Primary submission: 20.12.2018 | Final acceptance: 15.05.2019

Stock Market Trends and Oil Prices: Evidence from a Developing Country

Anggraini Dewi [1], Phonwattana Somsathid [2], Sudawan Somjai [3], Erlane K. Ghani [4], Zulfikar Bagus Pambuko [5]

ABSTRACT

This study examines the influence of oil prices, business size, and return on equity investment, market liquidity, systematic risk and portfolio investment on the Indonesian stock market. The main dependent variables of this stock market study are the four dimensions of stock market efficiency, stock market return, stock market valuation and stock market volatility. Data were gathered over the 2008-2016 period with annual observations for 30 firms currently listed in Indonesian financial markets. A two-fold regression analysis is applied. First, the impacts of explanatory variables on stock market indicators and oil prices is examined through a separate regression technique. Next, the lagged values of oil prices are added to the model to reflect their empirical influence on stock market measures. The study findings indicate that oil prices significantly affect all the performance indicators of the Indonesian stock market. Market liquidity also has a significant impact on the stock market. When the lagged predictors of stock market efficiency, stock market valuation, and stock market volatility were added, they were found to be significantly associated with the first lag of oil prices. These findings provide important justification of the literature on financial markets and their behavior when oil prices change. However, the study is limited with respect to other economic variables whose effects on the stock market is not observed. Future studies can address this constraint by taking the GDP, inflation, interest rates, and interaction of regional financial markets as core determinants of the local stock market in Indonesia.

KEY WORDS: Stock market efficiency, oil price volatility, Indonesia, financial market, GDP

JEL Classification:

[1] Universitas Mercu Buana, Indonesia; [2] Political Science Association of Kasetsart University, Thailand; [3] Suan Sunandha Rajabhat University, Thailand; [4] Universiti Teknologi Mara, Malaysia; [5] Universitas Muhammadiyah Magelang, Indonesia.

1. Introduction and Background

The association between oil price changes and their impact on the stock market has been explored in the vast body of literature. Over the past few years, significant changes in oil prices and their direct effect on the stock market in the world economy have been examined (Chen, Roll, & Ross, 1986; Kilian & Park, 2009). As the oil price factor has a vital part in the economy, changes in oil prices significantly affect various economic indicators and financial markets (Ghosh & Kanjilal, 2016; Jain & Biswal, 2016; Papapetrou, 2001). The global integration of various financial markets has created a flow of capital between economies and has also opened up various investment opportunities. In this regard, global investors move from one market to

Correspondence concerning this article should be addressed to: **Sudawan Somjai**, Graduate School, Suan Sunandha Rajabhat University, Bangkok, Thailand. E-mail: sudawan.so@ssru.ac.th

another to obtain better returns on their investments. Such investments are either in the form of physical or financial assets. In this regard, when international investors venture into the stock market, they are more vulnerable to changing economic and financial situations (Sassen, 1989; Vernon, 1966). Variations in oil prices are an important indicator for defining stock prices in the overall stock market. Both theoretical and empirical contributions in the literature indicate that oil prices shocks are directly impacting the expected rate of return in the market (Basher, Haug, & Sadorsky, 2016). In both developed and developing regions, the association between the stock market (SM) and oil prices (OP) is significantly addressed. However, there are various economies that have yet to be explored for this causal association, as the nature of the interaction varies between different regions.

In the Indonesian context, many targets for local stock markets have been established by the relevant authorities. For 2019, a goal was set to increase daily stock transactions to 600 million US dollars. The increase in transactions is expected to happen as a result of initial public offerings by more than 35 companies by the end of 2019. Additionally, the Financial Services Authority (FSA) and their board of commissioners have set a target for more local market stability (in financial terms) and good service provision.

In October 2018, the Jakarta Composite Index (JCI) experienced a weakening of 2.3% with net sales of RP 5.3 million. In addition, the bank capital adequacy ratio in September 2018 reached 23%, providing a good indicator for the stability of one role player in the financial markets. Figure 1 presents the annual stock market capitalization for the Indonesian economy for the 15 years from 2000 to 2015. It can be seen that there was a significant increase in the value of market capital from half a million to almost 6 million during this period. The graph in this figure presents the normal value as published by the CEIC Data (2019), while the Jakarta Composite Index is used for the normalization of all stocks traded in the Indonesian stock exchange.

This study observed trends in the Indonesian stock market through the factors of oil prices, stock market equity returns, business size, market liquidity, systematic risk, and portfolio investment. To the best of our knowledge, this study is among the first attempts to examine stock market performance through the four dimensions of market efficiency, market volatility, market return and market valuation. The next section presents the literature context. Section three explains the key variables of the study. Section four clarifies the research methods and study sample used. Section five presents the regression results, and the last section presents the study's conclusions, limitations, and some recommendations.

2. Literature Review

Various studies have examined the linkage between stock markets (SM) and changes in the price of oil. Jain and Biswal (2016) have observed the factors of stock and oil prices, gold prices, and exchange rate dynamics for the Indian stock market. They explained that India is a major importer of oil and gold from around the world, and that this activity is directly associated with the stock market, as seen in exchange rate movements. The Indian exchange rate and stock market trends are observed empirically through nonlinear causality and time varying correlations with oil prices. These authors found that, during the study period of 2008-2013, a correlation exists between crude oil prices and various other indicators in the Indian economy. Research conducted by Kang, Ratti, & Yoon (2015) studied oil price shocks and stock market. Key highlights of their study indicate that there is covariance between volatility and daily stock data, while a negative association exists between the stock price and the stock market.

A research study conducted by (Dębski, Feder-Sempach & Wójcik, 2018; Diaz, Molero, & de Gracia, 2016; Sadorsky, 2009) examined oil price volatility and stock returns in G7 countries using monthly data from 1970 to 2014. To measure the oil price volatility, they considered alternative measures for oil prices such as nominal, real, world prices, etc. The estimation model used in the study is based on a vector auto regression that considered interest rates, economic activities, stock return, and volatility in oil prices. Authors such as Bagirov & Mateus (2019) have explored the relationship between the stock market and oil prices from the financial performance of gas companies in Europe. The findings of their study describe a relationship between stock markets in Europe and oil prices. In addition, their findings also reveal a spillover association between the two. There are some other factors that put pressure on the performance indicators of firms that are not listed on the stock market. Mokni and Youssef

 DOI: 10.5709/ce.1897-9254.318

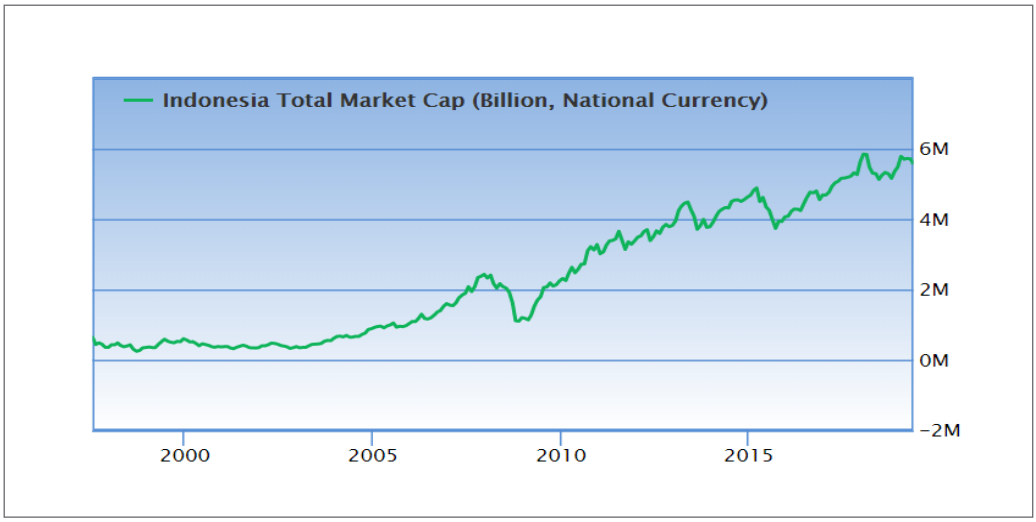

Figure 1. Total Market Capitalization in Indonesia
Source: Adapted from "Indonesia Market Capitalization: % of GDP" by CEIC Data (2019). Available at https://www.ceicdata.com/en/indicator/indonesia/market-capitalization--nominal-gdp

(2019) explained that there is a significant and positive association of persistence between crude oil prices and stock markets in GCC countries. Additionally, empirical facts explain that after the recent oil price collapse in 2014, there was a dependence between crude oil prices and stock markets in the GCC region. Their findings are very reliable for decision-making when forecasting the stock index based on the news from oil markets. Research work conducted by Roubaud & Arouri (2018) revealed the association between oil prices, the exchange rate and the stock market under a situation of risk and uncertainty. By applying VAR and MS-VAR methods, they found a significant relationship between oil, stock markets, and currency that is nonlinear in nature. In addition, the association between the variable is not the same for all regions, and oil prices play a major role between stock market and exchange rate factors (Ho & Iyke, 2017).

From the context of OP and SM, the trend in the literature does not indicate a causal association between the two, but it does when some other explanatory variables are present. In this regard, research conducted by the following authors have focused on the stock market, changes in oil prices, portfolio investment, and market risk factors (Apergis, 2019; Arouri & Nguyen, 2010; Degiannakis, Filis, & Kizys, 2014; Ghouma & Hewitt, 2019; Khalfaoui, Sarwar, & Tiwari, 2019; Li, Cheng, & Yang, 2015; Mohanty, Nandha, Turkistani, & Alaitani, 2011; Sadorsky, 1999; Wei, 2003; Wen, Wang, Ma, & Wang, 2019). Their findings demonstrate that significant association exists between all these variables. Additionally, the regional context of stock markets and oil price volatility has also been observed in the current literature. Notable studies conducted by Click & Plummer (2005) and Lucas (1993) have examined Asian markets, while Masih, Peters, & De Mello (2011) consider South Korea and emerging markets, Malik & Hammoudeh (2007) examined US and Gulf State equity markets, Bastianin, Conti, & Manera (2016) examined G7 countries, and Gan, Lee, Yong, & Zhang (2006) looked at the New Zealand market. To the best of our knowledge, this study is one of the first attempts to examine the empirical and causal association between oil prices, stock market indicators, investment opportunities, systematic risk, market liquidity and portfolio investment for the Indonesian context. This study also provides a theoretical background for this association, as the current literature has not focused on Indonesia.

Table 1. Definition of Variables

Variable Nature	Variable Name	Abbreviation	Literature Source
Dependent	Stock market efficiency	SMEFFICIENCY	(Jegadeesh & Titman, 1993)
	Stock market return	SMRETURN	(Zhong & Enke, 2017)
	Stock market valuation	SMEVAULATION	(Li, Zhang, & Xiao, 2017)
	Stock market volatility	SMVOLATILITY	(Adam, Marcet, & Nicolini, 2016)
Independent	Oil price	OILPRICE	(Degiannakis et al., 2014)
	Return on equity	ROE	(Gitman, Juchau, & Flanagan, 2015)
	Business size	SIZE	(Kamran, Khan, & Sharif, 2016)
	Market liquidity	MARKETLIQU~Y	(Gitman et al., 2015)
	Portfolio investment	PORTFOLIOI~S	(Gitman et al., 2015)
	Systematic risk	SYSRISK	(Gitman et al., 2015)

3. Description of Variables

The current study employs four dependent measures as the dependent variables, as well as six different independent variables. The definition and rationale for including these variables in the model are presented in Table 1.

4. Study Sample and Research Methods

This study uses a sample of 30 firms listed in the Indonesian stock market, with annual observations for the of 2008-2016 period. Data was collected from official company sources, online portals, and annual reports. As for the methodology, a multiple regression approach was applied. The following regression equations explore the relationship between the regressors and outcomes. Equation 1 explores the causal association between stock market efficiency and regressors, while Equation 2 uses stock market returns as the main dependent variables of the study. Equation 3 considers stock market valuation, and Equation 4 considers stock market volatility as key outcome factors.

$$\begin{aligned}&\text{Stock Market Efficiency}(\text{SMEFFICIENCY})=\\&=\alpha+\beta1(\text{Oil price}:\text{OILPRICE})i,t+\\&+\beta2(\text{Return on Equity}:\text{ROE})i,t+\\&+\beta3(\text{Size of business}:\text{SIZE})i,t+\\&+\beta4(\text{Market liquidity}:\text{MARKETLIQU}\sim\text{Y})+\\&+\beta5(\text{Portoflio Investment}:\ \text{PORTFOLIOI}\sim\text{S})i,t+\\&+\beta6(\text{Systematic Risk: SYSRISK})i,t+\epsilon\end{aligned}\quad(1)$$

$$\begin{aligned}&\text{Stock Market Return}(\text{SMRETURN})=\\&=\alpha+\beta1(\text{Oil price}:\text{OILPRICE})i,t+\\&+\beta2(\text{Return on Equity}:\text{ROE})i,t+\\&+\beta3(\text{Size of business}:\text{SIZE})i,t+\\&+\beta4(\text{Market liquidity}:\text{MARKETLIQU}\sim\text{Y})+\\&+\beta5(\text{Portoflio Investment}:\ \text{PORTFOLIOI}\sim\text{S})i,t+\\&+\beta6(\text{Systematic Risk}:\text{SYSRISK})i,t+\epsilon\end{aligned}\quad(2)$$

$$\begin{aligned}&\text{Stock Market Valuation}(\text{SMEVAULATION})=\\&=\alpha+\beta1(\text{Oil price}:\text{OILPRICE})i,t+\\&+\beta2(\text{Return on Equity}:\text{ROE})i,t+\\&+\beta3(\text{Size of business}:\text{SIZE})i,t+\\&+\beta4(\text{Market liquidity}:\text{MARKETLIQU}\sim\text{Y})+\\&+\beta5(\text{Portoflio Investment}:\ \text{PORTFOLIOI}\sim\text{S})i,t+\\&+\beta6(\text{Systematic Risk}:\text{SYSRISK})i,t+\epsilon\end{aligned}\quad(3)$$

$$\begin{aligned}&\text{Stock Market Volatility}(\text{SMVOLATILITY})=\\&=\alpha+\beta1\ (\text{Oil price: OILPRICE})i,t+\\&+\beta2(\text{Return on Equity}:\text{ROE})i,t+\\&+\beta3(\text{Size of business}:\text{SIZE})i,t+\\&+\beta4(\text{Market liquidity}:\text{MARKETLIQU}\sim\text{Y})+\\&+\beta5(\text{Portoflio Investment}:\text{PORTFOLIOI}\sim\text{S})i,t+\\&+\beta6(\text{Systematic Risk}:\text{SYSRISK})i,t+\epsilon\end{aligned}\quad(4)$$

After testing the empirical relationship between variables, Equations 5-8 consider oil price lagged values as the explanatory variables of the study. The reason for testing this relationship is that an extensive body

 DOI: 10.5709/ce.1897-9254.318

Table 2. Descriptive Facts of the Study

Variables	Mean	Std.Dev.	Min	Max	p1	p99	Skew.	Kurt.
SMEFFICIENCY	4.5	2.65	-0.26	8.65	0.4328196	0.32599835	-0.007	2.150
SMRETURN	3.87	1.68	-0.26	4.62	0.7116359	0.15813322	-0.011	3.960
SMEVAULATION	1.62	0.62	-0.26	6.64	0.2133487	0.14488957	-0.007	4.10
SMVOLATILITY	6.671	2.91	-0.26	9.29	0.5604856	0.59860549	-0.007	4.00
OILPRICE	56.97	4.87	-0.26	40.5	0.087688	0.10941234	-0.042	4.00
ROE	1.62	0.62	-0.26	6.87	0.9951842	0.31020614	-0.041	1.00
SIZE	10.62	4.924	-0.26	11.2	0.2849624	0.52785973	-0.063	2.00
MARKETLIQU~Y	6.97	3.97	-0.26	8.61	0.5283291	0.2408679	-0.023	3.00
PORTFOLIOI~S	22.64	10.35	-0.25	18.2	0.0452188	0.57884862	0.021	2.00
SYSRISK	2.65	6.87	-0.25	13	0.3714553	0.0491758	0.01	4.00

of literature has covered the impact of lagged values of oil prices as having a significant effect on stock market performance. Therefore, the following equations were also developed and tested.

$$\begin{aligned}&\text{Stock Market Efficiency(SMEFFICIENCY)}=\\&=\alpha+\beta1(\text{Oil price: OILPRICE})i,t+\\&+\beta2\,(\text{Return on Equity: ROE})i,t+\\&+\beta3\,(\text{Size of business: SIZE})i,t+\\&+\beta4\,(\text{Market liquidity: MARKETLIQU~Y})+\\&+\beta5\,(\text{Portoflio Investment: PORTFOLIOI~S})i,t+\\&+\beta6\,(\text{Systematic Risk: SYSRISK})i,t+€\end{aligned}\tag{5}$$

$$\begin{aligned}&\text{Stock Market Return}\,(\text{SMRETURN})=\\&=\alpha+\beta1(\text{Oil price lagged}:\text{OILPRICEL1})i,t+\\&+\beta2\,(\text{Return on Equity}:\text{ROE})i,t+\\&+\beta3\,(\text{Size of business}:\text{SIZE})i,t+\\&+\beta4\,(\text{Market liquidity}:\text{MARKETLIQU}\sim\text{Y})+\\&+\beta5\,(\text{Portoflio Investment}:\ \text{PORTFOLIOI}\sim\text{S})i,t+\\&+\beta6\,(\text{Systematic Risk}:\text{SYSRISK})\,i,t+€\end{aligned}\tag{6}$$

$$\begin{aligned}&\text{Stock Market Valuation}\,(\text{SMEVAULATION})\,=\\&=\alpha+\beta1\,(\text{Oil price lagged}:\text{OILPRICEL1})i,t+\\&+\beta2\,(\text{Return on Equity}:\text{ROE})i,t+\\&+\beta3\,(\text{Size of business}:\text{SIZE})i,t+\\&+\beta4\,(\text{Market liquidity}:\text{MARKETLIQU}\sim\text{Y})+\\&+\beta5\,(\text{Portoflio Investment}:\ \text{PORTFOLIOI}\sim\text{S})i,t+\\&+\beta6\,(\text{Systematic Risk}:\text{SYSRISK})\,i,t+€\end{aligned}\tag{7}$$

$$\begin{aligned}&\text{Stock Market Volatility}\,(\text{SMVOLATILITY})=\\&=\alpha+\beta1(\text{Oil price lagged}:\text{OILPRICEL1})i,t+\\&+\beta2\,(\text{Return on Equity}:\text{ROE})\,i,t+\\&+\beta3(\text{Size of business}:\text{SIZE})i,t+\\&+\beta4\,(\text{Market liquidity}:\text{MARKETLIQU}\sim\text{Y})+\\&+\beta5\,(\text{Portoflio Investment}:\ \text{PORTFOLIOI}\sim\text{S})i,t+\\&+\beta6\,(\text{Systematic Risk}:\text{SYSRISK})i,t+€\end{aligned}$$

5. Results and Discussion

Table 2 presents the descriptive statistics of the study for the four measures: stock market efficiency (SMEFFICIENCY), stock market return (SMRETURN), stock market valuation (SMEVALUATION), and stock market volatility (SMVOLATITY). The stock market efficiency mean value is 4.5, and it has a deviation of 2.66, a minimum score of -0.26, and a maximum score of 8.65. The stock market return factor has an average value of 3.87 and a maximum trend of 4.62. The highest mean score (6.671) was for stock market volatility, the oil price average trend is 56.97, and for size, it is 10.62. Additionally, the portfolio investment log trend is 22.64, with a deviation of 10.35, while systematic risk (as measured through the level of inflation in the economy) is 2.35 with a deviation of 6.87.

Table 3 presents the regression findings for stock market efficiency through oil prices, overall return on equity, listed company size, systematic risk, market liquidity and portfolio investment. It is observed that the oil price has

Table 3. Linear Regression for Stock Market Efficiency

SMEFFICIENCY	COEF.	SE	T-VALUE	P-VALUE	SIG.
OILPRICE	0.231	0.131	1.76	0.082	*
ROE	0.111	0.109	1.56	0.122	
SIZE	-0.082	0.102	-0.81	0.423	
SYSRISK	0.120	0.079	1.52	0.132	
MARKETLIQUDITY	0.534	0.113	4.75	0.000	***
PORTFOLIOINVS	0.024	0.110	0.22	0.830	
_CONS	0.197	0942	0.35	0.729	
MEAN DV	0.015	SD: DV			0.080
R2	0.741	OBSERVATIONS			270
F-STATISTICS	4.942	P>F			0.000

*** P<0.01, ** P<0.05, * P<0.1 Indicates level of significance

Table 4. Linear Regression for Stock Market Return

SMRETURN	COEF.	SE	T-VALUE	P-VALUE	SIG.
OILPRICE	0.065	0.097	6.41	0.000	***
ROE	0.622	0.117	6.39	0.000	***
SIZE	0.003	0.090	0.03	0.974	
SYSRISK	0.012	0.070	0.17	0.868	
MARKETLIQUDITY	0.197	0.100	1.97	0.052	*
PORTFOLIOINVS	0.103	0.098	1.05	0.295	
_CONS	0.621	0.641	0.31	0.760	
MEAN DV	0.015	SD: DV			0.080
R2	0.482	OBSERVATIONS			270
F-STATISTICS	5.841	P>F			0.000

*** P<0.01, ** P<0.05, * P<0.1 Indicates level of significance

a coefficient of 0.231, with a standard error of 0.131 for stock market efficiency in Indonesia. This effect is found to be significant at 10%, as the t-value is just approaching the threshold point of 1.96. This means that oil prices in Indonesia are directly associated with stock market efficiency. More efficiency is observed when the prices are under robust control, while factors such as ROE, size, systematic risk and portfolio investment are found to be insignificant indicators of efficiency in the Indonesian stock market. For market liquidity, the effect on stock market efficiency is 0.534, which is significant at 1%.

The linear regression results presented in Table 4 provides the empirical findings for the stock market return factor using the study's set of explanatory variables. Again, it was observed that oil prices directly impact the stock market returns with a coefficient of 0.065 and a standard error of 0.097. This impact is significant at a 1% probability of error. There is a significantly positive influence on the return on equity (ROE) of firms listed on stock market, with a coefficient of 0.622 and a standard error of 0.117. The company size factor is found to be an insignificant determinant of

Table 5. Linear Regression for Stock Market Volatility

SMEVAULATION	COEF.	SE	T-VALUE	P-VALUE	SIG.
OILPRICE	0.228	0.131	1.76	0.082	*
ROE	0.187	0.109	1.56	0.122	
SIZE	-0.092	0.102	-0.81	0.423	
SYSRISK	0.119	0.079	1.52	0.132	
MARKETLIQUDITY	0.530	0.113	4.75	0.000	***
PORTFOLIOINVS	0.028	0.110	0.22	0.830	
_CONS	0.297	0.174	0.35	0.729	
MEAN DV	0.015	SD: DV			0.080
R2	0.614	OBSERVATIONS			268
F-STATISTICS	4.942	P>F			0.000
*** P<0.01, ** P<0.05, * P<0.1 Indicates level of significance					

Table 6. Linear Regression For Stock Market Efficiency

SMVOLATILITY	COEF.	SE	T-VALUE	P-VALUE	SIG.
OILPRICE	0.492	0.131	1.76	0.082	*
ROE	0.172	0.109	1.56	0.122	
SIZE	-0.092	0.102	-0.81	0.423	
SYSRISK	0.129	0.079	1.52	0.132	
MARKETLIQUDITY	0.531	0.113	4.75	0.000	***
PORTFOLIOINVS	0.029	0.110	0.22	0.830	
_CONS	0.631	0.124	0.35	0.729	
MEAN DV	0.015	SD: DV			0.080
R2	0.567	OBSERVATIONS			270
F-STATISTICS	4.942	P>F			0.000
*** P<0.01, ** P<0.05, * P<0.1 Indicates level of significance					

stock market return in Indonesia. Regarding market liquidity, the coefficient of 0.197 reflects the t-statistic of 1.97, significant at 10%. This means that higher levels of market liquidity lead to higher stock market returns. The portfolio investment factor has a positive but insignificant impact on stock market returns.

The stock market valuation presented in Table 5 has an oil price coefficient of 0.231 and a standard error of 0.131. This means that oil prices in Indonesia also have a direct influence on stock market valuation. The effects of ROE, company size and systematic risk are again found to be insignificant for stock market valuation. Regarding market liquidity, the coefficient is 0.530, and the standard error is 0.113. This shows that higher market liquidity leads to a higher stock market valuation in Indonesia. Overall, the variation explained by all independent variables is 0.614. The value of the F-test is 4.942, which is significant at 5%. This means that all coefficients are significantly different from zero, indicating their marginal effect on stock market valuation. Table 6 presents the regression results for stock market volatility as the main outcome

factor. We again found that the effect of the price of oil is positively significant, which means that stock market volatility is increasing due to increasing oil prices in Indonesia. This effect is significant at 10%. Additionally, market liquidity is directly associated with stock market volatility at a 1% percent probability of error.

Table 7 presents the stock market efficiency results using the set of explanatory variables, with the addition of lagged values for OILPRICEL1. The findings with the lagged oil price values indicate that past oil price values through lag 1 are directly and significantly associated with stock market efficiency. In addition, it was found that only the effect of stock market liquidity is positively significant at 1% percent, with the coefficient of 0.934. This means that more stock market efficiency is observed through market liquidity, and stock market efficiency is significantly positive.

Table 8 presents the regression results for stock market returns using the lagged predictor of oil prices along with other explanatory variables of the study. The lagged oil price values are not observed to significantly affect stock market returns. However, through return on equity, the stock market return is found to be significantly and positive associated, with a coefficient of 0.621 and a standard error of 0.097. The F-test result for this model indicates that it is a good fit with an explained variation of 0.687. In addition, Tables 9 and 10 present the effect of lagged predictors on stock market valuation and volatility for the sample period.

6. Conclusions and Recommendations

This study examined the relationship between stock market efficiency measures and oil prices in Indonesia using the factors of overall equity return, business size, systematic risk, market liquidity and portfolio investment. The study used a data sample of 30 listed firms with annual observations from 2008 to 2016. To measure the overall performance of the Indonesian stock market, the key indicators used are stock market efficiency, stock market return, stock market valuation, and stock market volatility. While from the overall economy, oil prices reflect the characteristics of macroeconomic indicators with other measures from financial market. Under the first regression model, key determinants for stock market efficiency are oil prices and market liquidity during the sample period. For stock market return, it is observed that oil price found to be an insignificant determinant, but the effect of overall return on equity for selected firms and market liquidity is positively significant. Regarding stock market valuation, the price of oil is found to be a significant indicator, with a positive and direct influence, along with market liquidity. Regarding stock market liquidity, it is observed that the price of oil has a direct influence on the Indonesian stock market, along with market liquidity. For the lagged predictors of oil prices, the first lag is calculated to identify its causal relationship with all the stock market measures. With the presence of the first lag in the model, the price of oil and market liquidity are significant determinants of overall stock market efficiency. Regarding stock market returns, the effect of lagged oil price values is insignificant but is significant for overall return on equity and market liquidity factors. Additionally, the stock market valuation is directly influenced by the lagged oil price values, market liquidity and portfolio investment. With oil price L1, stock market volatility and market liquidity are found to be significant determinants for the full sample of the study. These findings indicate that stock market performance is directly influenced by the price of oil and also its lagged values. In addition, market liquidity is another indicator that has a direct impact on various stock market measures. Therefore, it is believed that significant attention needs to be focused on the price of oil in Indonesia for a better understanding of stock market trends. In the meantime, the market liquidity factor indicates that more liquid financial markets produce better efficiency, valuations and returns in the stock market. These findings are beneficial for both businesses and national decision-makers to achieve better stock market stability. Regarding the limitations of the study, this work considered a sample of only 30 firms listed on the Indonesian stock market, which could be expanded in the future. Secondly, stock market trends are also influenced by other macroeconomic indicators such as changes in economic growth, credit opportunities, country stability and governance, interest rates, and inflation levels. Future studies could address these factors as well.

 DOI: 10.5709/ce.1897-9254.318

Table 7. Linear Regression For Stock Market Efficiency

SMEFFICIENCY	COEF.	SE	T-VALUE	P-VALUE	SIG.
OILPRICE	0.431	0.066	6.50	0.000	***
ROE	0.171	0.145	1.18	0.241	
SIZE	-0.092	0.180	-0.68	0.498	
SYSRISK	0.130	0.092	1.31	0.194	
MARKETLIQUDITY	0.934	0.081	3.33	0.001	***
PORTFOLIOINVS	0.024	0.154	0.15	0.878	
_CONS	0.745	0.157	0.30	0.762	
MEAN DV	0.015	SD: DV			0.080
R2	0.487	OBSERVATIONS			261
F-STATISTICS	5.155	P>F			0.000
*** P<0.01, ** P<0.05, * P<0.1 Indicates level of significance					

Table 8. Linear Regression for Stock Market Return

SMRETURN	COEF.	SE	T-VALUE	P-VALUE	SIG.
OILPRICEL1	0.194	0.254	0.55	0.581	
ROE	0.621	0.097	6.39	0.000	***
SIZE	0.614	0.901	0.003	0.174	
SYSRISK	0.418	0.087	0.170	0.184	
MARKETLIQUDITY	0.187	0.018	2.01	0.005	***
PORTFOLIOINVS	0.103	0.098	1.05	0.295	
_CONS	0.934	0.185	0.54	0.760	
MEAN DV	0.015	SD: DV			0.080
R2	0.687	OBSERVATIONS			262
F-STATISTICS	5.682	P>F			0.000
*** P<0.01, ** P<0.05, * P<0.1 Indicates level of significance					

Table 9. Linear Regression for Stock Market Valuation

SMEVAULATION	COEF.	SE	T-VALUE	P-VALUE	SIG.
OILPRICEL1	0.157	0.621	1.76	0.082	*
ROE	0.974	0.046	1.56	0.122	
SIZE	-0.363	0.943	-0.81	0.423	
SYSRISK	0.197	0.098	1.52	0.132	
MARKETLIQUDITY	0.287	0.126	4.75	0.000	***
PORTFOLIOINVS	0.187	0.635	0.22	0.830	
_CONS	0.145	0.018	3.45	0.000	***
MEAN DV	0.015	SD: DV			0.080
R2	0.657	OBSERVATIONS			263
F-STATISTICS	4.942	P>F			0.000
*** P<0.01, ** P<0.05, * P<0.1 Indicates level of significance					

Table 10. Linear Regression for Stock Market Volatility

SMVOLATILITY	COEF.	SE	T-VALUE	P-VALUE	SIG.
OILPRICEL1	0.411	0.131	1.76	0.082	*
ROE	0.129	0.109	1.56	0.122	
SIZE	-0.192	0.102	-0.81	0.423	
SYSRISK	0.364	0.371	0.52	0.132	
MARKETLIQUDITY	0.624	0.113	4.75	0.000	***
PORTFOLIOINVS	0.258	0.110	0.22	0.830	
_CONS	0.197	0.145	0.350	0.729	
MEAN DV	0.015	SD: DV			0.080
R2	0.361	OBSERVATIONS			270
F-STATISTICS	4.942	P>F			0.000

*** P<0.01, ** P<0.05, * P<0.1 Indicates level of significance

References

Adam, K., Marcet, A., & Nicolini, J. P. (2016). Stock market volatility and learning. *The Journal of finance, 71*(1), 33-82.

Apergis, N. (2019). Oil prices and corporate high-yield spreads: Evidence from panels of nonenergy and energy European firms. *The Quarterly Review of Economics and Finance, 72*, 34-40.

Arouri, M. E. H., & Nguyen, D. K. (2010). Oil prices, stock markets and portfolio investment: evidence from sector analysis in Europe over the last decade. *Energy Policy, 38*(8), 4528-4539.

Bagirov, M., & Mateus, C. (2019). Oil prices, stock markets and Firm performance: Evidence from Europe. *International Review of Economics & Finance, 61*, 270-288.

Basher, S. A., Haug, A. A., & Sadorsky, P. (2016). The impact of oil shocks on exchange rates: A Markov-switching approach. *Energy Economics, 54*, 11-23.

Bastianin, A., Conti, F., & Manera, M. (2016). The impacts of oil price shocks on stock market volatility: Evidence from the G7 countries. *Energy Policy, 98*, 160-169.

CEIC Data. (2019). Indonesia Market Capitalization: % of GDP. Available at https://www.ceicdata.com/en/indicator/indonesia/market-capitalization--nominal-gdp

Chen, N. F., Roll, R., & Ross, S. A. (1986). Economic forces and the stock market. *The Journal of Business, 59*(3), 383-403.

Click, R. W., & Plummer, M. G. (2005). Stock market integration in ASEAN after the Asian financial crisis. *Journal of Asian Economics, 16*(1), 5-28.

Dębski, W., Feder-Sempach, E., & Wójcik, S. (2018). Statistical Properties of Rates of Return on Shares Listed on the German, French, and Polish Markets-a Comparative Study. *Contemporary Economics, 12*(1), 5-16.

Degiannakis, S., Filis, G., & Kizys, R. (2014). The effects of oil price shocks on stock market volatility: Evidence from European data. *The Energy Journal, 35*(1), 35-56.

Diaz, E. M., Molero, J. C., & de Gracia, F. P. (2016). Oil price volatility and stock returns in the G7 economies. *Energy Economics, 54*, 417-430.

Gan, C., Lee, M., Yong, H. H. A., & Zhang, J. (2006). Macroeconomic variables and stock market interactions: New Zealand evidence. *Investment Management and Financial Innovations, 3*(4), 89-101.

Ghosh, S., & Kanjilal, K. (2016). Co-movement of international crude oil price and Indian stock market: Evidences from nonlinear cointegration tests. *Energy Economics, 53,* 111-117.

Ghouma, H. H., & Hewitt, C. S. (2019). Lobbying Expenditures And Sin Stock Market Performance. *Research in International Business and Finance, 49*, 176-190.

Gitman, L. J., Juchau, R., & Flanagan, J. (2015). Principles of managerial finance (6th ed.). Melbourne: Pearson Education Australia.

Ho, S. Y., & Iyke, B. N. (2017). On the causal links between the stock market and the economy of Hong Kong. *Contemporary Economics, 11*(3), 343-363.

Jain, A., & Biswal, P. (2016). Dynamic linkages among oil price, gold price, exchange rate, and stock market in India. *Resources Policy, 49*, 179-185.

Jegadeesh, N., & Titman, S. (1993). Returns to buying winners and selling losers: Implications for stock market efficiency. *The Journal of Finance, 48*(1), 65-91.

Kamran, H. W., Khan, M. U., & Sharif, S. (2016). Capital Structure Determinants: Evidence from Banking Sector of Pakistan. *Research Journal of Finance and Accounting, 5*(19), 59-66.

Kang, W., Ratti, R. A., & Yoon, K. H. (2015). The impact of oil price shocks on the stock market return and volatility relationship. *Journal of International Financial Markets, Institutions and Money, 34*, 41-54.

Khalfaoui, R., Sarwar, S., & Tiwari, A. K. (2019). Analysing volatility spillover between the oil market and the stock market in oil-importing and oil-exporting countries: Implications on portfolio management. Resources Policy, 62, 22-32.

Kilian, L., & Park, C. (2009). The impact of oil price shocks on the US stock market. *International Economic Review, 50*(4), 1267-1287.

Li, Q., Cheng, K., & Yang, X. (2015). Impacts of oil price shocks on the returns of China's listed oil companies. *Energy Procedia, 75*, 2604-2609.

Li, X., Zhang, J., & Xiao, Z. (2017). Accounting earnings, Market valuation and economic growth. *Journal of Accounting and Economics, 5*. Available at http://en.cnki.com.cn/Article_en/CJFDTotal-LXGZ201705004.htm

Lucas, R. E. (1993). On the determinants of direct foreign investment: evidence from East and Southeast Asia. *World development, 21*(3), 391-406.

Malik, F., & Hammoudeh, S. (2007). Shock and volatility transmission in the oil, US and Gulf equity markets. *International Review of Economics & Finance, 16*(3), 357-368.

Masih, R., Peters, S., & De Mello, L. (2011). Oil price volatility and stock price fluctuations in an emerging market: evidence from South Korea. *Energy Economics, 33*(5), 975-986.

Mohanty, S. K., Nandha, M., Turkistani, A. Q., & Alaitani, M. Y. (2011). Oil price movements and stock market returns: Evidence from Gulf Cooperation Council (GCC) countries. *Global Finance Journal, 22*(1), 42-55.

Mokni, K., & Youssef, M. (2019). Measuring persistence of dependence between crude oil prices and GCC stock markets: A copula approach. *The Quarterly Review of Economics and Finance, 72*, 14-33.

Papapetrou, E. (2001). Oil price shocks, stock market, economic activity and employment in Greece. *Energy Economics, 23*(5), 511-532.

Roubaud, D., & Arouri, M. (2018). Oil prices, exchange rates and stock markets under uncertainty and regime-switching. *Finance Research Letters, 27*, 28-33.

Sadorsky, P. (1999). Oil price shocks and stock market activity. *Energy Economics, 21*(5), 449-469.

Sadorsky, P. (2009). Renewable energy consumption, CO2 emissions and oil prices in the G7 countries. *Energy Economics, 31*(3), 456-462.

Sassen, S. (1989). Finance and business services in New York City: International linkages and domestic effects. In L. Rodwin, & H. Sazanami (Eds.), Deindustrialization and regional economic transformation. The Experience of the United States (pp. 132-290). London, UK: Unwin Hyman Ltd.

Vernon, R. (1966). International investment and international trade in the product cycle. *The Quarterly Journal of Economics, 80*(2), 190-207.

Wei, C. (2003). Energy, the stock market, and the putty-clay investment model. *American Economic Review, 93*(1), 311-323.

Wen, D., Wang, G. J., Ma, C., & Wang, Y. (2019). Risk spillovers between oil and stock markets: A VAR for VaR analysis. *Energy Economics, 80*, 524-535.

Zhong, X., & Enke, D. (2017). Forecasting daily stock market return using dimensionality reduction. *Expert Systems with Applications, 67*, 126-139.

 DOI: 10.5709/ce.1897-9254.318