

# A Quantitative Study of Oil Price Decrease and Bankruptcy Probability in Oil and Gas Companies

Dini Rosdini, Rahardi Gita Nautika

Department of Accounting Faculty of Economics and Business, Universitas Padjadjaran, Jalan Dipati Ukur No. 35, Bandung 40132, Indonesia

## ARTICLE INFO

**Keywords:**  
Oil Price,  
Probability of Bankruptcy,  
Altman Z-Score,

**Kata Kunci:**  
Harga Minyak,  
Probabilitas Kebangkrutan,  
Altman Z-Score,

## ABSTRACT

The decrease of oil prices globally has an impact on oil and gas company's financial health. This study aims to provide empirical evidence about the effect of oil prices on the probability of bankruptcy in Indonesia, Singapore, and Australia using the probability of bankruptcy model of Altman Z-Score. The price of oil is measured by the price of Brent crude. Our sample is made of 20 oil and gas firms listed at the Indonesia Stock Exchange (IDX), the Australian Securities Exchange (ASX) and the Singapore Exchange (SGX) during the period of 2013-2015 selected through purposive sampling. This study is a quantitative research with secondary data analyzed using simple regression model. The results of this study indicate that oil prices significantly influence the bankruptcy probability of oil and gas companies in Indonesia, Singapore, and Australia.

## SARI PATI

*Penurunan harga minyak secara global berdampak pada tingkat kesehatan perusahaan minyak dan gas. Penelitian ini bertujuan untuk memberikan bukti empiris mengenai pengaruh harga minyak terhadap probabilitas kebangkrutan di Indonesia, Singapura, dan Australia dengan menggunakan model probabilitas kebangkrutan Altman Z-Score. Harga minyak mentah yang digunakan dalam penelitian ini adalah Brent crude. Sampel penelitian adalah 20 perusahaan minyak dan gas yang terdaftar di Bursa Efek Indonesia, Bursa Efek Australia, dan Bursa Efek Singapura selama periode 2013-2015 yang dipilih melalui purposive sampling. Penelitian ini merupakan penelitian quantitative dengan data sekunder yang dianalisis dengan model regresi sederhana. Hasil penelitian ini menunjukkan bahwa harga minyak berpengaruh terhadap probabilitas kebangkrutan pada perusahaan minyak dan gas di Indonesia, Singapura, dan Australia.*

Corresponding author:  
dini.rosdini@unpad.ac.id

© 2019 IRJBS, All rights reserved.

## INTRODUCTION

Crude oil prices in Indonesia encountered a downturn since 2015. According to the data obtained from the official website of BPH Migas, although Indonesian government raised the price of Premium gasoline on the 18 of November 2014 up to IDR 8,500 per liter, the price of Premium gasoline decreased by 11.8 percent to the rate of IDR 7.600 per liter on January 1, 2015. Fallin the price of Premium gasoline continued until it reached the rate of IDR 6.550 per liter on April 1, 2016.

The decrease in oil prices was not only just happening in Indonesia, but also globally. The benchmarks for the light crude oil group is West Texas Intermediate (WTI) in North America and Brent crude in Europe and Africa. West Texas Intermediate and Brent are the most used benchmarks for crude oil prices marker in the world market (Hammoudeh et al., 2008). At the end of 2014 the price of Brent crude and West Texas Intermediate, both of which are an international benchmark, has fallen by more than 45 percent from last year's prices.

Market price of crude oil fluctuations is determined by the mechanism of demand and supply as the fundamental factors (Nizar, 2012). On the demand side, economic growth affects the price of oil. Thus, when the global economy is in decline, so does the oil price. Europe and Japan have not recovered from the previous economic crisis, China is also now very carefully guarding the weakening of his economic growth, which amounted to 7.1 percent in 2015, 7 percent in 2016 and 6.9 percent in 2017 (World Bank, 2015). This economic downfall makes the demand of the world's oil decreases which in return cause oil prices downturn.

On the supply side, crude oil price fluctuation is strongly influenced by the availability or oil supplied by producer countries. Availability or supply of oil is closely associated with the production capacity, investment, and refinery infrastructure capacity (Kesicki, 2010). Oil production in the United States

have increased almost two times it's initial price in the past few years, this made oil exporters such as Middle-east countries, Nigeria, and Algeria had to find new markets in Asia (Krauss, 2016). Similarly, Canada and Iraq continued to increase their oil production. Furthermore, Krauss (2016) mentioned that OPEC as an organization that is supposed to regulate the price and production of oil company refused to cut oil production that could raise world oil prices, countries like Saudi and his allies refuse to cut oil production. Meanwhile, the economic sanctions of Iran have just been lifted, and Iran as well continued to increase its oil production (Krauss, 2016).

According to a report released by Deloitte (2016) entitled "The crude downturn for exploration and production companies", as much as 35 percent of oil and gas companies around the world or as many as 175 companies are categorized as high-risk quadrant with the determining factors of high leverage ratio and low debt service coverage. This means, the world oil prices downturn has an impact on the oil and gas company's financial health. Deloitte (2016) reported that these companies have stockpiled a total debt of more than \$ 150 billion on their balance sheet. 50 of the 175 companies that have negative equity or leverage ratio above 100, most likely these companies will be bankrupt by 2016, unless oil prices recover.

A stock price index is an indicator or reflection of changes in stock price. The movement of stock prices is an indicator of investor interest in investing. According to a report released the Colonial First State (2015), entitled "The impact of lower oil prices on the Australian equities", oil prices downturn caused energy sector index S&P/ASX 200 to decline in value of nearly 18 percent in the December quarter 2015. In Indonesia Stock Exchange price index of mining stocks also experience asimilar thing, during 2015 mining sector stock prices has declined by 40 percent. The same thing happened tothe Singapore Exchange, the FTSE ST Oil and Gas has declined by 34.3 percent during 2015. Also,

supported by a research conducted by Rahmanto, et al (2016) who have shown that changes in world oil prices has positive effect on the entire sector in the Indonesia Stock Exchange. This indicate that the interest of investors to invest in oil and gas companies in Indonesia, Australia and Singapore has declined. World oil prices downturn resulted of some oil and gas companies experiencing financial difficulties and were exposed to bankruptcy. This makes investing in oil and gas companies very costly.

Most companies go public in order to obtain alternative financing or funding sources. Investors will assess a company before deciding to invest in it. The assessment could be achieved by analyzing the ratings of the company, the informations contained in the financial statements that reflect the company's performance and financial condition. Financial reports aim to provide data needed to make investment decisions such as the decision to buy, sell, or retain ownership of a company. The market will respond to the fluctuations in the stock price of a company, if a company's financial condition and performance is good, then the company's stock price will also go up. Therefore, predictions and analysis of financial statements are essential not only for companies but also for stakeholders (Hadi and Anggraeni, 2010).

One form of a company's financial statements analysis is to predict its bankruptcy. The period of an oil prices downturn is the right time to analyze bankruptcy prediction on oil and gas companies. There are several models of bankruptcy prediction, one bankruptcy prediction method is by counting and classifying firms using Altman Z-Score (1968), Altman is the first researcher to apply Multiple Discriminant Analysis for the analysis of bankruptcy. Altman Z-Score is generated by summing the results of multiplying a certain constant value, each with 5 elements of ratio of manufacturing companies (Altman, 1968). Based on the Z-score, companies are grouped into 3 groups: bankrupt, gray area, and financially healthy, companies that are categorized

into bankruptcy group are predicted to suffer financial distress within one or two year to come (Altman, 1968). For companies that fall within the gray area, they are predicted to have the possibility to go bankrupt but can still be saved if cautiously managed by taking right decisions. Meanwhile, if a company is categorized as financially healthy, it is predicted that the company will not experience financial distress (Altman, 1968). Based on the explanation above authors are interested in examining the relationship between world oil prices of Brent on the probability of bankruptcy. This study aims to determine in which extent the world oil prices of Brent can affect the probability of a company's bankruptcy directly.

#### **Hypothesis Development**

The main objective of financial reporting is to provide relevant information to each user of financial statements both internal and external parties regarding the financial position, financial performance, and cash flows of an entity for making economic decisions. Users of financial statements may employ the information contained in the financial statements in a straightforward manner using facts and data or reprocess the data which is attached to the financial statements by analyzing them according to their intent and purpose. Analysis of the financial statements is for the purpose to use them as the subject of application of analytical tools and techniques and see its relationship with the aim to determine the financial conditions and can generate a more informed decision.

Financial statements analysis can help investors in making investment decisions. The investment decision in question is the decision to buy, sell, or retain ownership. Positive earnings in large numbers reflect the conditions established by companies that can afford to pay high dividends. The market will respond to the fluctuations in the stock price of a company, if the company's financial condition and performance is good enough, then the company's stock price will also go up (Susanto and Ekawati 2006). A company also requires analysis of its

financial reports in order to know informations about the condition and position of the company in more depth. Those informations can be useful for companies in planning, conducting, and assessing the activities of the company in order to operate more effectively and efficiently. When a company operate more effectively and efficiently than its competitors it will result to a competitive advantage that the company will gain over its competitors.

In the midst of world oil prices downturn, the biggest fear for stakeholders of anoil and gas company is the financial health of the company. The threat of bankruptcy due to low selling prices led the management board and the investors to be more cautious in making decisions. One way of predicting bankruptcy is by analyzing the information contained in the financial statements. Altman's Z-score is one of the models used for predicting bankruptcy in manufacturing, non-manufacturing company, and private company years prior to the bankruptcy (Altman, 1968). Z-score as a bankruptcy prediction model first uses Multiple Discriminant Analysis (MDA) and has a level of accuracy that is quite high at 94 percent. Z-score is calculated based on the 5 ratios namely the working capital to total assets, retained earnings to total assets, eanings before interest and taxes to total assets, market value of equity to total liabilities, and sales to total assets (Altman, 1968).

Altman's Z-score models has been used in several prior research in oil and gas industry with companies in developing countries as its object such as Indonesia (Rahmanto et al, 2016; Witjaksono, 2010), Oman (Mohammed, 2016) and in emerging countries as well such as United States (Mitra, 2007). Moreover, Altman et al (2014) who conducted a review and empirical analysis of Altman's Z-Score Model, have found that the analyses at the level of all data show that the original Z-Score model performs very satisfactorily in an international context. Furthermore, Altman et al (2014) stated that based on their empirical tests in their study, that the original Z-Score Model and

its re-estimated version, work consistently well internationally and are easy to implement and interpret. Based on these considerations, this study used Altman Z-score model as a tool for bankruptcy prediction.

This study aims to determine whether there is an influence of bankruptcy prediction using the model of Altman Z-score in oil and gas companies listed on the IDX, the ASX and the SGX. Thus, the hypothesis of this study is:

**H1:** The decline in the price of Brent crude has an influence on the probability of bankruptcy on the company's oil and gas sector.

## **METHODS**

### **Research Methods**

This research is an an explanatory study or hypothesis testing study. Explanatory research aims to explain the relationship between two or more symptoms or variables. In this study the variables studied were stock prices as independent variables and the probability of bankruptcy as the dependent variable. The probability of bankruptcy is calculated using the Z-score of 20 companies listed on the Indonesia, Singapore and Australia stock exchanges. The Z-score value is calculated using 5 financial ratios as follows: X1 (Working Capital / Total Assets) to measure company's liquidity position, X2 (Retained Earnings / Total Assets) to measure the ability of a company's cumulative profit, X3 (Earning Before Interest and Tax / Total Asset), X4 (Market Value of Equity / Book Value of Debt), and X5 (Sales / Total Assets).

This study used secondary data. Data was obtained by downloading financial reports from the links [www.idx.co.id](http://www.idx.co.id), [www.asx.com.au](http://www.asx.com.au), and [www.sgx.com](http://www.sgx.com) and the market price of Brent type oil obtained from the link [www.investing.com](http://www.investing.com). The research instruments are the market prices of Brent type oil and the five financial ratios used in calculating Altman Z-score. While the complementary instruments in this study are documentation and

literature study instruments (library research).

This study examined 20 oil and gas companies in Indonesia, Singapore, and Australia from 2013 to 2015. The sampling method we used is the purposive sampling. The criteria used in the selection of the sample are (1) Companies that have a primary business activity in the oil and gas sector; (2) Listed in Indonesia Stock Exchange (IDX), Australian Securities Exchange (ASX) and Singapore Exchange (SGX) in the period of 2013-2015 with a complete financial data; (3) Prepare financial statements to the date of the financial end December 31; (4) Perform production activities (refinery).

### Variables

The dependent variable (Y) is the variable that is affected by the independent variable. The dependent variable in this research is the Z-Score resulting from the calculation of 5 financial ratios namely  $X_1$  (Working Capital / Total Assets) for measuring the liquidity position of a company,  $X_2$  (Retained Earnings / Total Assets) to measure the ability of a company's cumulative profit,  $X_3$  (Earning Before interest and Tax / Total Assets), and  $X_4$  (Market Value of Equity / Book Value of Debt) and  $X_5$  (Sales / Total Assets) these ratios were calculated based on the financial statements of oil and gas companies listed on the Indonesia Stock Exchange (IDX), the Australia Securities Exchange (ASX) and the Singapore Exchange (SGX). The formula of the Z-score is:

$$Z = 1.2X_1 + 1.47X_2 + 3.3X_3 + 0.6X_4 + 1.0X_5$$

The independent variables (X) are variables that affect the dependent variable. The independent variables used in this research is the market prices of Brent oil. The market prices of Brent crude are used as the benchmark prices of the world oil market. In addition to Brent crude, West Texas Intermediate crude is also commonly used as a benchmark in world of oil prices. Benchmarks for the light crude oil group is West Texas Intermediate (WTI) in North America and Brent crude in Europe and Africa. West Texas Intermediate and Brent are

the most famous oil prices markers for crude oil in the world market (Hammoudeh et al., 2008).

Today, Brent crude is more widely used as a benchmark, because it is used not only in Europe but also in the area of West Africa and the Mediterranean. Even the price of oil in Southeast Asia had already started to follow the benchmark oil price Brent (Nunan, 2012). Brent crude oil has more influence on the world of oil prices globally compared to WTI. This makes the price of Brent crude oil one of the best indicators of world oil prices.

### Data Analysis Method

To test the hypothesis developed in this study, we used regression analysis with the help of IBM SPSS Statistics software. There are three models of the regression equation which will be tested in this study, namely Indonesia regression model, the regression model of Australia, and the Singapore regression model. The regression equation used in this study is as follows:

$$PK = \alpha + \beta_1 HM_t + e$$

Information:

PK	= Probability of Bankruptcy
HM	= Oil Prices
$\alpha$	= Constant
$\beta_1$	= Regression Coefficient
e	= Error

## RESULTS AND DISCUSSION

### Results

Table 1 shows the comparison value of Z-score of the state of Indonesia, Australia, and Singapore. In 2013, 2014 and 2015, the country that have the highest average of Z-Score is Indonesia. While Australia have lowest average of Z-Score value. Most of the companies in these three countries experienced a decline in the value of their Z-score during the period of June 2013 to December 2015. 16 of the 20 companies analysed have a decreased Z-Score with the most downturn obtained with

the company Nido Petroleum (NDO) with a decrease of -198.06 percent. However, 4 of the 20 companies analysed have an increased Z-score during the period of June 2013 to December 2015. The companies Ratu Prabu Energi (ARTI), Radiant Utama Intersco (Ruis), Keppel Corp (BN4), and Swiber (BGK) with Swiber (BGK) are the companies that have the highest increase with a rate of 99.54 percent. Nevertheless, that does not mean those companies were not affected by the decrease in oil prices.

Table 1. Descriptive Statistics Analysis

Indonesia				
Year	Average	Std Deviaton	Min	Max
2013	2.69	2.392	0.749	7.33
2014	2.719	2.185	0.608	6.412
2015	1.61	1.254	-0.103	2.779
Australia				
Year	Average	Std Deviaton	Min	Max
2013	1.819	1.768	0.101	5.788
2014	1.251	1.636	-0.629	4.03
2015	0.219	1.227	-1.186	1.959
Singapore				
Year	Average	Std Deviaton	Min	Max
2013	2.252	0.645	1.562	3.222
2014	1.513	0.904	0.349	2.871
2015	1.313	0.875	-0.105	2.116

From the period of June 2013 until December 2015 the value of Z-score of companies does not always declined. Only three companies experience a continuous decrease from June 2013 until December 2015, namely Incremental Oil Gas (IOG), Tap Oil Limited (TAP), and Kris Energy Ltd (SK3). While other companies in Indonesia, Singapore, and Australia Z-score experienced rises and falls during the period June 2013 to December 2015.

The decline in world oil prices began in mid 2014. However, the effects of the decline started to affect companies in the early half of 2015. It can be seen from the Z-score of companies in the first semester of 2015 when compared with the value of their Z-score the second semester of 2014, 18 companies experienced a significant decline, while the two

remaining companies namely Santos Ltd. (STO) and Keppel Corp (BN4) experienced an insignificant increase or steady.

A Company is expected to bankrupt within one to two years if its value of the Z-Score was under 1.81. While a company considered financially healthy when its Z-Score is above 2.99. Companies that have a Z-Score values between 1.81 and 2.99 are believed to have a healthy financial condition but have the probability to go bankrupt if wrongly managed. In 2013, there were 10 of the 20 companies that have a Z-Score below 1.81, or in other words to be predicted bankrupt within one to two years. In 2014, the number of companies that have a value below 1.81 Z-Score increased to 11 from 20 companies. By 2015 the number of companies that have a Z-Score below 1.81 again increased to 14 from 20 companies.

It showed that the predicted outcome from Z-score calculation is that 10 out of 20 companies will be bankrupt within a period of one to two years. But it proved to be inaccurate because of those 10 companies are still in operation until 2015. There is some evidence suggesting why these Z-score failed to predict the bankruptcy of those companies, it is because those companies are multinational companies that have lines of business outside of the oil sector and the companies supported by the parent company has a strong financial condition or an enterprise supported by the state. In addition, anomaly of years studied, and the limited sample of data used can also be a cause of disruption of the value of Z-score.

**Classical Assumption Test**

Test for normality in this study is made using the Kolmogorov-Smirnov (K-S). If the significance value obtained is greater than 0.05, it can be concluded that the residual in the regression model are normally distributed. The test results of the all three regression models Indonesia, Australia, and Singapore showed that the residue in the regression model are normally distributed, namely 0056, 0569

and 0296. In other words, the regression model of the three countries are eligible to use because it has met the assumptions of normality of data.

Multicollinearity test was conducted using the Run Test. Data can be said autocorrelation free, if the significance value is greater than 0.05. The test results showed a significance level of each country, 0.398 for Indonesia model, 0.109 for Australia model, and 0.063 for Singapore model. The results of the third Run Test of these countries have a value above 0.05. It can be concluded that the residual value of the three models is random or there is no autocorrelation between residual value.

Heteroscedasticity test aims to test whether in a regression model, it occurs an inequal residual variance from one observation to another (Ghozali, 2013). Based on the scatterplot graph, there is no clear pattern, and dots spread randomly above and below the number 0 on the Y axis on the third regression model. These results indicate that all three models freed from their studies and have qualified heteroscedasticity regression analysis.

**Hypothesis Test**

This research was conducted using a significance level ( $\alpha$ ) of 0.05 or 5 percent. From the table 2, it can be notice that the  $t_{count}$  value obtained for the model of Indonesia is amounted to 3.263. This value was then compared with the value of the  $t_{table}$  on the t distribution table with  $\alpha = 0.05$ ,  $df = 34$  (36-1-1), for two-tailed test values we obtained  $t_{table} \pm$

2.032. From these values it can be seen that the  $t_{count}$  obtained amounted to 3.263, is outside of the t table value range (-2.032 and 2.032). In accordance with the criteria of testing the hypothesis that  $H_0$  rejected and  $H_1$  are accepted, meaning the price of oil significantly influence the probability of bankruptcy in the model of Indonesia.

From the table2, we can also see that the  $t_{count}$  value obtained by the Australian model is 3.178. This value was then compared with the value of the  $t_{table}$  on the t distribution table. With  $\alpha = 0.05$ ,  $df = 46$  (48-1-1), for two-tailed test values we obtained a value of  $t_{table} \pm 2.013$ . Therefore the value of  $t_{count}$  obtained 3,178, is outside the t table value range (-2.013 and 2.013). In accordance with the criteria of testing the hypothesis,  $H_0$  are rejected and  $H_1$  are accepted, meaning the price of oil significantly influence the probability of bankruptcy on the Australian model.

From the table2, the  $t_{count}$  value obtained is equal to 3,874 for the Singapore model. This value was also compared with the value of the  $t_{table}$  on the t distribution table. With  $\alpha = 0.05$ ,  $df = 34$  (36-1-1), for two-tailed test values we obtained a t tabel value of  $\pm 2.032$ . From these values it can be seen that the  $t_{count}$  we obtained was 3,874, which is outside of the  $t_{table}$  value range (-2.032 and 2.032). In accordance with the criteria of testing the hypothesis that  $H_0$  are rejected and  $H_1$  accepted, meaning the price of oil significantly influence the probability of bankruptcy on the Singapore model.

Table 2. t Test Result

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1 (Constant)	-.639	.957		-.688	.509
Indonesia	.036	.011	.488	3.263	.003
2 (Constant)	-.629	.596		-1.056	.296
Australia	.022	.007	.424	3.178	.003
3 (Constant)	.313	.340		.922	.363
Singapore	.015	.004	.553	3.873	.000

**Analysis Coefficient of Determination**

The coefficient of determination (R<sup>2</sup>) aims to measure how far is the ability of the model to explain the variations in the dependent variable. The coefficient of determination is between zero and one. A small (R<sup>2</sup>) value means that the ability of the independent variables in explaining the variation of the dependent variable is very limited. According to the table 3 the coefficient of determination is 21.6 percent for the Indonesian model. This shows that the price of oil contributed to the probability of bankruptcy in Indonesia for a value of 21.6 percent, while the remaining 78.4 percent is the contribution of other variables not examined in this study. Regarding the Australian model, we obtained a determination coefficient of 16.2 percent which means that the price of oil contributed to the probability of bankruptcy by 16.2 percent, while the remaining 83.8 percent is the contribution of other variables outside of our model. Finally, the value of the coefficient of determination for the Singapore model is 28.6 percent meaning that the price of oil contributed to the bankruptcy probability of 28.6 percent, while the remaining 71.4 percent is the contribution of other variables outside of our model.

**Discussion**

Based on the results of hypothesis testing, it was concluded that oil prices had a significant effect on the probability of bankruptcy in these 3 countries in the Asia Pacific: Indonesia, Australia and Singapore. This is evidenced by the significance value, which is 0.003 in Indonesia and Australia, and 0.000 in Singapore, which are smaller than the significance level of 0.05. It supports the research conducted by Rahmanto et al. (2016) and Witjaksono, A.A. (2010)

who found that world oil prices had a positive effect on the mining sector and JCI on the Indonesia Stock Exchange. Furthermore, this study supports the results of a report released by the Colonial First State entitled “The impact of lower oil prices on Australian equities” (2015) which states that the weakening of oil prices has a negative impact on the Australian stock market, especially in the energy sector. Also, this study is in line with the one of Chang, Y., & Wong, J. F. (2003) which states that oil price shock has a significant adverse effect on Singapore.

The variable oil price shows a positive and significant effect on the probability of bankruptcy. The results of this study indicate that when the world price of oil type Brent goes up, the value of Z-Score of a company will also go up. The lower the price of oil, the lower the sales of oil and gas of companies. With production costs that remain the same, it makes profits of companies become lower. This also has an impact on the decline in interest in investment in oil and gas companies, which can be seen from declining stock prices.

According to a report released by Deloitte (2016) entitled “The crude downturn for exploration & production companies”, as many as 35% of oil and gas companies around the world or as many as 175 companies are in high-risk quadrants. Most likely these companies will experience bankruptcy in 2016, unless oil prices recover. According to Z-Score calculation data, it is known that there are 14 oil and gas companies in 2015 that have a Z-Score below 1.81 that means they are likely to go bankrupt within one to two years. But according to the results of the

Table 3. Coefficient of Determination

Model	R	R Square	Adjusted R Square	Std. Error of the Estimated
Indonesia	.488 <sup>a</sup>	.238	.216	1.95189
Australia	.424 <sup>a</sup>	.180	.162	1.40374
Singapura	.553 <sup>a</sup>	.306	.286	.69285

Z-Score calculation in 2013 there were 10 oil and gas companies that would experience bankruptcy within a period of up to two years. This prediction of bankruptcy proved to be incorrect because all those 10 companies were still operating in 2015. Therefore, it is necessary to conduct further research on the accuracy of the predictions of the bankruptcy using the Altman Z-Score model in oil and gas companies.

### MANAGERIAL IMPLICATIONS

This study's findings have several implications for management boards of oil and gas companies. These implications are not only specific to oil and gas company in Asia-Pacific countries but could possibly be expanded to other countries. This research provides empirical evidence that oil price has an effect on the probability of bankruptcy. Thus, before the oil price turmoil occurred, company's managers should prepare a thorough financial and operational planning especially how they conduct efficiency and effectivity their operations since the oil price won't always be in a good position.

Our results also suggest that bankruptcy should be taken seriously as a determinant of market structure in hazardous industries like oil and gas companies. The oil and gas industry are vital to the global economy and to many national economies, including in developing and emerging countries. This means that the industry is also central to sustainable development, as oil and gas are key pillars of the global energy system and, as such, are drivers of economic and social development.

When the oil price is getting more and more low due to a lack of demand, this is the best time for oil and gas companies to look at investment opportunity in alternative source of energy or to participate more in a sustainable practice in production. For example, oil and gas company could focus on collaboration with UN Environment through the Partnership for Clean Fuels and Vehicles on lead removal from gasoline worldwide. Lead is a toxic substance that usually found in gasoline, that has been known for

many years to negatively affect child health and well-being (Aizer and Currie, 2018). The oil and gas companies can gain benefit from collaborating with stakeholders to broaden their impact and enhance their ability to leverage additional resources to achieve the Sustainable Development Goals (SDGs).

### CONCLUSION

Based on the results of data analysis and implication, we can draw several conclusions. Oil prices affect the probability of bankruptcy of oil and gas companies in the three countries studied. The price of oil in Indonesia has a significant influence on the probability of bankruptcy with the contribution of 21.6 percent. This shows that the price of oil contributed to the probability of bankruptcy in Indonesia by 21.6 percent, while the remaining 78.4 percent is the contribution of other variables outside of our model. Oil prices in Australia have a significant effect on the probability of bankruptcy with the contribution of 16.2 percent. This shows that the price of oil contributed to the probability of bankruptcy by 16.2 percent, while the remaining 83.8 percent is the contribution of other variables outside of our model. Oil prices in Singapore have a significant effect on the probability of bankruptcy with the contribution of 28.6 percent. This shows that the price of oil contributed to the bankruptcy probability of 28.6 percent, while the remaining 71.4 percent is the contribution of other variables outside of our model.

The variable oil price in Indonesia, Singapore, and Australia showed a positive and significant effect on the probability of bankruptcy. The results of this study indicate that the increase in world oil prices of Brent will increase a company's Z-Score. The lower the price of oil the decrease in sales in oil and gas companies. With production costs remain the same, this makes profit of the company go down. It is also impacted by the decline of interest in investment in oil and gas that can be seen from the decline in stock prices.

There are 10 of the 20 oil and gas companies in

Indonesia, Australia and Singapore, which have a Z-Score below 1.81, or in other words to be predicted bankrupt within one to two years. In 2014, the number of companies that have a value of Z-Score below 1.81 increased to 11. By 2015 the number of companies that have a Z-Score below 1.81 again increased to 14.

Our suggestions for future researchers are that, they could examine the effect of oil prices on the entire corporate sector. Moreover, future researchers can add more independent variable, control variables, or mediating variables to determine other variables that affect the probability of bankruptcy. Researchers can also use other bankruptcy prediction models such as Springate, Zmijewski, or CA-Score. ■

---

REFERENCES

---

- Aizer, A., & Currie, J. (2018). Lead and Juvenile Delinquency: New Evidence from Linked Birth, School and Juvenile Detention Records. *The Review of Economics and Statistics*. doi:10.1162/rest\_a\_00814
- Altman, E. I. (1968). Financial ratios, discriminant analysis and the prediction of corporate bankruptcy. *The Journal of Finance*, 23(4), 589–609.
- Altman, Edward I. and Iwanicz-Drozdzowska, Malgorzata and Laitinen, Erkki K. and Suvas, Arto, (2014). Distressed Firm and Bankruptcy Prediction in an International Context: A Review and Empirical Analysis of Altman's Z-Score Model (August 10, 2014).
- BPH Migas. 2016. Harga BBM di SPBU. Retrieved from <http://www.bphmigas.go.id/harga-bbm-di-spbu>
- Chang, Y., and Wong, J. F. (2003). *Oil price fluctuations and Singapore economy*. *Energy policy*, 31(11), 1151-1165.
- Colonial First State. (2015). *The impact of lower oil prices on Australian equities*. Retrieved from <http://www3.colonialfirststate.com.au/content/dam/wm/advisers/investments/docs/FS6219.pdf>
- Deloitte. (2016). *The crude downturn for exploration and production companies*. Deloitte Center for Energy Solutions. Retrieved from <http://www2.deloitte.com/us/en/pages/energy-and-resources/articles/the-crude-downturn-for-exploration-and-production-companies.html>
- Ghozali, I. (2011). Analisis Multivariate Program IBM SPSS 19. *Semarang: Badan Penerbit Universitas Diponegoro*.
- Hadi, S., and Anggraeni, A. (2008). Pemilihan Prediktor Delisting Terbaik (Perbandingan Antara The Zmijewski Model, The Altman Model, dan The Springate Model). *Jurnal Akuntansi and Auditing Indonesia*, 12(2).
- Hammoudeh, S. M., Ewing, B. T., and Thompson, M. A. (2008). Threshold cointegration analysis of crude oil benchmarks. *The Energy Journal*, 79-95.
- Kesicki, F. (2010). The third oil price surge – What's different this time? *Energy Policy*, 38(3), 1596–1606. <http://doi.org/10.1016/j.enpol.2009.11.044>
- Krauss, Clifford. (2016). Oil Prices Explained: Signs of a Modest Revival. *The New York Times*. Retrieved from <http://www.nytimes.com/interactive/2016/business/energy-environment/oil-prices.html>
- Mitra, S. (2007). Nonaudit Service Fees and Auditor Independence: Empirical Evidence from the Oil and Gas Industry. *Journal of Accounting, Auditing & Finance*, 22(1), 85–107.
- Mohammed, Shariq. 2016. Bankruptcy Prediction by Using the Altman Z-score Model in Oman: A Case Study of Raysut Cement Company SAOG and its subsidiaries, *Australasian Accounting, Business and Finance Journal*, 10(4), 2016, 70-80.
- Nizar, M. A. (2012). Dampak Fluktuasi Harga Minyak Dunia Terhadap Perekonomian Indonesia. *Buletin Ilmiah Litbang Perdagangan*, 6(2). Retrieved from <http://fiskal.depkeu.go.id/2010/adoku/2014kajianpkemCDampakFluktuasiHargaMinyakDunia.pdf>
- Nunan, Anthony. (2012). Brent Favored Over WTI Oil by U.S. for First Time. *Bloomberg*. Retrieved from <http://www.bloomberg.com/news/articles/2012-12-06/brent-favored-over-wti-by-u-s-for-first-time-as-prices-diverge>
- Rahmanto, F., Riga, M. H., and Indriana, V. (2016). The Effects of Crude Oil Price Changes on the Indonesian Stock Market: A Sector Investigation. *INDONESIAN CAPITAL MARKET REVIEW*, 8(1), 12–22.
- Witjaksono, A. A. (2010). Analisis Pengaruh Tingkat Suku Bunga SBI, Harga Minyak Dunia, Harga Emas Dunia, Kurs Rupiah, Indeks Nikkei 225, dan Indeks Dow Jones terhadap IHSG (studi kasus pada IHSG di BEI selama periode 2000-2009) *Jurnal Bisnis dan Akuntansi*, 10(2), 81-90.
- The World Bank. (2015). Bank Dunia: Prospek Ekonomi Global Membaik pada 2015, Namun Masih Berisiko. *The World Bank Press Release*. Retrieved from <http://www.worldbank.org/in/news/press-release/2015/01/13/global-economic-prospects-improve-2015-divergent-trends-pose-downside-risk>