



## **Macroeconomic Fundamental and Stock Price Index in Southeast Asia Countries: A Comparative Study**

**Sugeng Wahyudi<sup>1\*</sup>, H. Hersugondo<sup>2</sup>, Rio Dhani Laksana<sup>3</sup>, R. Rudy<sup>4</sup>**

<sup>1</sup>Department of Management, Faculty Economics and Business, Diponegoro University, Semarang, Indonesia, <sup>2</sup>Department of Management, Faculty Economics and Business, Diponegoro University, Semarang, Indonesia, <sup>3</sup>Department of Management, Faculty Economics and Business, Diponegoro University, Semarang, Indonesia, <sup>4</sup>Department of Management, Faculty Economics and Business, Diponegoro University, Semarang, Indonesia. \*Email: [sugengwahyudi@undip.ac.id](mailto:sugengwahyudi@undip.ac.id)

### **ABSTRACT**

This study analyzed the effect of macroeconomic variables on the composite index in the Southeast Asia Countries. The variable in this study is inflation, interest rate, exchange rate, gross domestic products (GDP), crude oil price, primary commodity price and wages in Indonesia, Malaysia, Singapore, Philippine, and Thailand. The study used time series data from the 2001-2015 at each country. By using an analysis technique threshold autoregressive conditional heteroscedasticity, the results from showed that the inflation interest rate, GDP have a negative effect on the composite index in all countries except Thailand; crude oil price has the positive effect in Indonesia, Malaysia, and Singapore, while in the Philippine and Thailand has a positive effect. Primary commodity price has a positive effect on the composite index only in Singapore, meanwhile in the Philippine and Thailand has a negative effect on the composite index. Wages have a positive and significant effect on the composite index in all countries.

**Keywords:** Macroeconomic, Threshold Autoregressive Conditional Heteroscedasticity, Southeast Asian Countries

**JEL Classification:** G1

### **1. INTRODUCTION**

The relationship among macroeconomic variables with capital market is being developed by the researchers for the last decades. Some of them were conducted by (Boonyanam, 2014) in Thailand (Dritsaki 2005) in Athens (Khan, 2014) in Pakistan (Hosseini et al., 2011) in India (Issahaku et al., 2013) in Ghana (Izedonmi and Abdullahi, 2011) in Nigeria and Hersugondo et al. (2015) in Southeast Asia's. These studies have provided a clearer representation of the effect of macroeconomic variables on the capital market in various countries. However, based on the research results, it was found that the studies resulted in various results. This suggests that macroeconomic variables have different effects depending on the capital market in any country's economy. Therefore, it is interesting to conduct the same kinds of research on the effect of macroeconomic variables on the capital markets in Southeast Asia countries.

Based on the background mentioned above, the aim of this study was to explain the effect of macroeconomic variables proxy by inflation,

interest rates, exchange rates, gross domestic produ (GDP), oil price, primary commodity prices and wages on the aggregate stock price indexes in Southeast Asia countries including Indonesia, Malaysia, Singapore, Philippine, and Thailand. This research is expected to be useful for capital market investors to be used as the consideration in their policy of investment in the capital markets, especially at the effect of macroeconomic variables including inflation, interest rates, exchange rates, GDP, oil price, primary commodity price and wages on the aggregate stock price index. This study is different from previous studies conducted in Indonesia because, in addition to analyzing the effect of macroeconomic variables on aggregate stock price index in Indonesia, this study compared with the other countries in Southeast Asia, such as Malaysia, Singapore, Philippine, and Thailand. This study used threshold autoregressive conditional heteroscedasticity (TARCH) analysis model by observing the effect of macroeconomic variables on aggregate stock price index in each country.

Investigated the effect of macroeconomic variables on the stock price in Pakistan during the period of 1998-2009 (Boonyanam,

2014). Using multiple regression studies, they found that GDP and exchange rate have a positive effect on the stock price. The consumer price index (CPI) had a negative effect on the stock price, while the value of exports, money supply (M2), Foreign Direct Investment, and oil price did not have a significant effect on the stock price.

Hosseini et al. (2011) examined the effect of macroeconomic variables on the stock market indexes in China and India during the period of January 1999-January 2009. Using vector error correction model, the results showed that, in Chinese stock market in the long term, crude oil price, money supply, and inflation rates had a positive effect on the stock index, whereas the increase in industrial production had a negative effect on the stock index. In another hand, in Indian stock market in the long term, crude oil price and money supply had a positive effect on the stock index, whereas industrial production and inflation rate had a negative effect on stock market.

Hsing, 2013 investigated the effect of macroeconomic variables on the stock market in Croatia during the period from the Quarter III of 1997 to the Quarter I of 2010. Using EGARCH, the research showed that the Croatian stock market was positively affected by the GDP, the ratio of money supply (M1) to GDP, German stock price index and government bonds in Europe. On the other hand, the Croatian stock market was negatively affected by the government's budget deficit ratio to GDP, the level of domestic interest rates, currency exchange rates, and inflation rates. (Luca, 2007) conducted another research on the effect of macroeconomic variables on the Slovakian stock market index in the period from the Quarter I of 2000 to the Quarter II of 2010. Using EGARCH analysis, the research results showed that the Slovakian stock market index was positively affected by GDP, exchange rate, and the German stock market index. Meanwhile, the ratio of government debt to GDP, the level of domestic interest rates, inflation rates and the yield of the European government bond had a negative effect on the Slovakian stock market index.

This study has a benefit for capital market investors who want to invest in the capital market in Southeast Asia especially in Indonesia, Malaysia, Singapore, Philippine, and Thailand. They can consider various macroeconomic factors such as inflation, interest rates, exchange rates, GDP, crude oil price, primary commodity price and wage because based on the results of this study, these variables have significant effects on the composite indexes in the countries.

## 2. LITERATURE REVIEW

### 2.1. Arbitrage Pricing Theory (APT)

APT is a theory that explains how an asset price is determined by the market or how to determine the profit margin considered feasible for an investment. APT uses an idea that the assets of two investment opportunities have the same characteristics and cannot be sold at a different price. The concept used in APT is the law of one price; when the assets with the same characteristics are sold at different price, there will be an opportunity to do arbitrage by buying very cheap assets and at the same time selling them at

higher price in order to gain profits without risk (Hersugondo et al., 2015). APT assumes that the profit margin is affected by various factors in economy and industry. The correlation of the profit margin of two securities occurs because the two securities are affected by the same factors.

### 2.2. Macroeconomic Factors

Macroeconomic factors are the macro fundamental factors with the most attention of investors in the capital market. The changes in macroeconomic factors have a tendency to affect the capital market so that rational investors would first see the estimated future trend of macroeconomic factors before making investment decisions. This is because investment growth will be largely determined by the volatility of macroeconomic factors in the future.

Inflation is one of the indicators of the macroeconomic factors defined as the tendency of the continuous and general rising of prices. The indicator which is often used to measure the rate of inflation is CPI in which the change in CPI from time to time shows the price movement of goods and services consumed by a society (Khan, 2014). The interest rate is one indicator of macroeconomic factors defined as a number of fees to be paid by the borrower on the loan he receives and also the amount of the remuneration obtained by the lender on his investment (Brigham and Houston, 2007).

The exchange rate is one indicator of macroeconomic factors defined as the exchange rate of the local currency against foreign currency. The value of foreign exchange rates is highly considered by the international market players since foreign exchange rate affects the costs and benefits of the trades in goods, services and securities (Issahaku et al., 2013).

GDP can be defined as the value of final goods and services produced by various production units in the territory of a country in a particular year. A commodity is a real object which is relatively easy to trade, may be submitted physically, can be stored for a certain period of time and can be interchanged with other products of the same type, which usually can be purchased or sold by investors through the futures exchange (Chen, 1986) (Frisch, 2010) and (Hsing, 2011).

### 2.3. Aggregate Stock Price Index

Aggregate stock price index or commonly known as a composite index is the average price of the entire price of the stocks listed on a stock exchange and an indicator or reflection of the price movements of all shares listed on a stock exchange. The stock traded in a stock exchange is not only one stock issued by a company, but there are lots of stocks issued by many companies (Kwon et al., 1997).

## 3. RESEARCH METHOD

### 3.1. Data Source

This study used the secondary data in which the population and sample in this study are the monthly data for inflation, interest rates, exchange rates, GDP, oil price, primary commodity price

and wages, and the aggregate stock price indexes in Indonesia, Malaysia, Singapore, Philippine, and Thailand in the years of 2001-2015. The data in this study was the time series data with the sampling technique used purposive sampling method. The data of the aggregate stock price index was obtained from the Indonesia stock exchange (www.idx.co.id) and the Stock Exchanges in Malaysia, Singapore, Philippine, and Thailand. The data of inflation, interest rate, and exchange rate were obtained from the Bank of Indonesia (www.bi.go.id) and the state-owned banks in Malaysia, Singapore, Philippine, and Thailand. The data of GDP and wages were obtained from the Central Bureau of Statistics (www.bps.go.id) and the statistical agencies in Malaysia, Singapore, Philippine, and Thailand. The data of crude oil price was obtained from the Ministry of Energy and Mineral Resources (www.esdm.go.id), while the data of the primary commodity price was obtained from the Ministry of Commerce (www.kemendag.go.id) and the Economic Trading in Malaysia, Singapore, Philippine, and Thailand.

**3.2. The Operational Definition of the Variables**

Operational variables	
Exchange rate (KURS)	The ratio of the average monthly value of local currencies at each country to the foreign currencies
GDP	The value generated by each country
COP	The average monthly price of crude oil per barrel prevailing at each country
PCP	A monthly average price of primary commodities prevailing at each country
Wage	The value of the monthly minimum regional wage prevailing at each country

GDP: Gross domestic product, COP: Crude oil price, PCP: Primary commodity price

**3.3. The Operational Definition of the Variables**

Countries	Indonesia	Malaysia	Singapore	Philippine	Thailand
Stock exchange index	CSPI	KLCI	STI	PSE	SET

CSPI: Composite stock price index, KLCI: Kuala Lumpur composite index, STI: Straits times index, PSE: Philippine stock exchange, SET: Stock exchange of Thailand

**3.4. Empirical Model**

The data analysis technique in this research was the analytical model of TARCh. Then to support analysis techniques using GARCH and TARCh methods, this study also conducted the tests on the data stationary using Augmented Dickey-Fuller (ADF) Test. The heteroscedasticity test used the white test, the data normality test used the Jarque-Bera test, the multicollinearity test used the Breusch-Godfrey LM Test, and the autocorrelation test used the Durbin-Watson.

The TARCh model in this research is as follows:

$$\sigma_t^2 = \alpha_0 + \alpha_1 \sigma_{t-1}^2 + \lambda_1 e_{t-1}^2 + \gamma_1 d_{t-1} \tag{1}$$

$$CI_t = \beta_0 + \beta_1 INF_t + \beta_2 IR_t + \beta_3 KURS_t + \beta_4 GDP_t + \beta_5 COP_t + \beta_6 PCP_t + \beta_7 WAGE_t \tag{2}$$

With the component of TARCh

Where:

CI: The composite indexes of composite stock price index (CSPI), Kuala Lumpur composite index (KLCI), Straits times index (STI), Philippine stock exchange (PSE) and Stock exchange of Thailand (SET)

INF: Inflation

IR: Interest rate

KURS: Exchange rate

GDP: Gross domestic product

COP: Crude oil prices

PCP: Primary commodity prices

WAGE: Wages.

**4. DATA ANALYSIS**

**4.1. Unit Root Stationery Test**

Based on Table 1, it shows that the Prob. Value for ADF Test in Indonesia is 0.0000 < 0.05 so that it can be concluded that the data has been stationary. Likewise, the statistical values of ADF Test in Malaysia, Singapore, Philippine, and Thailand are 0.0002, 0.0001, 0.0000, and 0.0002 respectively. The test results on the first stage for data stationary test indicated that the data has been stationary in Indonesia, Malaysia, Singapore, Philippine and Thailand.

**4.2. Heteroscedasticity Test**

Based on Table 2, it is found that there has been heteroscedasticity to the data of Indonesia with the value of Prob. Chi-square 0.0000 < 0.05 in White test results. Likewise, the values of Prob. Chi Square in Malaysia, Singapore, Philippine, and Thailand are 0.0000. The test results on the second stage for data heteroscedasticity test indicate that heteroscedasticity occurs on the data of Indonesia, Malaysia, Singapore, Philippine, and Thailand.

**4.3. Multicollinearity Test**

Based on Table 3, it is found that the probability for the Breusch-Godfrey LM Test in Indonesia is 0.0623 > 0.05 so that it can be said that there is no multicollinearity among the independent variables. Likewise, the values of probability in Malaysia, Singapore, Philippine, and Thailand are 0.0520, 0.0672, 0.0889, and 0.0758 respectively. The test results on the fourth stage for multicollinearity test show that there is no multicollinearity among the independent variables in Indonesia, Malaysia, Singapore, Philippine and Thailand.

**Table 1: Unit root test of Indonesia**

Root Test	t-statistic	P*
ADF tests statistic	-5.774687***	0.0000
Test critical values		
1% level	-3.466994	
5% level	-2.877544	
10% level	-2.575381*	

ADF: Augmented Dickey-Fuller, \* and \*\*\*: Significant at 1% and 10% significance level

**Table 2: White test of Indonesia**

Heteroskedasticity test: White			
F-statistic	4.270276	Prob. F (35,144)	0.0000
Obs*R <sup>2</sup>	91.67440	Prob. Chi-square (35)	0.0000
Scaled explained SS	77.53047	Prob. Chi-square (35)	0.0000

#### 4.4. Autocorrelation Test

Based on Table 4, it shows that the statistical value of Durbin-Watson for testing the autocorrelation in Indonesia is 1.998079; between 1.5 and 2.5. Thus, it indicates that there is no autocorrelation in the research variables. Likewise, the statistical value of Durbin-Watson in Malaysia, Singapore, Philippine, and Thailand are 1.981983, 1.914185, 1.856895, and 1.927278 respectively. The test results on the fifth stage for autocorrelation test show that there is no autocorrelation in the research variables in Indonesia, Malaysia, Singapore, Philippine and Thailand.

#### 4.5. TARCh Analysis Model

Based on Table 5, the result of TARCh analysis in Indonesia shows that INF has the significant value of 0.0011 with the value of regression coefficient of -3778, 787 that shows its negative effect. Thus, there is a negative and significant effect of inflation on the aggregate stock price index in Indonesia. In another hand, IR has the significant value of 0.0640 with the value of regression coefficient of +3940, 892 that show its positive effect. Therefore, the interest rate has a positive insignificant effect on the aggregate stock price index in Indonesia.

KURS has the significant value of 0.2352 with the value of regression coefficient of -0.046238 that shows its negative effect. Therefore, KURS has a negative insignificant effect on the aggregate stock price index in Indonesia. Besides, GDP has the significant value of 0.0000 with the value of regression coefficient of +2.495597 that shows its positive effect. Therefore, GDP has a positive and significant effect on the aggregate stock price index in Indonesia.

PCP has the significant value of 0.0000 with the value of regression coefficient of +13.03947 that shows its positive effect. Therefore, the crude oil price has a positive and significant effect on the aggregate stock price index in Indonesia. On the other hand, PCP has the significant value of 0.1081 with the value of regression coefficient of -0.294686 that shows its negative effect. Therefore, primary commodity price has negative insignificant on the aggregate stock price index in Indonesia.

WAGE has the significant value of 0.0000 with the value of regression coefficient of +0.000964 that shows its positive effect. Therefore, the wage has a positive significant effect on the aggregate stock price index in Indonesia. By using TARCh analysis method which was similar to that carried out in Indonesia, the research was also conducted in Malaysia, Singapore, Philippine and Thailand.

The equation of TARCh model in Indonesia:

$$IHSG = -1392.069 - 3778.787 INF + 3940.892 IR - 0.0462 KURS + 2.4955 GDP + 13.0394 COP - 0.2946 PCP + 0.000964 WAGE \quad (3)$$

The equation of Var (e<sub>t</sub>):

$$\sigma_t^2 = 48811.19 + 0.715512e^2_{t-1} - 0.338784\sigma^2_{t-1} - 0.093021d_{t-1} \quad (4)$$

#### 4.6. Adjusted R<sup>2</sup>

Based on the highest value of adjusted R<sup>2</sup>, then the best model selection was conducted in the TARCh method in the countries of Indonesia, Malaysia, Singapore, Philippine and Thailand with the following results Table 6.

According to Table 6, it can be concluded that the model of CSPI estimation in Indonesia is the TARCh model with the value of Adjusted R<sup>2</sup> of 96.392%. KLCI in Malaysia used the TARCh model with the value of Adjusted R<sup>2</sup> of 95.190%. STI in Singapore used the TARCh model in with the value of Adjusted R<sup>2</sup> of 80.0031%. PSE in Philippine used the TARCh model with the value of Adjusted R<sup>2</sup> of 94.883%. SET in Thailand used the TARCh model with the value of Adjusted R<sup>2</sup> of 92.9561%.

### 5. RESEARCH RESULTS

Inflation has a negative and significant effect on the aggregate stock price indexes in Indonesia, Malaysia, Singapore, and Philippine. In another hand, in Thailand, inflation has a positive and significant effect on the aggregate stock price index. Interest Rate has negative and significant effect on aggregate stock price index only in Thailand, but in Indonesia, Malaysia, Singapore, and Philippine the interest rates have a positive and significant effect on the aggregate stock price indexes. The exchange rate has a positive significant effect on aggregate stock price index only in Malaysia and Thailand, but in Singapore, the exchange rate has a

**Table 3: Multicollinearity test of Indonesia**

Breusch-Godfrey serial correlation LM test			
F-statistic	159.9208	Prob. F (2,170)	0.0680
Obs*R <sup>2</sup>	117.5308	Prob. Chi-Square (2)	0.0623

**Table 4: Autocorrelation test of Indonesia**

Durbin-Watson stat	1.998079
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**Table 5: TARCh analysis of Indonesia**

Variable	Coefficient	P
C	-1392.069	0.0002
INF	-3778.787	0.0011
IR	3940.892	0.0640
KURS	-0.046238	0.2352
GDP	2.495597	0.0000
COP	13.03941	0.0000
PCP	-0.294686	0.1081
WAGE	0.000964	0.0000

TARCh: Threshold autoregressive conditional heteroscedasticity, GDP: Gross domestic products, COP: Crude oil price, PCP: Primary commodity price

**Table 6: Adjusted R<sup>2</sup>**

Dependent variable	Adjusted R <sup>2</sup>
CSPI	0.963923
KLCI	0.951904
STI	0.800031
PSE	0.948823
SET	0.929561

CSPI: Composite stock price index, KLCI: Kuala Lumpur composite index, PSE: Philippine stock exchange, SET: Stock exchange of Thailand

positive and significant effect on the aggregate stock price index by simply using the analytical method of TARCh. In contrast, in the Philippine, the exchange rate has a negative significant effect on the aggregate stock price index. In Indonesia, although the exchange rate has a negative effect on the aggregate stock price index, the effect is not significant (Table 7).

GDP has a positive and significant effect on the aggregate stock price indexes in Indonesia, Malaysia, Singapore, and Philippine, but in Thailand, GDP has a negative and significant effect on the aggregate stock price index. Crude oil prices has a positive significant effect on the aggregate stock price indexes in Indonesia, Malaysia, and Singapura. In Philippine, even though the crude oil price has a positive effect on the aggregate stock price index, but the effect is not significant. Primary commodity price has a positive and significant effect on the aggregate stock price index only in Singapore. In Malaysia, even though the primary commodity price has a positive effect, it is not significant on the aggregate stock price index. In Philippine and Thailand, the primary commodity prices have the negative and significant effect on the aggregate stock price indexes. In Indonesia, although the primary commodity price has a negative effect, the effect is not significant on the aggregate stock price index. Wage has a positive and significant effect on aggregate stock price indexes in Indonesia, Malaysia, Singapore, and Thailand, but in Philippine, the wage has a negative significant effect to the stock price index.

## 6. CONCLUSION

The conclusions of this study are as follows: (1) Inflation has a negative significant effect on the aggregate stock price indexes in Indonesia, Malaysia, Singapore, and Philippine, but in Thailand, inflation has a positive and significant effect on the aggregate stock price index, (2) interest rate has a negative significant effect on the aggregate stock price index only in Thailand, but in Indonesia, Malaysia, Singapore, and Philippine, the interest rates have a positive and significant effects on the aggregate stock price indexes, (3) exchange rate has a positive and significant effect on the aggregate stock price indexes in Malaysia and Thailand. Although the exchange rate has a positive effect on the aggregate stock price index, it is not significant. In Philippine, the exchange

rate has a negative significant effect on the aggregate stock price index. In Indonesia, although the exchange rate has a negative effect on the aggregate stock price index, it is not significant, (4) GDP has a positive and significant effect on the aggregate stock price indexes in Indonesia, Malaysia, Singapore, and Philippine, but in Thailand, GDP has a negative and significant effect on the aggregate stock price index, (5) crude oil price has a positive and significant effect on the aggregate stock price indexes in Indonesia, Malaysia, and Singapore. In Philippine and Thailand, although the crude oil prices have a positive effect on the aggregate stock price indexes, it is not significant, (6) primary commodity price has a positive significant effect on the aggregate stock price index only in Singapore. In Malaysia, even though the primary commodity price has a positive effect on the aggregate stock price index, it is not significant. In Philippine and Thailand, the primary commodity prices have a negative significant effect on the aggregate stock price indexes. In Indonesia, although the primary commodity price has a negative effect, it is not significant, (7) wage has a positive and significant effect on the stock price indexes in Indonesia, Malaysia, Singapore and Thailand, but in Philippine, the wage has a negative significant effect on the aggregate stock price index.

### 6.1. Policy Implications

The implication of managerial policy which can be taken in this study is that capital market investors need to pay attention to inflation, interest rates, exchange rates, GDP, crude oil price, primary commodity price and wage because, based on the results of this study, these variables were proven to have various effects on the aggregate stock price indexes in the ASEAN countries, such as Indonesia, Malaysia, Singapore, Philippine, and Thailand.

### 6.2. Research Limitations

This study still has some limitations: (1) This study only used macroeconomic variables including the variables of inflation, interest rates, exchange rates, GDP, crude oil price, primary commodity price and wage with no regard to microeconomic factors which also have the effect on the aggregate stock price index, (2) the data in this study were limited to the monthly data throughout 2001-2015 obtained in Indonesia, Malaysia, Singapore, Philippine and Thailand. The model used was TARCh.

Table 7: TARCh analysis results

Dependent variable	C	INF	SB	KURS	GDP	HMM	HKU	WAGE
CSPI	1392.07*** 0.0002	3778.79*** 0.0011	3940.89* 0.0640	-0.04624 0.2352	2.49560*** 0.0000	13.0394*** 0.0000	-0.29469 0.1081	0.00096*** 0.0000
KLCI	-202.59 0.1038	-2454.58*** 0.0000	8923.40*** 0.0000	156.96*** 0.0001	1.4669*** 0.0000	0.48612*** 0.0002	6.61893 0.2644	0.75640*** 0.0000
STI	1745.99*** 0.0005	-3919.60*** 0.0000	17742.25*** 0.0007	573.42** 0.0179	2.77087*** 0.0000	4.4217*** 0.0000	0.04576*** 0.0000	0.0914*** 0.0043
PSE	-1249.37 0.4909	-13273.64*** 0.0000	31950.36*** 0.0000	61.0614*** 0.0000	53.0462*** 0.0000	0.0875 0.1674	0.0146*** 0.0083	-1.1297*** 0.0013
SET	1528.74*** 0.0000	2511.85*** 0.0001	-1660.41* 0.0943	43.595*** 0.0000	-0.90032* 0.0505	0.00402 0.8522	-0.0251*** 0.0000	0.15839*** 0.0000

CSPI: Composite stock price index, KLCI: Kuala Lumpur composite index, PSE: Philippine stock exchange, SET: Stock exchange of Thailand, \*significant at 10% level \*\*significant at 5% level \*\*\*significant at 1% level, TARCh: Threshold autoregressive conditional heteroscedasticity

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