nurudin (2020) finds that bankrupt companies have higher leverage than non-bankrupt ones.

H_2: Oil price crisis increase bankruptcy risk for companies with higher leverage.

2.5. Oil Price Crisis, Bankruptcy Risk, and Companies Value
Companies' market value in the stock market is a response of investors on the crisis condition. Investors see a big probability that crisis increases bankruptcy risk so they take the companies' stock off, furthermore, the stock price falls. In the context of the oil price crisis, investors sent the negative sentiment to the market that oil and gas companies have poor performance because of revenue and cash generation reduction. It leads to a lower market price. Riga et al. (2016) find that oil price crashes reduce the stock index of oil and gas companies.

H_3: Oil price crisis decrease market value for companies with higher bankruptcy risk.

3. METHODOLOGY

3.1. Research Sample
Research populations are oil and gas companies in Indonesia. The research sample consists of oil and gas companies listed on the Indonesian Stock Exchange 2013-2019. There are 9 oil and gas companies with a total sample of 63 firm-years. The list of companies is as in Table 1.

3.2. Variables and Analysis Method
This research uses a fixed-effect regression test as an analysis method. There are 3 different models for each 3 research hypotheses (details are in equations 2,3, and 4 in section "RESULT"). Regression analysis includes dependent, independent, moderating,

and control variables. For H_1 and H_2, the dependent variable is bankruptcy risk. For H_3, the dependent variable is companies' market value. Moderating variables for H_2 and H_3 respectively are leverage and bankruptcy risk. The Independent variable is the oil price crisis. Control variables include companies' size, price-earnings ratio, and market share.

Bankruptcy risk is measured by the z-score of Altman (1968). This research uses Altman (1968) z-score because it can predict the bankruptcy of Indonesian companies until 87.8 percent (Matturungan et al., 2017). Altman's (1968) z-score is calculated as equation 1. A lower z-score is an indicator of higher bankruptcy risk.

Z = 1.2 *working capital to total assets* + 1.4 *retained earnings to total assets* + 3.3 *EBIT to total assets* + 0.6 *market value of equity to total liabilities* + 0.999 *sales to total assets* (1)

The oil price crisis refers to the crisis period where the oil price crash happens in 2014-2015. Oil price crisis is measured by dummy variable where score 1 for oil price crash period and score 0 if otherwise. Market value is measured by market value to total assets ratio where market capitalization is divided by total assets. Leverage is measured by the debt to total assets ratio where total liabilities are divided by total assets. Size is measured by the logarithm of total assets. The price-earnings ratio is measured by stock price divided by earnings per share. Market share is measured by the total revenue of companies divided by the total revenue of all companies in the oil and gas industry based on the Jakarta Stock Industrial Classification (JASICA).

4. RESULT

4.1. Descriptive Statistics
Based on Table 2, the highest bankruptcy risk is −1.8856 while the lowest one is 6.1164. The average value of bankruptcy risk is 0.9707 with its deviation of 1.5045. The highest market value is 1.8940 while the lowest one is 0.0461 relative to total assets. The

Table 1: Sample

Crude oil and natural gas companies	Stock code
Apexindo pratama duta	APEX
Benakat Integra	BIPI
Elnusa	ELSA
Energi Mega Persada	ENRG
Medco Energi International	MEDC
Perdana Karya Perkasa	PKPK
Radiant Utama Interinsco	RUIS
Ratu Prabu Energi	ARTI
Surya Esa Perkasa	ESSA

Source: Indonesian stock exchange

Table 2: Descriptive statistics

Variables	Mean	Maximum	Minimum	SD
Z-Score	0.9707	6.1164	−1.8856	1.5045
Market value	0.3582	1.8940	0.0461	0.3741
Leverage	0.6397	1.2920	0.2394	0.2207
Size	12.6794	13.9217	10.8553	0.7233
Price earnings ratio	35.8433	858.4719	−56.9845	130.8858
Market share	0.1111	0.5236	0.0002	0.1363

Source: Statistical output

average value of companies' market value is 0.3582 relative to total assets with its deviation of 0.3741. The highest leverage is 1.2920 while the lowest one is 0.2394. The average value of leverage is 0.6397 with its deviation of 0.2207. The highest stock price is 858.4719 while the lowest one is −56.9845 relative to earnings. The average value of the stock price is 35.8433 relative to earnings with its deviation of 130.8858. The highest market share is 52.36 percent while the lowest one is 0.02 percent relative to total oil and gas industry revenue. The average value of the market share is 11.11 percent relative to total oil and gas industry revenue with its deviation of 13.63%.

4.2. Hypothesis Testing for H_1

H_1 aims to examine the effect of the oil price crisis on bankruptcy risk. The empirical model for H_1 is as in equation 2 while the result of regression analysis of equation 2 is as in Table 3. Z is bankruptcy risk. CRISIS is an oil price crisis period. LEV is leverage. SIZE is companies' size. PER is the price-earnings ratio. MS is market share. H_1 is accepted if coefficient b1 in equation 2 is negative and significant.

$$Z = a + b1CRISIS + b2LEV + b3SIZE + b4PER + b5MS + e \quad (2)$$

Table 3 shows that the oil price crisis period (CRISIS) has a coefficient value of −0.4220 with t-statistics of −2.3889 (significant in 0.05). The result shows that the oil price crisis period reduces the z-score. It indicates that H_1, where the oil price crisis increases bankruptcy risk, is accepted. The crisis period is one of the most impactable factors to make companies go bankrupt. Oil price crisis makes oil selling price falls. It leads to lower revenue and earnings. Furthermore, companies cannot generate cash flow from core revenue. Cash generation failure makes companies could not meet the debt payment. Companies experience financial difficulties as a cumulative impact from profitability and solvency reduction. In this case, oil and gas companies are more likely to go bankrupt when the oil price is falling. The result is consistent with Andrade and Kaplan (1998), RizwanKhurshid (2013), Tan (2012), and Aguiar-Díaz and Ruiz-Mallorquí (2015) who find higher bankruptcy risk and financial difficulty in the crisis period.

4.3. Hypothesis Testing for H_2

H_2 aims to examine the moderating role of leverage on the relationship between the oil price crisis and bankruptcy risk. The empirical model for H_2 is as in equation 3 while the result of regression analysis of equation 3 is as in Table 4. Z is bankruptcy risk. CRISIS is an oil price crisis period. LEV is leverage. SIZE is companies' size. PER is the price-earnings ratio. MS is market share. H_2 is accepted if coefficient b2 in equation 3 is negative and significant.

$$Z = a + b1CRISIS + b2CRISIS \times LEV + b3LEV + b4SIZE + b5PER + b6MS + e \quad (3)$$

Table 4 shows that the interaction variable of the oil price crisis period and leverage (CRISIS x LEV) has a coefficient value of −1.8627 with t-statistics of −2.3317 (significant in 0.05). The result shows that the oil price crisis period reduces the z-score more for companies with higher leverage. It indicates

that H2, where the oil price crisis increases bankruptcy risk for companies with higher leverage, is accepted. Higher leverage shows the insolvency condition, where it is one of the indicators of bankruptcy. Higher debts lead companies to a higher risk of financial difficulty especially when total debt is bigger than total assets. When companies fail to convert assets into cash revenues or earnings, they cannot fulfill their obligation to pay the debt and/or its interests. The result is consistent with Nurudin (2020) who finds that bankrupt companies have higher leverage than non-bankrupt ones.

4.4. Hypothesis Testing for H_3

H_3 aims to examine the moderating role of bankruptcy risk on the relationship between the oil price crisis and companies' market value. The empirical model for H_3 is as in equation 4 while the result of regression analysis of equation 4 is as in Table 5. MVA is the market value to assets ratio. Z is bankruptcy risk. CRISIS is an oil price crisis period. LEV is leverage. SIZE is companies' size. PER is the price-earnings ratio. MS is market share. H_3 is accepted if coefficient b2 in equation 4 is positive and significant.

Table 3: Hypothesis testing for H_1

Variable	Coefficient	t-Statistic	Prob.
CRISIS	−0.4220	−2.3889**	0.0208
LEV	−6.8091	−8.4876***	0.0000
SIZE	−1.9468	−3.4925***	0.0010
PER	0.0009	1.1412	0.2593
MS	3.6302	1.9328*	0.0591
Constant	29.6958		
R-squared	0.8631		
F-statistic	23.7711***		

***Significant in 0.01, **Significant in 0.05, *Significant in 0.10. Source: Statistical output

Table 4: Hypothesis testing for H_2

Variable	Coefficient	t-Statistic	Prob.
CRISIS	−1.2664	−2.3508**	0.0229
CRISIS x LEV	−1.8627	−2.3317**	0.0231
LEV	−7.2509	−8.7120***	0.0000
SIZE	−1.8593	−3.3784***	0.0015
PER	0.0009	1.1829	0.2427
MS	2.9641	1.5691	0.1232
Constant	28.9426		
R-squared	0.8328		
F-statistic	23.0535***		

***Significant in 0.01, **Significant in 0.05. Source: Statistical output

Table 5: Hypothesis testing for H_3

Variable	Coefficient	t-Statistic	Prob.
CRISIS	−0.0685	−1.3492	0.1837
CRISIS x Z	0.2283	6.9691***	0.0000
Z	0.2278	6.6268***	0.0000
LEV	0.7636	2.5178**	0.0153
SIZE	−0.7344	−4.9059***	0.0000
PER	−0.0003	−1.4438	0.1554
MS	1.0882	2.2831**	0.0270
Constant	8.8357		
R-squared	0.8397		
F-statistic	22.6567***		

***Significant in 0.01, **Significant in 0.05. Source: Statistical output

$$MVA = a + b1CRISIS + b2CRISIS \times Z + b3Z + b4LEV + b5SIZE + b6PER + b7MS + e \quad (4)$$

Table 5 shows that the interaction variable of oil price crisis period and bankruptcy risk (CRISIS x Z) has a coefficient value of 0.2283 with t-statistics of 6.6961 (significant in 0.01). The result shows that the oil price crisis period increase market value more for companies with higher z-score (lower bankruptcy risk). In other words, the oil price crisis period reduces market value more for companies with a lower z-score (higher bankruptcy risk). It indicates that H_3, where the oil price crisis decrease market value for companies with higher bankruptcy risk, is accepted. Companies' market value in the stock market is a response of investors on the crisis condition. Investors see a big probability that crisis increases bankruptcy risk so they take the companies' stock off, furthermore, the stock price falls. In the context of the oil price crisis, investors sent the negative sentiment to the market that oil and gas companies have poor performance because of revenue and cash generation reduction. It leads to a lower market price. The result is consistent with Riga et al. (2016) who find that oil price crashes reduce the stock index of oil and gas companies.

5. CONCLUSION

This research aims to examine the effect of the oil price crisis on bankruptcy risk. The result shows that the oil price crisis increases bankruptcy risk, especially for companies with higher leverage. Furthermore, the oil price crisis reduces market value for companies with higher bankruptcy risk. It indicates that the oil price crisis brings performance for oil and gas companies to generate revenue, earnings, and cash flow that leads companies to insolvency condition. This research implies regulator and government formulate a specific oil and energy regulation to protect oil and gas companies from bankruptcy risk and value losses.

This research has limitations to do not consider the bankrupt oil and gas companies as a comparison sample. To the best of the author's knowledge, bankrupt oil and gas companies as an impact of the oil price crash in 2014 do not exist in Indonesia. Further research is expected to consider the bankrupt oil and gas companies from other countries.

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