# The Effect of Crude Oil Price and Macro Economic Variables on Aggregate Stock Index in Emerging Capital Markets Southeast Asia's

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abstract: - this study analyzes the effect of crude oil price and macroeconomic variables in the composite index in emerging capital markets southeast asia's countries include singapore, indonesia, malaysia, , philippines, and thailand. this study uses time series data 2005 to 2017 data on crude oil price, inflation, interest rates, exchange rates, gdp, primary commodity price and wage with generalized autoregressive conditional heteroscedasticity models (garch) analyzing techniques. the results in inflation have a negative significant effect on composite index. in thailand, inflation has a positive and significant effect on composite index. interest rates have a significant negative effect on composite index only in thailand. in singapore, indonesia, malaysia, and philippines interest rate has a positive significant effect on composite index. the exchange rate has a positive significant effect on the composite index in malaysia and thailand. while in indonesia, even the exchange rate has a negative effect on composite index but not significant. gdp has a positive and significant effect on composite index.

key words: crude oil price, macroeconomic variables, composite index, garch.

## 1. Introduction

In making the decision to invest in a stock market, one of the approaches that can be used as a basis for investors is fundamental analysis. According to In Francis (1988) research, fundamental analysis is used to predict future stock prices by estimating the value of fundamental factors that a role in influencing future stock prices and applying interactions between these factors to get an estimate of stock prices.

Among the fundamental factors, macroeconomic variable is one of variables getting the most attention from stock market practitioners. The changes in macroeconomic variables have a tendency to affect the stock market, either directly or indirectly. The changes in macroeconomic variables will be responded directly by capital markets because of their potential to increase or decrease market or systematic risks.

The relationship between world Crude Oil Prices and macroeconomic variables in a country with a stock price index has been investigated by researchers over the past few decades Some of the studies include the ones conducted by Chen, Roll and Ross (1986) in the United States, Poon and Taylor (1991) in the UK, Kwon, Shin and Bacon (1997) in Korea, Al-Sharkas (2004) in Jordan, Dritsaki (2005 ) in Greece, Agrawalla and Tuteja (2008) in India, Coleman and Tettey (2008) in Ghana, Ahmet and Hasan (2010) in Turkey, Yu Hsing (2011) in Croatia, Khan and Zaman (2011) in Pakistan, Hosseini, Ahmad and Lai (2011) in China and India, Singh, Mehta and Varsha (2011) in Taiwan, Bekhet and Mugableh (2012) in Malaysia, Yu Hsing (2013) in Slovakia, Khan and Yousuf (2013) in Bangladesh, Nararuk Boonyanam (2014) in Thailand and Hersugondo et al. (2015) Southeast

The study of the effects of world oil price variables and macroeconomic variables on stock prices in a country has been widely discussed by many researchers. However, based on the results of the study, it was found that several studies produced mutually contradictory conclusions. This shows that the variable world oil prices and macroeconomic factors have different effects depending on the capital market in the economy of a country. Therefore, it is urgent to conduct research on the effect of Crude Oil Prices and macroeconomic variables on the index of stock prices in the capital market that emerged in the Southeast Asia region as

emerging market countries. Referring to the background above, the research objectives are expected to be able to explain the effect of Crude Oil Prices and macroeconomic variables proxied by Crude Oil Prices, inflation, interest rates, exchange rates, Gross Domestic Product, main commodity prices, and wages on stock prices in countries. Southeast Asian region. Asian countries include: Singapore, Thailand, Philippines, Malaysia and Indonesia.

# 2. Literature Study and Model Development

### 2.1 Macroeconomic Factors

Macro fundamental factors that get the most attention from investors in the capital market are Crude Oil Prices and macroeconomic factors. Changes in Crude Oil Prices and macroeconomic factors have a tendency to influence the capital market so rational investors will first look at estimates of future trends in Crude Oil Prices and macroeconomic factors before making investment decisions. The reason is because investment growth will be largely determined by the volatility of crude oil prices and macroeconomic factors in the future.

Another macroeconomic factor indicator is inflation is defined as the trend of rising prices in general and continuously. The indicator used to measure the inflation rate is the Consumer Price Index (CPI) by observing changes in CPI from time to time from changes in prices of goods and services consumed by the public (Hosseini 2011). The increase in inflation could lead to the rise in prices of goods in general, so that company's production costs will be relatively increased.

Interest rate could affect company's profits in two ways: (1) interest rate is a cost, so the higher the interest rate, the lower the profit gained by a company when the other things are considered constant; (2) interest rates affect the level of economic activity, so it may affect the profit gained by a company. (Nkoro 2012). The rise in interest rates has the impact of a company in the form of the increase in interest costs that decreases the performance of the company. One indicator of macroeconomic factors is the amount of a given currency to get another currency or exchange rate. Foreign exchange rates or exchange rates are one of the considerations of international market players in making investment decisions, because the exchange rate of foreign currencies will affect the costs and profits of trade in goods, services, and securities (Fischer 2004). Another indicator is Gross Domestic Gross (GDP) which is calculated based on the value of goods and services produced by citizens living in a country, both native and foreign citizens. The increase in GDP indicates that the economic condition of a country is in a good condition. Therefore, it can be said that GDP has a positive effect or influence on the aggregate stock price index.

The movement of the world's crude oil prices may affect the investment climate, even though its effects can vary in each country. For crude oil-producing countries, the increase in the world's crude oil prices is a particular advantage for the companies as high crude oil prices make the company's performance in the sector of oil and mining commodities will increase. Therefore, investors will tend to invest their funds into the various sectors of the oil and mining commodities because it will provide better stock returns (Hersugondo, 2015) Thus, it can be assumed that global crude oil prices have a positive influence on the aggregate stock price index, while commodities are real objects that are relatively easy to trade, can be given physically, can be stored for a certain period of time and can be exchanged for other products of different types or types. same type, and can be bought or sold by investors through the future. The increase in primary commodity prices could improve the investment climate and can foster economic growth in a country. Then, it can be said that primary commodity prices can have a positive effect on the aggregate stock price index.

Wage is stated / assessed in the form of money determined according to an agreement, the laws and regulations and paid on the basis of an employment agreement between employer and work recipient. The rise of wage may increase people's purchasing power and indicates that the economic condition of a country is in good condition. Therefore, it can be said that wage has a positive effect on the aggregate stock price index.

***Table 1**: Operational Variables*

| Operational Variables | | | | | |
|---|---|---|---|---|---|
| Variables | Difinition | | | | |
| Crude Oil Price (COP) | is the average price of crude oil on the international market | | | | |
| Exchange rate (KURS) | the amount of a currency that is given to get another currency. | | | | |
| Gross Domestic Product (GDP) | is a representation of the total value of sales of all goods and services produced in a certain period of time. | | | | |
| *Interest Rate (IR)* | the amount of interest paid per unit of time or the person must pay for the opportunity to borrow money | | | | |
| Primary Commodity Price (PCP) | A monthly average price of primary commodities prevailing in each country | | | | |
| WAGES | A compensation given to a hired person for services; price paid for labor. | | | | |
| | Indonesia | Malaysia | Singapore | Philippine | Thailand |

| | | | | | |
|---|---|---|---|---|---|
| Stock exchange index | Composite Stock Price Index Indonesia (CSPI) | Kuala Lumpur Composite Index (KLCI | Straits Times Index (STI) | Philippine Stock Exchange (PSE) | Stock Exchange of Thailand (SET). |

### 2.2 Aggregate Stock Price Index

The composite index or Composite Stock Price Index is the average price of all stock prices listed on the stock exchange and is a reflection or indicator of the price movements of all shares listed on the stock exchange. Shares are traded on the stock exchange and there are not only one stock but there are many shares issued by many companies. To assess the performance of all shares listed on an exchange, the stock exchange provides an indicator in the form of an aggregate stock price index. In Indonesia, the aggregate stock price index is known as the Composite Stock Price Index (CSPI) and is the best-known stock index in the Jakarta Stock Exchange.

In Malaysia, the aggregate stock price index Kuala Lumpur Composite Index (KLCI) which is in the KLSE (Kuala Lumpur Stock Exchange). Singapore uses the aggregate stock price index of STI (Straits Times Index), and the Philippine uses PSE (Philippine Stock Exchange). For Thailand, the aggregate stock price index is SET (Stock Exchange of Thailand).

## 3. Research Method

### 3.1 Data Sources

The data used in this study are secondary data with population and samples derived from monthly data for oil prices, inflation, interest rates, exchange rates, GDP, the price of major commodities and wages and the aggregate stock price over the years of 2005-2017. This research is in the form of time series data where sampling is using purposive sampling method. Data in the aggregate stock price index are obtained from Stock Exchanges in each country including Singapore, Malaysia, Indonesia, Thailand and the Philippines. Variable data on crude oil prices are obtained from the Ministry of Energy and Mineral Resources (www.esdm.go.id), inflation, interest rates, and exchange rates obtained from Bank Indonesia (www.bi.go.id) and state-owned banks while the GDP and wage data were obtained from the Central Bureau of Statistics (www.bps.go.id). Data, while primary commodity price data is obtained from the Ministry of Commerce (www.kemendag.go.id) and those Economic Trading countries.

### 3.2 Empirical Model

This study uses the analysis technique of Generalized Autoregressive Conditional Heteroscedasticity (GARCH) analysis. In this study, the technique is to test stationarity data using the Augmented Dickey-Fuller (ADF) test. Data normality test using Jarque-beta test, heteroscedasticity test using White Test and autocorrelation test using Durbin-Watson and multicollinearity test using Breusch-Godfrey LM Test. The GARCH model in this research is as follows:

$$CI_t = \beta_0 + \beta_1 COP_t + \beta_2 IRt + \beta_3 KURS_t + \beta_4 GDP_t + \beta INF_{5t} + \beta_6 PCP_t + \beta_7 WAGE_t$$

$$C^2_t = \alpha_0 + \alpha_1 e^2_{t-1} + \alpha_1 \lambda e^2_{t-1}$$

Where:

CI : the Composite Indexes of JCI, KLCI, STI, PSE and SET
COP : Crude Oil Prices;
INF : Inflation;
IR : Interest Rate
KURS : Exchange rate;
GDP : Gross Domestic Product

PCP : Primary Commodity Prices
WAGES: Wages

## 4. Data Analysis

Table 2 shows that based on the results of GARCH analysis in Indonesia, the inflation regression coefficient (INF) -3778,814 shows the negative effect of inflation on the aggregate stock price index. Then, there is a negative and significant effect of inflation on the aggregate stock price index in Indonesia. Interest Rate (IR) has a coefficient of 3940,896 and is significant. Therefore, interest rates have a positive but not significant effect on the aggregate stock price index in Indonesia with the KURS regression coefficient (0.045987). The GDP regression coefficient of 2.491332 which shows a positive effect has a significant effect on the aggregate stock price index in Indonesia. COP regression coefficient of 12.15285 which shows the positive effect. Therefore, crude oil prices have a positive and significant effect on the aggregate stock price index in Indonesia. PCP regression coefficient of (-0.23044). Therefore, the price of primary commodities is not significantly negative on the aggregate stock price index in Indonesia. WAGE has a significance value with a significant positive coefficient of 0,00098 towards the aggregate stock price index in Indonesia. By using the GARCH analysis method, this research was also conducted in other Southeast Asian countries, including Singapore, Malaysia, Thailand and the Philippines.

***Table 2**: GARCH Analysis of Indonesia*

| Variable | Coefficient |
|---|---|
| C | -1393.724*** |
| COP | 12.15285*** |
| INF | -3778.814*** |
| IR | 3940.896** |
| KURS | -0.045987* |
| GDP | 2.491332*** |
| PCP | -0.230442 |
| WAGES | 0.000980*** |

***sig. at α=0.01 **sig. at α=0.05 *sig. at α=0.10

The equation of GARCH model in Indonesia:

$CI_t$ = -1393.72 + 12.1528*COP + 3940.89*IR – 0.0459*KURS +2.4913*GDP – 3778.81*INF – 0.2304*PCP + 0.00098*WAGES

The equation of Var ($e_t$):

$\sigma_i^2 = 48811.42 + 0.602503e^2_{t-1} – 0.110721\sigma^2_{t-1}$

### 4.1. Discussion of Research Results

According to table 3, the final results of the research on the effect of price crude oil and macroeconomic variables proxied by inflation rate, interest rates, exchange rates, GDP, price of crude oil, major commodity prices, and wages on the aggregate stock price index in Indonesia, Malaysia, Singapore, Philippines and Thailand.

***Table 3**. Final Research Result*

| Variabel | Indonesia | Malaysia | Singapura | Filipina |
|---|---|---|---|---|
| COP | 12.15285*** | 0.581774*** | 4.392840*** | 0.080543 |
| INF | (3778.814)*** | (3767.23)*** | (3681.177)*** | (13273.88)*** |
| IR | 3940.896** | 11949.28*** | 10499.93** | 31908.91*** |
| KURS | (0.045987) | 127.4860** | 266.1028 | 63.79184*** |
| GDP | 2.491332*** | 1.368653*** | 3.271364*** | 53.91020*** |
| PCP | 0.230442 | 7.955397 | 0.049196*** | (0.014211) |
| WAGES | 0.000980 | 0.804851 | 0.088317 | (1.164735) |

***sig at α = 0.01 **sig at α = 0.05 *sig at α = 0.10

**Discussion of Hypothesis 1**

In Singapore, Malaysia, Philippine and Indonesia, effect Inflation variable on the aggregate stock price index has a negative and significant. Based on the regression coefficient value of the variable of inflation in Indonesia, it has statistically the negative significant effect of (3,778) on JCI.

The test results statistically imply; when the inflation in Indonesia rises by 1%, the composite index drops by 37.78814 points. Malaysian inflation statistically has the negative significant effect of (3767.23) on KLCI. The test results statistically imply; when the inflation in Malaysia rises by 1%, the KLCI decreases by 37.6723 points. Singaporean inflation statistically has the negative sign of (3,681) on the STI. The test results statistically imply; when the inflation in Singapore rises by 1%, the STI drops by 36.81177 points.

In Philippine, inflation statistically has the negative significant effect of (13,273) on PSE. The test results statistically imply; when the inflation in Philippine rises by 1%, the PSE drops by 132.7388 points. The research results in the country of Indonesia, Malaysia, Singapore and Philippine support the previous studies conducted by Al-Sharkas (2004) in Jordan, Dritsaki (2005) in Greece, Coleman and Tettey (2008) in Ghana, Khan and Zaman (2011) in Pakistan, Hosseini, Ahmad and Lai (2011) in India, Yu Hsing (2011) in Croatia and Yu Hsing (2013) in Slovakia stating that inflation has a negative and significant effect on the aggregate stock price index.

**Discussion of Hypothesis 2**

The interest rate has negative and significant effect on the aggregate stock price index only in Thailand. Based on the regression coefficients of the variability of inflation in Thailand, interest rate statistically has negative significant effect of (1,660) on SET. The test results statistically mean that when interest rate in Thailand rises by 1%, the SET falls by 16.60406 points. The research results support the previous researches carried out by Al-Sharkas (2004) in Jordan, Dritsaki (2005) in Greece, Coleman and Tettey (2008) in Ghana, Yu Hsing (2011) in Croatia, Yu Hsing (2013) in Slovakia and Emeka Nkoro and Aham Kelvin Uko (2013) in Nigeria which state that the interest rate variable has a negative significant effect on stock price index.

On the contrary, in the countries of Indonesia, Malaysia, Singapore and Philippine, the interest rates variable have a positive significant effect on the aggregate stock price index. Based on the regression coefficient value of the variable of interest rate, the interest rate in Indonesia statistically has positive significant effect at 3940.896 on the CSPI. The test results statistically mean that when the interest rate in Indonesia rises by 1%, the composite index rises by 39.40896 points. In Malaysia, the interest rate statistically has positive significant effect at 11949.28 to the KLCI. The test results statistically mean that when the interest rate in Malaysia rises by 1%, the KLCI rises by 119.4928 points. In Singapore, the interest rate statistically has positive significant effect at 10499.93 on the STI.

**Discussion of Hypothesis 3**

Referring to the results of data analysis, it shows that the exchange rate variable has a positive and significant effect on the stock price index in Thailand and Malaysia, while in Singapore, even though the exchange rate variable is positive, but the

effect is not significant. Based on the regression coefficient value of the variable of exchange rate, in Malaysia exchange rate statistically has positive significant effect at 127.4860 on the KLCI. The test results statistically mean that when the exchange rate in Malaysia rises by 1 point, the KLCI rises by 127.4860 points. In Thailand, the exchange rate statistically has positive significant effect at 43.59486 on the SET.

The test results statistically mean that when the exchange rate in Thailand rises by 1 point, the SET rises by 43.59486 points. In Singapore, exchange rate statistically has a positive insignificant effect of 266.1028 on the STI. The results of this test mean that STI is not directly affected by the exchange rates in Singapore. The rejection of the hypothesis of the effect of exchange rate on STI statistically because the standard deviation of the exchange rate is only 13.38%, making it smaller than the standard deviation of STI of 26.75% of the average value. Therefore, the rejection area for the variable of exchange rate is much larger.

The research results support the previous researches conducted by Coleman and Tettey (2008) in Ghana, Khan and Zaman (2011) in Pakistan, Singh Mehta and Varsha (2011) in Taiwan and Yu Hsing (2013) in Slovakia which state that the exchange rate has a positive and significant effect on stock price index.

In the Philippines, there are different conclusions, where the exchange rate has a negative significant effect on the aggregate stock price index. The other finding in Indonesia, although the exchange rate also has a negative effect on the aggregate stock price index, the effect is not significant. Based on the regression coefficient value of the variable of exchange rate, the exchange rate in Philippine statistically has negative significant negative effect of (63.79184) on PSE.

**Discussion of Hypothesis 4**

Variable Gross Domeatic Product has a positive and significant effect on the aggregate stock price index in Singapore, Malaysia, Philippine and Indonesia. Based on the regression coefficient value of the variable of GDP, Indonesia's GDP statistically has positive significant effect at 2.491332 on CSPI.

The test results statistically mean that when the GDP in Indonesia rises by USD 1 billion, the CSPI rises by 2.491332 points. In Malaysia, GDP statistically has positive significant effect at 1.368653 on the KLCI. The test results statistically mean that when the GDP in Malaysia increases by USD 1 billion, the KLCI rises by 1.368653 points. Singaporean GDP has positive significant effect at 3.271364 on the STI. The test results statistically mean that when GDP in Singapore rises by 1 billion USD, the STI rises by 3.271364 points. In Philippine, GDP statistically has positive significant effect at 53.91020 on the PSE.

The test results statistically mean that when the GDP in Philippine rises by USD 1 billion, the PSE rises by 53.91020 points. The research results support the previous researches conducted by Dritsaki (2005) in Greece, Khan and Zaman (2011) in Pakistan, Yu Hsing (2011) in Croatia and Yu Hsing (2013) stating that GDP has a positive significant effect on stock price index in Slovakia.

**Discussion of Hypothesis 5**

Crude oil price Variable has positive and significant effect on the aggregate stock price indexes in Singapore, Malaysia and Indonesia. In Thailand and Philippine, although the crude oil prices equally have a positive effect, but the effect is not significant.

Based on the regression coefficient value of the variable of crude oil price, Indonesia's crude oil price statistically has positive significant effect at 12.15285 on CSPI. The test results statistically imply that when crude oil price in Indonesia rises by 1 USD / barrel, the CSPI rises by 12.15285 points. Malaysian crude oil price statistically has positive significant effect at 0.581774 on the KLCI. The test results statistically mean that when the crude oil price in Malaysia rises by MYR 1 / barrel, the KLCI rises by 0.581774 points. In Singapore, the crude oil price statistically has positive significant effect at 4.392840 on the STI. The test results statistically imply that when crude oil price in Singapore rises by SGD 1 / barrel, the STI rises by 4.392840 points. In Philippine, the crude oil price statistically has positive effect of.080543 but has no significant effect on PSE.

The results of this test mean that the PSE is not directly affected by the crude oil price in Philippine. The rejection of the hypothesis of the effect of crude oil price on the PSE statistically because the standard deviation value of the crude oil price in Philippine is 39.37%, making it much smaller than the standard deviation of PSE at 60.12% of the average value. Therefore, the rejection of the variation of crude oil price in Philippine is much greater. In Thailand, the crude oil price statistically has positive effect of.004016 but no significant effect of the SET. The results of this test mean that SET is not directly affected by the crude oil price in Thailand.

**Discussion of Hypothesis 6**

In Southeast Asian countries Primary commodity prices have a negative influence on the aggregate stock price index except in Singapore. In Malaysia, even though the prices of primary commodities both have a positive effect on the aggregate stock price index, the effect is not significant. Based on the regression coefficient value of the variable of primary commodity price, in Singapore, the primary commodity price statistically has positive significant effect at 0.049196 on the STI.

The test results statistically mean that when the primary commodity price in Singapore, namely copper, rises by SGD 1/ metric ton, the STI rises by 0.049196 points. In Malaysia, the primary commodity price, such as rubber, statistically has a positive effect of 7.955397 but not significantly on the KLCI. The test results mean that the KLCI is not directly affected by the primary commodity price in Malaysia.

The rejection of the hypothesis of the effect of primary commodity prices on the KLCI is statistically not due on the value of the standard deviation, but it is caused by the value of the data distribution which tends to be away from the average value when compared with the data distribution of KLCI. It can be seen from the skewness value of primary commodity price at 0.762 which is much greater than the skewness value of PSE which is only 0.113. Therefore, the rejection of the primary commodity price variable is much greater.

**Discussion of Hypothesis 7**

In Singapore, Malaysia, Thailand and Indonesia, the wage variable has positive and significant effect on the stock price indexes. Based on the regression coefficient value of the variable of wage, wage in Indonesia statistically has a positive significant effect of 0.000980 on CSPI.

The test results statistically imply that when the wage in Indonesia rises by IDR 1, the CSPI rises by 0.000980 points. In Malaysia, wage statistically has positive significant effect at 0.804851 on the KLCI. The test results statistically imply that when the wage in Malaysia rises by MYR 1, the KLCI rises by 0.804851 points. Singapore wage statistically has a positive significant effect of 0.088317 on the STI. The test results statistically imply that when the wage in Singapore goes up by SGD 1, the STI rises by 0.088317 points. The results support the researches conducted by Blanchard and Fischer (1989) in the United States who found that wage has a positive effect on GNP, which indirectly affects the aggregate stock price index.

# 4. Conclusion

In Singapore, Malaysia, Indonesia, and Philippine Variable Inflation on this paper has negative effect on the aggregate stock price indexes. Another finding, variable inflation has a significant effect positive on the aggregate stock price index in Thailand. The interest rate has a significant negative effect on the aggregate stock price index only in Thailand, neither non Singapore, Malaysia, Indonesia, , and Philippines, base on their interest rates have a significant positive effect on the aggregate stock price indexes. Exchange Rate also has a positive significant effect on the aggregate stock price indexes in Thailand and Malaysia.

In Singapore, although the variable interest rate has a positive and not significant on the aggregate stock price index. In Philippine, the exchange rate has a negative significant effect on the aggregate stock price index. The exchange rate In Indonesia has a negative and not significant effect on the aggregate stock price index. GDP has a positive significant effect on aggregate stock price indexes in Singapore, Indonesia, Malaysia and Philippine. GDP in Thailand, which has a negative significant effect on the aggregate stock price index. Crude oil price has a positive significant effect on the aggregate stock price indexes in Indonesia, Singapore, and Malaysia. In Thailand and Philippine, although the crude oil price has a positive but not significant on the aggregate stock price index.

Primary commodity price in Singapore has a positive significant effect on the aggregate stock price index. In Malaysia, even though the primary commodity price has a positive effect, but it is not significant on the aggregate stock price index.

In Thailand and Philippine, the main commodity prices have negative and significant effect on the aggregate stock price indexes., the variable primary commodity price has a negative effect in Indonesia. Wage has positive and significant effect on the stock price indexes in Thailand, Singapore, Malaysia, and Indonesia, but has negative significant effect on the aggregate stock price index in Philippine.

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