THE ANALYSIS OF SELECTED MACROECONOMIC VARIABLES THAT INFLUENCE STOCK RETURNS' JAKARTA ISLAMIC INDEX (JII) AND ITS VECTOR AUTOREGRESSIVE (VAR) FORECASTING
Case Study: 10 companies listed in Jakarta Islamic Index period 2008-2012

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ABSTRACT

The main objectives of this study is to analyze the influence of macroeconomic variables to stock returns of 10 companies listed in Jakarta Islamic Index (JII) Indonesia Stock Exchange Market in the Arbitrage Pricing Theory framework and further conduct stock returns forecasting under Vector Autoregressive Model estimation. The macroeconomic variables in this study consist of Bank Indonesia interest rate, costumer price index, Brent international oil price and trading volume. The stock returns of 10 companies listed in JII and the selected macroeconomic variables are monthly panel data starting from December 2007 to January 2013. The result of this study indicates negative influence of Bank Indonesia interest rate and Brent international oil price to stock returns of 10 companies listed in JII. In addition costumer price index had positive influence to stock returns of 10 companies listed in JII. Meanwhile, trading volume had no causal relationship with stock returns; therefore, it cannot be involved in the Vector Autoregressive model. Impulse responses and Variance decomposition analysis results indicate that costumer price index had dominant influence to stock returns of 10 companies listed in JII rather than Bank Indonesia interest rate and Brent oil price. Eventually, on the basis of Schwarz Information Criteria (SIC), Akaike Information Criteria (AIC) and Automatic Eviews7 lag length determination we conclude that each equation consists of five lag value of stock returns, Bank Indonesia interest rate, costumer price index and Brent oil price. The estimated Vector Autoregressive VAR(5) predicts negative stock returns in year 2013.

Keywords: macroeconomic variables, stock returns, Jakarta Islamic Index (JII), Arbitrage Pricing Theory, Vector Autoregressive (VAR), Schwarz Information Criteria (SIC), Akaike Information Criteria (AIC), forecasting

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1. Background

According to Jaribah (2008), capitalization becomes the most important milestone in developing national economy. Umar economic jurisprudence defines capitalizations into two kinds, as basic and social capitalization. Basic capitalization refers to basic factors of production including investment. Social capitalization refers to infrastructure such as cities, mosque and market. Islamic capital market represents those capitalizations where investors develop their portfolio. These will develop wealth and capital market in the same time. A modern economic country develops its capital market for supporting their national economy.

Islamic economic system arises after global monetary crisis in 2008. It comes as an alternative economic system offering fair and justice in the economy. The system comes along with its instrument such Islamic capital market become the centre of *muamalah* activities which permitted as long as in line with *syariah* law Karim (2004). An Islamic capital market offers investment portfolios regarding to Islamic investment principles. There is different meaning of investment between conventional and Islamic economic system. The conventional system defines investment as the total income subtracted by total consumption and saving for maximizing returns. The Islamic economic system defines investment as part of wealth consists of return and social values such as generosity, worship and *al maqashid al syariah*. In the other words, Muslim investors are expected to bear risk beside return in different perspective comparing to investor in general.

Indonesia is a country with the largest Muslim population; therefore, Indonesian Muslim have to realize and consider their fast economic development by initiating strong foundation of national economy thought its real and monetary sector. Islamic capital market is the only institution for supporting national economy. Islamic capital market has two functions to support national economy. First, it functioned as financial market where investment portfolio is traded. Second, it functioned as real economic financial intermediary where fund is distributed from lender to borrower.

Indonesia Islamic capital market is a part of conventional capital market. So it almost impossible to separate both market. Therefore, we would like to examine how far Indonesia capital market contributes national economic growth through this following illustration:

Table 1. Indonesia Capital Market Development, 2007-2011

Year	Capital Market Capitalization (Trillion, IDR)	Capital Market Contribution Ration to GDP (%)
2007	1.988,33	50,24
2008	1.076,50	21,72
2009	2.019,38	35,97
2010	3.327,29	50,55
2011	3.821,99	55,07

Source : BAPEPAM Annual Report, 2007-2011

Capital market capitalization indicates the multiplication of aggregate number of stocks and regular market closing price. The Indonesia Exchange (IDX) market

capitalization and its contribution to GDP become one indicators of Indonesia capital market development. 2008's IDX market capitalization is 1.076,50 trillion, decreasing 46,42% from 2007s' capitalization which is 1.988,33 trillion. In 2009 IDX market capitalization is significantly increased 87,59% from 1.076,50 in 2008 to 2.091,38 trillion. In 2010 IDX market capitalization is increased 46,13% from 2.091,38 trillion in 2009 to 3.247,10 trillion in 2010; Furthermore in 2011, IDX market capitalization also increased 3,20% from 3.247,10 trillion in 2010 to 3.821,99 trillion in the end of 2011.

Subject to the economic condition the contribution of capital market to GDP is fluctuating. In 2007 capital market contributes 50,24% and decreased significantly to 21,72% in 2008. In 2009, capital market contribution experienced light increasing from 21,72% in 2009, to 35,97% in 2010. The increasing of capital market contribution to GDP is continuously increased respectively from 35,97% in 2009 to 50,55% in 2010 and also 55, 07% in 2011.

Indonesia capital market has the experience of excellent performance during past five years. In 2007 it contributes 50,24% and there are decreasing trends in the next two following years (year 2008-2009) due to the global financial crisis at that time. The crisis doesn't impact Indonesia capital market negatively. It's proven by the increasing in trend of capital market contribution to GDP from year 2008 until 2011. In other words, Indonesia capital market is relatively secure and profitable. In the other hand, Jakarta Composite Index in year 2009 was awarded as the best index in ASEAN and second best index in the world. In addition, in year 2010 Indonesia index was nominated as the best index in Asia Pacific and the second best index in Asia Pacific in 2011.

Indonesia conventional capital market and the Islamic capital market is an entity. Both couldn't stand alone; meaning that, the development of Indonesia capital market represents the development of Indonesia Islamic capital market. Although Indonesia isn't Islamic based country, it is the world largest Muslim in population country. It becomes one of potential developing market in the Islamic finance world industry.

As one of large Islamic finance market, Indonesia must deeply concern to develop Islamic capital market and preparing its society to apply Islamic economic in particular Islamic investment. Today, there are two major Islamic indices in Jakarta Composite Index: they are Jakarta Islamic Index abbreviated as JII and Islamic *Syariah* Security Index abbreviated as ISSI. JII comes as actualization of *Syariah* board regulation No. 05/DSN-MUI/IV/2000 concern stocks trading which issued in April 2000. JII is a part of Jakarta Composite Index that supposed to guide the investors to invest their funds in term of *syariah* compliance stocks. JII consists of top 30 stocks in several main sectors including agriculture, mining, chemical, consumption, property, infrastructure, utility, transportation and trades which are passed from output screening mechanism based on *syariah* criteria. As well as JII, ISSI is a *syariah* compliance index consists of indices from more company with less strict than JII in stocks valuation.

Jakarta Islamic Index consists of 30 most liquid *syariah* compliance stocks. This research examines 10 companies which are continuously being listed in JII since 2008 to 2012. JII10 consists of 10 companies from various sectors including infrastructure, agriculture, utility, chemical industry, mining and consumption. All of companies have been listed in JII since 2008 to 2012 without delisting from JII. Unilever and Kalbe Farma Ltd represent as Consumption industry, Telekomunikasi Indonesia Ltd represents as Utility industry, Semen Gresik and Indocement Tunggal Prakasa Ltd represent as Chemical industry, Astra Agro Lestari represents as Agriculture industry, Tambang Batubara Bukit Asam, Aneka Tambang and Timah Ltd represent as Mining Industry and United Tractor Ltd represents Trading industry Ltd.

Stocks market investment faces the possibility of generating both risks and returns; JII10s' stocks will not be free from risk as well. As explained previously, Islam doesn't merely treat investment for profit maximization, but also consists of worshiping spirit. According to Novia (2011), in more practical market, risk relates to price fluctuation for several stocks or sectors. It happened because of investor responds' on the changing of expected rate of return.

There are some researches on the influence of macroeconomic variable on stock returns in several countries with various results. According to Ahmet Bŭyŭksalvarecı (2010), return on stock in Turkish Stock Exchange Market was negatively influenced by foreign exchange rate, oil price, industrial production index and money market interest rate. In addition, money supply had positive influence on stock returns. Meanwhile, the costumer price index had no significant influence on stock return. Otherwise according to Benaković (2010), return on stock in Croatian Capital Market was negatively influenced by inflation and positively influenced by other macroeconomic variable such as industrial production index, interest rate, and market index and oil price. Nazir (2010) also described return on stock in Pakistan Equity Market was negatively influenced by inflation, exchange rate and interest rate. Meanwhile political stability had positive influence on it. In Malaysia Islamic Stock Market according to Hussin (2012), return on stock was negatively influenced by some macroeconomic variable such as industrial production index and costumer price index. The other macroeconomic variable; such as money supply and exchange rate; was positively influenced return on stock in the market. According to Novia (2010), Jakarta Islamic Index return on stock was negatively influenced by costumer price index and exchange rate. Furthermore, industrial production index and Indonesia composite index had positive influence to stock returns. Money supply and interest rate had no significant influence to JII stock returns. According to Puteh (2010), Indonesia composite index stock returns ware positively influenced by inflation, exchange rate and interest.

However the different evidence is found in Aman Stock Market. Al-Huda (2012) stated that return on stock in Aman Stock Market was not significantly influenced by the macroeconomic variable such as interest rate, budget deficit and inflation. The research results mentioned before indicating different countries and macroeconomic variables might come with different circumstances and implications. The macroeconomic variable such as CPI, IPI, exchange rate, interest rate, market

index, money supply, trading volume, gold and oil price varied on its significance depend on market efficiency in each country.

Investment has two common analytical tools to determine the relationship among the expected return and risk of investment; there are Capital Asser Pricing Model (CAMP) and Arbitrage Pricing Theory (APT) (Chen and Ross in Bűyűksalvarecı, 2010). CAPM describes balance relationship between risks of each asset in a balance market by strictly take beta of individual stock returns to market portfolios' returns. The Arbitrage Pricing Theory (APT) becomes model to explain risk and return relationship in an investment. It developed by Ross in 1976. APT comes with more general determinants rather than CAPM in explaining risk and returns of investment, rather than strictly hold on beta of individual stock return to market portfolios' returns. It allows return of investment to be generated from many variables such as macroeconomic variables (Pudjiastuti, 2004).

This study aims to analyze the effects of macroeconomic variables on Jakarta Stock Exchange Market on APT framework and provide further forecast on JII selected 10 companies' stock returns. Jakarta Islamic Index 10 selected companies abbreviated as JII10 is on the basis of monthly data, starting from January 2008 to December 2012 and relates to three macroeconomic variables. The macroeconomic variables in this study are Bank Indonesia Rate, Costumers Price Index and Brent standard oil price. Furthermore, this study will examine 10 companies stock returns which are listed in JII from 2008-2012 with no de-listing record from it. The selection supposed to ensure company healthiness and the fulfillment of Islamic investment principles. Eventually this research entitles with "*The Analysis of Selected Macroeconomic Variables that Influence Stock Returns Jakarta Islamic Index and Its Vector Autoregressive (VAR) Forecasting." (Case study: 10 companies listed in Jakarta Islamic Index Period 2008-2012*)

2. Limitation

Study limitation aims to restrict the analysis problems that may occurred. Therefore, this study is restricted to the following limitations:

1. Focus on stock of ten companies listed in JII during research period.
2. The stock returns refer to the changes of stock price movement of the ten companies.
3. The study period is January 2008 – December 2012 monthly time series data.

3. Research Questions

There are several types of investors and investment alternatives. According to Huda (2007), there are three characteristics of investors; it is risk averse, risk neutral and risk seeking. Meanwhile, there are two investment alternative with refers to risk and return. Higher possibility of returns drives higher possibility of risks and vice versa. The risk seeking investor takes relatively riskier market. They expect higher possibility of returns. Meanwhile, risk averse and neutral investor relatively takes a lower risk market and expect lower risk burden regarding to their safety preference.

The investors relay their decision to some important information in particular financial condition and macroeconomic condition.

The information of companies' financial condition and macroeconomic condition contribute major suggestion to public companies that have relatively higher sensitivity to macroeconomic fluctuating condition. Previous studies on macroeconomic variables that influence return on stock in Turkey, Aman, Croatia, Pakistan, Malaysia and Indonesia have been conducted. Those studies provide different evidence. According to Benaković (2010), costumer price index had negative influence to stock returns in Croatian capital market, while Novia (2010) found costumer price index had negative influence to Indonesia stock returns as well. In the other hand, according to Hussin (2012) costumer price index had positive influence to stock returns in Malaysian Islamic stock market. According to Puteh (2010), interest rate had positive influence to Indonesian stock returns; In the other hand Croatian stocks' return is positively influenced by interest rate, oil price and market index (Benaković, 2010). According to Nazir (2010), interest rate was negatively influenced by Pakistan stock returns. The former studies found that Industrial production index has positive influence in Indonesian, Malaysian and Croatian stock returns; while negative influence is found in Aman stock returns. The studies also found that money supply was negatively influence to Malaysian stock returns and positively influence Aman stock returns.

Different evidence coming from the former studies results in different information that describes the influence of investor investment in Indonesia stock market. Therefore, further study is needed in order to update the relevant information. Based on those problems, the research questions of this study are declared in these following questions:

1. What is the influence of interest rate to JII10 stock returns?
2. What is the influence of costumer price index to JII10 stock returns?
3. What is the influence of oil price to JII10 stock returns?
4. What is the influence of trading volume to JII10 stock returns?

4. Research Aims
This study defines these following aims in order to answer the research questions:
1. To analyze the influence of costumers price index to JII10 stock returns.
2. To analyze the influence of interest rate to JII10 stock returns.
3. To analyze the influence of oil price to JII10 stock returns.
4. To analyze the influence of trading volume to JII10 stock returns.

5. Previous Researches

There are plenty of domestic and international researches on stock returns. Each research comes with different analysis tools and results. Here is some researches on stock returns in several countries:

Table. 2. Previous Studies

No.	Title	Model	Conclusion
1.	Amet Bűyűksalvarecı (2010) on *"The Effects if Macroeconomics Variables on Stock Returns: Evidence from Turkey"* period 2003 – 2010.	Ordinary Least Square (OLS)	The study defines Turkey return on stock is positively influenced by money supply and negatively influenced by foreign exchange rate, oil price, industrial production index, money market interest rate and costumer price index; In addition, the research explains that gold has no significant influence to Turkey returns on stock.
2.	Benaković, Posedel (2010) on *"Do Macroeconomic factors matter for stock returns? Evidence from estimating a multifactor model on Croatian market"* period 2004 – 2009.	Cross-Sectional Regression	The study defines Turkey return on stock is positively influenced by money supply and negatively influenced by foreign exchange rate, oil price, industrial production index, money market interest rate and costumer price index; In addition, the research explains that gold has no significant influence to Turkey returns on stock.
3.	Khalid, Shakil and Ali (2010) on *"Post Liberalization Impact of Macroeconomic Factors on Stock Market Return"*.	Exponential Generalized Auto Regressive Conditional Heteroskedasticity *(EGARCH)*	This study defines Pakistan returns on stock is positively influence by political stability and income per capita; and negatively influenced by inflation, interest rate and exchange rates.
4.	Maruddani and Safitri (2008) on *"Vector Autoregressive (VAR) For Forecasting Indofood Sukses Makmur Ltds' Stock Price"*.	Vector Autoregressive *(VAR)*	The study defines that AIC and SC values determine four lag values of Stock on ROA, DER and EPS and VAR can be used to forecast the future value of stock from 2006:1 until 2007:12
5.	Muflih (2012) on *"The Factors that affect shares' Return in Amman Stock*	Simple Regression ANOVA	His study defines Amman stock returns is negatively influenced by size of the

	Market" period 2005 – 2010.		company and positively influenced by number of employees and balance of payment; in addition, interest rate gross domestic product, budget deficits and inflation have no significant influence to Aman stock returns.
6.	Huzin, Fidlizan, Abu and Awang (2012) on *"Malaysian Islamic Stock Market: a Time Series Analysis".* Period 1999 – 2007.	Vector Autoregressive *(VAR)*	The study defines Malaysian Islamic stock returns is positively influenced by industrial production index and costumer price index. In addition, the returns on stock are negatively influenced by money supply and exchange rate.
7.	Lee, Hamzah and Maysami (2004) on *"Relationship between Macroeconomic variables and stock market indices: Cointegration Evidence from Stock Exchange Singapore'sAll-S sectors indices"*	Error Correction Model *(ECM)* and Vector Error Correction Model *(VECM)*	This study defines all Singapore's poperty index are significantly influenced by inflation, interest rate, exchange rate, industrial production index and money supply. Moreover Singapore's financial index is significantly influenced by those variables except money supply; in addition, the Singapore's hotel index is not significantly influenced by money supply and interest rate but significantly influenced by the rest of variables.
8.	Novia (2010) on *"Macroeconomic Factors that Influence Return on Stock in Jakarta Islamic Index"* period 2005 – 2010.	Generalized Auto Regressive Conditional Heteroskedasticity *(GARCH)*	Her research defines Jakarta Islamic Index return on stock is positively influenced by industrial production index and market index. Moreover stock return is negatively influenced by costumer price index and exchange rate; In addition, stock returns have no significant influence with money

|			supply and interest rate.
9.	Kuwornu (2012) on *"Effect of Macroeconomic Variables on the Ghanaian Stock Market Returns: A Co-integration Analysis"* period 1992 – 2008.	Error Correction Model *(ECM)*	The study defines negative relationship between Ghanaian return on stock and crude oil price. Furthermore the research explains that Ghanaian return on stock is positively influenced by t-bill rate, inflation and exchange rate.
10.	Khan and Rizwan (2008) on *"Trading Volume and Stock Returns: Evidence from Pakistan Stock Market"* period 2007-2008.	Generalized Auto Regressive Conditional Heteroskedasticity *(GARCH)* and Vector Autoregressive *(VAR)*	The study defines positive contemporaneous relationship among trading volume and stock returns in Pakistan stock market.

Source: Relevant Undergraduate Thesis and Journals

The previous studies provide relevant information and motivate future research as enrichment of the empirical study to stock market field. Therefore, the author distinguishes this study by offering these following particular differences:

1. Research case study
   This study will cover the case of companies listed in Jakarta Islamic Index (JII) starting from year 2008 until 2012.
2. Variables
   This study use costumer price index, oil price and interest rate which have various contradictions in the previous studies.
3. Research Period
   The data that will be used in this study consists of companies which are listed in JII since year 2008 until 2012.

Based on this research questions, research objectives, theoretical backgrounds and the previous research results; therefore we develop this following framework:

Figure 1. Research Framework
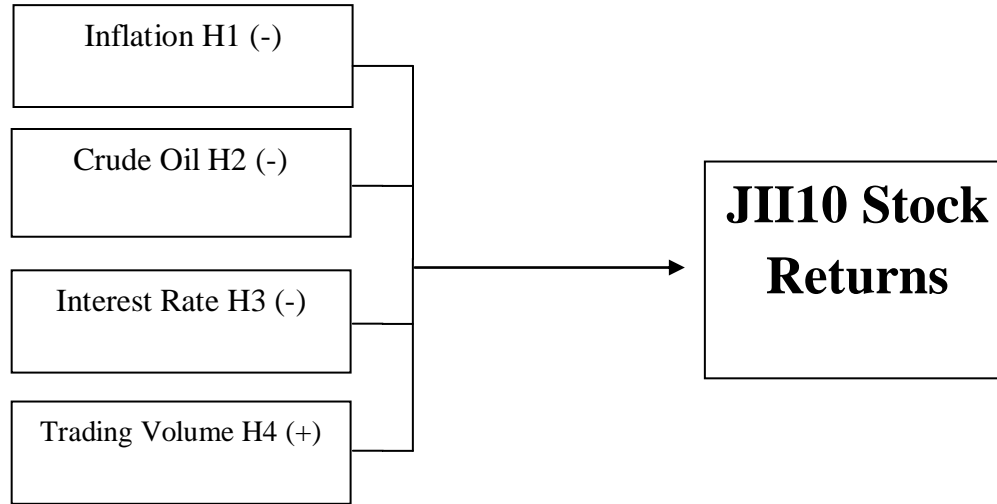
Source: Agrawal (2010), Bűyűksalvarecı (2010), Posedel (2010), Nazir (2010), Hussin (2012), Maysami (2004), Novia (2010), Kowarnu (2012) Khan and Rizwan (2008) and Hasan, Jinnan and Javed (2009)

6. Hypothesis

On the basis of previous research questions, research objectives, theoretical backgrounds, previous researches' results and research framework. This study develops these following hypotheses:

1. H1: There is negative effect of costumer price index to JII10 stock returns period 2008-2012.
2. H2: There is negative effect of crude oil price to JII10 stock returns period 2008-2012.
3. H3: There is negative effect of interest rate to JII10 stock returns period 2008-2012.
4. H4: There is positive effect of trading volume to JII10 stock returns period 2008-2012.

7. Research Variables and Operational Definitions
7.1. Data Collecting Method and Sources

The ultimate goal of this study is to explore the effect of selected macroeconomic variables on JII10 stock returns and forecast the future value of JII10 stock returns. It uses secondary time series data starting from December 2007 to January 2013 from several sources. The following table represents research data and it sources:

Table 3. Data and Sources

No	Data	Source
1.	Closing price of JII10	www.duniainvestasi.com
2.	Trading Volume	www.duniainvestasi.com
3.	Brent Crude Oil Price	www.eia.gov
4.	Costumer Price Index	Indonesian Monetary Statistic (SEKI) Bank Indonesia
5.	Interest Rate	Indonesian Monetary Statistic (SEKI) Bank Indonesia

Source: www.duniainvestasi.com

This study also obtains relevant information from official websites, magazines, journals and articles regarding to the relevant field of study.

7.2. Research Variable and Definitions

According to Sugiarto (2006), research variable is an attribute or characteristic of object or activity which has some varieties. Those varieties are determined by researcher to be observed and concluded. This research consists of two variables which are dependent and independent variable. Dependent variable of this research is stock returns while the independent variable of this research is inflation, interest rate and oil price.

7.3. Econometric Model

Econometric model is statistical model used in econometrics. It defines the statistical relationship between variables in particular phenomena. This study uses this following Econometric model:

Model 1:

$$Y_{1t} = \alpha_1 + \sum \beta_{1l} Y_{1t-l} + \sum \lambda_{1l} Y_{2t-l} + \sum \gamma_{1l} Y_{3t-l} + \sum \omega_{1l} Y_{4t-l} + \sum \Phi_{1l} Y_{5t-1} + e_1$$

Model 2:

$$Y_{2t} = \alpha_2 + \sum \beta_{2l} Y_{2t-l} + \sum \lambda_{2l} Y_{2t-l} + \sum \gamma_{2l} Y_{3t-l} + \sum \omega_{2l} Y_{4t-l} + \sum \Phi_{2l} Y_{5t-1} + e_1$$

Model 3:

$$Y_{3t} = \alpha_3 + \sum \beta_{3l} Y_{1t-l} + \sum \lambda_{3l} Y_{2t-l} + \sum \gamma_{3l} Y_{3t-l} + \sum \omega_{3l} Y_{4t-l} + \sum \Phi_{4l} Y_{5t-1} + e_1$$

Model 4:

$$Y_{4t} = \alpha_4 + \sum \beta_{4l} Y_{1t-l} + \sum \lambda_{4l} Y_{2t-l} + \sum \gamma_{4l} Y_{3t-l} + \sum \omega_{4l} Y_{4t-l} + \sum \Phi_{4l} Y_{5t-1} + e_1$$

Model 5:

$$Y_{5t} = \alpha_5 + \sum \beta_{5l} Y_{1t-l} + \sum \lambda_{5l} Y_{2t-l} + \sum \gamma_{5l} Y_{3t-l} + \sum \omega_{5l} Y_{4t-l} + \sum \Phi_{5l} Y_{5t-1} + e_1$$

Where Y_1 is Stock returns (RJII10), Y_2 is Costumer price index (CPI), Y_3 is Brent Oil price (OIL), Y_4 is Bank Indonesia Interest rate (BIR), Y_5 is Trading volume (VOL), e_1 is Error term (t1,2,3,4,5), l is Lag length with $l = 1,2,…,$ x and x is maximum lag.

The above equation derives this following *Vector Autoregressive order p* $VAR(p)$:

$$Z_t = \alpha_0 + \Phi_1 Z_{t-1} + \phi_2 Z_{1-2} + \cdots + \phi_p Z_{t-p} + e_t$$

Where p is predicted lag.

7.4. Operational Definitions

Dependent variable is a variable that being described or influenced by other variables (independent variable). The dependent variable of this study is return on stock JII10 consists of 10 selected companies stocks. The value of JII10 stock returns is obtained by calculation of JII10s' closing price by using this following equation:

$$R_t = ln(P_t) - ln(P_{t-1})$$

Where R_t is Return for Month t, P_t is Closing price of JII10 stock for month t and P_{t-1} is Closing price of JII10 stock for month t-1 respectively.

The independent variable is a variable that describe or influence other variable. This study uses these following independent variables: inflation, interest rate and oil price.

   a. Inflation
      Inflation is a continuous increasing in general price level. Costumer price index is the representative of inflation that measures the average change in prices of goods and services in a particular period of time.
   b. Interest Rate
      Bank Indonesia rate is used as the representative of interest rate which is nationally used as the monetary standard of Indonesian interest rate.
   c. Oil Price
      Brent oil price becomes the representative for international oil price in this research.
   d. Trading Volume
      Trading volume is the amount of tradable stock in certain period of time. It represents market responds on the stocks available in the market.

Table 4. Operational Definitions Research Variables

No	Variable	Definition	Scale
1.	Stock Returns	Profit results when the price of a stock held by investor rises above its purchase price.	Ratio
2.	Inflation	Inflation is the continuous increasing in general price level.	Ratio
3.	Brent Oil Price	Brent international oil price	Ratio
4.	Bank Indonesia Interest Rate	BI Rate	Ratio
5.	Trading Volume	The amount of tradable stock in certain period of time	Ratio

Source: Relevant Journals and Books

7.5. Research Sample

Population is compilation of elements. It becomes core focus in a study while sample becomes a part of population. This study population is companies which are listed in Jakarta Islamic Index (JII) since year 2008 until. Those companies are chosen regarding their liquidity, *syariah* acceptability and market acceptability. Meanwhile, this study sample is 10 selected companies which are listed in Jakarta Islamic Index (JII) since year 2008 until 2012. Those years involves of Indonesian economic recovery moment after global financial crisis in 2008. Judgment sampling method is used in this research. It takes the samples in accordance to pre-determined criteria mentioned below:

1. The selected companies are public company that is listed in Jakarta Islamic Index continuously since 2008-2012.
2. The selected companies represent almost sectors available in the index.
3. The selected companies have strong fundamental basis.

From total population of 30 companies, this study takes 10 companies that fulfill the sample criteria. Table 5. describes the list of companies selected in this research:

Table 5. The List of Sample Companies

No	Code	Sector	Company
1.	PTBA	Mining	Tambang Batubara Bukit Asam Ltd
2.	TINS	Mining	Timah Indonesia Ltd
3.	ANTM	Mining	Aneka Tambang Ltd
4.	TLKM	Telecommunication	Telekomunikasi Indonesia Ltd
5.	UNTR	Infrastructures	United Tractor Ltd
6.	KLBF	Pharmacy	Kalbe Farma Ltd
7.	INTP	Chemical Industry	Indocement Tunggal Prakasa Ltd
8.	SMGR	Chemical Industry	Semen Gresik Ltd
9.	AALI	Agriculture	Astra Agro Lestari Ltd
10.	UNVR	Consumption Industry	Unilever Indonesia Ltd

Source: www.duniainvestasi.com

7.6. Analysis Method

Vector Autoregressive (VAR) model observes the relationship between stock returns and macroeconomic variables and further forecasts the future value of stock returns by following these procedures:

    a. Unit Root Test – Augmented Dickey-Fuller Test
    b. Correlation Matrix - Johansen-Juselius Cointegration Test
    c. Granger Causality Test
    d. Variance Decomposition and Impulse Response Analysis
    e. Forecasting with *Vector Autoregressive (VAR)*

In detail those mentioned techniques will be described in the following explanation.

a. Unit Root Test and Covariance Matrix

According to Thomas (1997), Unit root test supposed to figure out the stationary of research data. The null hypothesis is tested by Augmented Dickey-Fuller test. The ADF test defines the existence of unit root in the research data. Supposed in a *random walk model* equation:

$$Y_t = \rho Y_{t-1} + \mu_t$$

Where Y is the observed variable, t is period of time, ρ is coefficient and e is error term

And so the regression model could be figured as the following equation:

$$\Delta Y_t = \delta Y_{t-1} + e_t$$

Where δ is $(\rho - 1)$ with Δ as its first difference and the regression comes with this following hypothesis:

$H_o = \delta = 0$ Means the unit roots exist and the data is not stationer.

$H_1 = \delta < 0$ Means the unit roots not exist and the data is stationer.

The existence of units root implies spurious behavior in the data; furthermore, after the stationary of research data is known the linearity of research data testing will be conducted trough cointegration test.

7.6.1. Johansen-Juselius Cointegration Test

Cointegration test consists of two ways first Residual based test and second Maximum likelihood based test. Engle-Granger test becomes the representative of residual based test. Meanwhile, Johansen - Juselius becomes the representative of likelihood based test. This study uses Johansen-Juselius test to observe the existence of cointegration vectors in the non stationary time series data where the Null hypothesis is supposed to be no cointegration among the variables. Furthermore, the

Vector Autoregressive (VAR) is used to examine the existence of multivariate cointegration among the variables.

According to Irawan (2005), Vector Autoregressive (VAR) becomes an equation system where in every variable is a linear function of the Constanta and its lag value. The independent variables in VAR cover the lag value of dependent variable entirely. The following equation illustrates how independent variable in VAR covering the lag value of dependent variable in a model:

$$Y_t = A_o + A_1 Y_{t-1} + A_2 Y_{t-2} \ldots. + A_p Y_{t-p} + e_t$$

Where Y_t is Dependent variables' vector ($Y_{1,t}, Y_{2,t}, Y_{e,t}$), A_o is Intercept vector n x 1, A_1 is Parameters' matrix n x 1 and e_t is Vectors' residual ($\sum_{1,t}, \sum_{2,t}, \sum_{e,t}$) n x1

VAR assumes that the all independent variables in the model do not correlate each others.

According to Widarjono (2005), the Johansen procedures select the value of Lag length in the basis of Akaike Information Criterion (AIC) and Schwarz Information Criterion (SIC).

$$AIC = \log + \left(\frac{\sum \hat{e}_i{}^2}{n}\right) + \frac{2k}{n}$$

$$SIC = \log + \left(\frac{\sum \hat{e}_i{}^2}{n}\right) + \frac{k}{n}\log n$$

Where $\sum \hat{e}_i{}^2$ is the amount of squared resuidual, k is the amount of independent variable and n is the amount of observations.

In addition, the Error Correction Term is inserted only if the co-integration exists in order to oversight the short-run deviation due to the impact of financial development behavior that apparently more obvious in short-run rather than in long-run.

7.6.2. Granger Causality Test

According to Granger (1988), the existence of cointegrating vectors implies that granger causality exists at least in one direction. A granger variable causes the other variable only if it assists its future value. In cointegrated series variables might be share similar stochastic trends. This research conducts Granger causality test to look for directional relationship among variables.

Gujarati (2003) stated that, there are three Granger interpretations: first unidirectional causality, second bilateral causality and third independence causality. Unidirectional causality occurs if dependent variable lag coefficience is significant while all independent variable lag coefficience is zero. Bilateral causality occurs if all lag coefficience of both dependent and independent variables are significant and the lag variable is not zero. Independence causality occurs only if all lag coefficience of both dependent and independent variables are zero.

7.6.3. Variance Decomposition and Impulse Response Analysis

According to Sims (1992) in Ajija (2007) impulse response function (IRF) illustrates the expectation of future period from variable forecast deviation due to other variable innovation effects. It exposes the existence of shock variable to other variable until its equilibrium point. Variance decomposition of forecast error variance decomposition becomes an instrument of VAR that separate the estimated variable to be shock variable or innovation variable; where it assumes that the innovation variable do not correlate each others. The variance decomposition analysis provides information of the movement of shock variable to certain variables and so to another shock variable.

7.6.4. Descriptive Statistics

Descriptive statistics becomes a set of whole descriptive coefficient concluded the variables in a study. It represents the entire population or sample in the study and explains data central tendency and dispersion measurement. *Eviews7* is used as the econometric tool to analyze the data. Eventually, this study finds the following descriptive statistics:

Table 6. Descriptive Statistics

Descriptions	RJII10	BIR	CPI	OIL	RJII10VOL
Mean	626.1667	6.933333	125.8040	92.15300	297458417.3
Median	1994.500	6.500000	124.6000	95.84000	185302250
Maximum	14044.00	9.500000	164.0100	132.7200	1111937250
Minimum	-22534.00	5.750000	110.0800	39.95000	48354000
Skewness	-0.998150	0.979300	1.483741	-0.409904	1.586559
Observations	60	60	60	60	60

Source: Data Analysis Result

Table 6 defines the descriptive statistics of all variable with regards to changes in selected macroeconomic variables and JII10 stock returns. It defines that first; Stock Returns of 10 selected JII companies (RJII10) Mean, Median, Maximum and Minimum value are 626.1667, 1994.500, 14044.00 and -22534.00 respectively. Second, Bank Indonesia Interest Rate (BIR) Mean, Median, Maximum and Minimum value are 6.933333, 6.500000, 9.500000 and 5.750000 respectively. Third, Costumer Price Index (CPI) Mean, Median, Maximum and Minimum value are 125.8040, 124.6000, 164.0100 and 110.0800 respectively. Forth, Crude Brent Oil Price (OIL) Mean, Median, Maximum and Minimum value are 92.15300, 95.84000, 132.7200 and 39.95000 respectively. Fifth, Trading Volume (VOL) Mean, Median, Maximum and Minimum value are 297.458.417,3, 185.302.250, 1.111.937.250 and 48.354.000 respectively.

The result also explains that all variables in this study exhibit positive mean. In term of Skewness BIR, CPI and Trading Volume are positively skewed which are 0.979300, 1.483741 and 1.586559 respectively. Meanwhile, RJII10 and Oil Price are negatively skewed they are -0.998150 and -0.409904 respectively.

The relationship to be observed between stock returns and macroeconomic variables is derived from this following equation.

$$RJII10_{it} = \beta_o + \beta_{1t}CPI_{it} + \beta_{2t}BIR_{it} + \beta_{3t}OIL_{it} + \beta_{4t}VOL_{it} + e_t$$

Where JII10 is stock returns on 10 selected companies in Jakarta Islamic Index, CPI is costumer price index , BIR is Bank Indonesia Interest Rate, OIL is Brent Crude Oil Price, VOL is trading volume of 10 selected companies in Jakarta Islamic Index, β_o is the intercept, $\beta_1, \beta_2, \beta_3, \beta_4$ are the coefficient of macroeconomic variables and e_t is the error term.

7.7.   Unit Root Test

Eviews7 is used in this study. It conducted the unit root test as the first test to build the proper econometric model for JII10 stock returns *VAR* forecasting. Unit root test is conducted by observing the value of *Akaikie Information Criterion* (AIC) and *Schwarz Criterion* (SC) through the *Augmented Dickey-Fuller* (ADF-test) in level and first difference level. ADF-test used to examine the stationary and lag length of the four variables in this study in level and first difference.

Table 7 Lag Length Determination by AIC and SC

BIR	AIC	SC	CPI	AIC	SC	RJII10	AIC	SC
(VAR)1	-2.217	-1.073	(VAR)1	6.858	7.002	(VAR)1	20.91	21.05
(VAR)2	-1.165	-0.984	(VAR)2	6.894	2.075	(VAR)2	20.918	21.09
(VAR)3	41.52	41.7	(VAR)3	6.92	7.139	(VAR)3	20.94	21.16
(VAR)4	-1.223	-0.965	(VAR)4	1.811	2.069	*(VAR)4*	*20.863*	*21.12*
(VAR)5	*-4.887*	*4.59031*	*(VAR)5*	*-7.781*	*-7.483*	(VAR)5	20.881	21.17
VOLJII10	**AIC**	**SC**	**OIL**	**AIC**	**SC**	**Variable**	**Lag**	
(VAR)1	41.62	41.76	(VAR)1	6.864	7.007	RJII10	Lag 4	
(VAR)2	41.52	41.7	(VAR)2	6.874	7.054	BIR	Lag 5	
(VAR)3	41.5	41.22	(VAR)3	6.859	7.078	CPI	Lag 5	
(VAR)4	*41.36*	*41.61*	(VAR)4	6.896	7.154	OIL	Lag 5	
(VAR)5	41.41	41.71	*(VAR)5*	*-1.675*	*-1.378*	VOL	Lag 4	

Source: Data Analysis Result

This study observes the lowest value of AIC and SC to be the proper lag for *VAR* estimation and forecasting. Table 7 shows the results of lag length determination on the basis of *Akaike Information Criterion* (AIC) and *Schwarz Criterion* (SC) value. It shows that RJII10 and VOL are in lag 4. It defined the lowest value of AIC and SC among the other lag length (1 until 5) which is in lag 4. RJII10 lag(4) AIC and SC are 20.863 and 21.12 respectively. Meanwhile OIL lag(4) AIC and SC are 41.36 and 41.61 respectively; Meanwhile, BIO, OIL and CPI match their minimum AIC and SC in lag 5. Finally, this study conclude lag 5 as the proper lag length to be used in *VAR* estimation and forecasting.

Table 8 Automatic *Eviews7* Lag Length Determination

Lag	LogL	LR	FPE	AIC	SC	HQ
1	139.2456	NA	5.22e-09	-4.881659	-4.699174	-4.811090
2	200.6159	109.3508	1.40e-09	-6.204216	-5.109307*	-5.780806*
3	226.2982	41.09163	1.39e-09	-6.229026	-4.221693	-5.452774
4	247.1755	29.60782	1.72e-09	-6.079110	-3.159353	-4.950016
5	**295.7292**	**60.03006***	**8.20e-10***	**-6.935609***	**-3.103427**	**-5.453673**
6	313.0389	18.25378	1.33e-09	-6.655959	-1.911353	-4.821181

Source: Data Analysis Result

Beside manual lag length determination an automatic lag length determination is used in this study. It supposed to strengthen lag length determination. Table 4.4.2 shows the result of automatic lag length determination by *Eviews7*. It shows that based on the value of *Final prediction error* (FPE) *and Akaike Information Criterion* (AIC) which is 12.28991099 and -6.935609 respectively. Meanwhile, *Schwarz Criterion* and *Hannan-Quinn Information Criterion* match in lag 1 which is -5.109307 and -5.780806 respectively. Automatic *Eviews7* lag length determines lag 5 as proper lag length in *VAR* estimation and forecast based on *FPE* and AIC value.

Table. 9 ADF Unit Root – Stationary Test at Level Lag 5

No	Series	ADF t-statistic	Mackinnon Critical Value	p-value	Lag Length	Conclussion
1.	JII10	-6.962831	-2.911730	0.0000	5	Stationary
2.	OIL	-2.47905	-2.912631	0.1922	5	Non-stationary
3.	BIR	-2.964573	-2.912631	0.4455	5	Non-stationary
4.	CPI	-1.660874	-2.911730	0.04	5	Stationary
5.	VOL	-6.33374	-2.911730	0.0000	5	Stationary

Source: Data Analysis Result

Table. 9 consists the result of stationary test in determined lag 5 in *"level"*. It describes that Brent Crude Oil (OIL) variable had no stationary criteria because, its p-value is higher than $\alpha = 5\%$ or 0.05 which is 0.1922. Meanwhile, Bank Indonesia Interest Rate also had no stationary criteria because of its p-value. BIR p-value is 0.4455, its higher than $\alpha = 0.05$. Otherwise, the rest variables are have stationary criteria in 95% confidence level. Base on the mentioned explanation further *cointegration-degrees'* test is conducted to overcome the stationary problems.

Table. 10 ADF Unit Root – Stationary Test at First Difference Lag 5

No	Series	ADF t-statistic	Mackinnon Critical Value	p-value	Lag Length	Conclussion
1.	DJII10	-4.191441	-3.4952	0.0000	5	Stationary
2.	DOIL	-4.187405	-3.4952	0.0000	5	Stationary
3.	DBIR	-3.524020	-3.4952	0.0000	5	Stationary
4.	DCPI	-5.244475	-3.4952	0.0000	5	Stationary
5.	DVOL	-3.959329	-3.4952	0.0000	5	Stationary

Source: Data Analysis Result

Table. 10 consists of stationary test in determined lag 5 in first difference *(integrated-degrees' test)*. It defines that p-value of all variables passed the stationary test. All variable tested in *integrated-degrees'* test. All variable p-value is 0.0000 and its lower than α = 0.05. Therefore, Stock returns, oil price, bank Indonesia interest rate, costumer price index and trading volume have stationary criteria.

Because the stationary test is conducted in the first difference/integrated-degrees test; therefore, the relationship to be examined among JII10 stock returns and macroeconomic variables must be conducted in *VAR* estimation and forecasting on their first difference. It defined in the following equation:

$$DRJII10_{it} = \beta_o + \beta_{1t}DCPI_{it} + \beta_{2t}DBIR_{it} + \beta_{3t}DOIL_{it} + \beta_{4t}DVOL_{it} + e_t$$

Where D is the first difference, JII10 is stock returns on 10 selected companies in Jakarta Islamic Index, CPI is costumer price index, BIR is Bank Indonesia Interest Rate, OIL is Brent Crude Oil Price, VOL is trading volume of 10 selected companies in Jakarta Islamic Index, β_o is the intercept, $\beta_1, \beta_2, \beta_3, \beta_4$ are the coefficient of macroeconomic variables and e_t is the error term.

7.8. Johansen - Juselius Cointegration Test

Cointegration is a combination of linear relationship from every non-stationary variable in this study. Those variables must be integrated at order or the similar degree. The integrating variables define similar stochastic trend and long-term similar movement. Johanses – Juselius test is conducted after the two previous tests and results this following table:

Table. 11 Johansen – Juselius Cointegration Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.728706	159.7397	88.80380	0.0000
At most 1 *	0.596298	89.29383	63.87610	0.0001
At most 2	0.297602	40.31160	42.91525	0.0890
At most 3	0.219277	21.23580	25.87211	0.1697
At most 4	0.135600	7.868891	12.51798	0.2626

Source: Data Analysis Result

Table. 12 Johansen – Juselius Cointegration Test with Maximum Eigenvalue Statistic

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.728706	70.44583	38.33101	0.0000
At most 1 *	0.596298	48.98223	32.11832	0.0002
At most 2	0.297602	19.07579	25.82321	0.3002
At most 3	0.219277	13.36691	19.38704	0.2993
At most 4	0.135600	7.868891	12.51798	0.2626

Source: Data Analysis Result

Table. 11 and 12 display the result of Johansen – Juselius Cointegration Test based on the likelihood ratio test consists of first trace statistics and second maximum Eigen value statistics. Table. 12 shows the results of trace statistics at 5 months lag length. The above results proved that the null hypothesis of no cointegration between JII10 stock returns and selected macroeconomic variables for period 1/2008 to 12/2012 can be rejected in Indonesia Jakarta Islamic Index (JII). Trace test implies the existence of 2 cointegrating vectors among variables at the $\alpha = 0.05$. To ensure the results Maximum Eigen value test is conducted. Table. 12 Confirms the existence of cointegrating at the $\alpha = 0.05$. Eventually, study proves evidence on the existence of long term relationship between macroeconomic variables and JII10 stock returns.

7.9. Granger Causality Test

According to Hasan, Jinnah and Javed (2009), Johansen – Juselius cointegration test doesn't account for data structural breaks. Therefore, Granger Causality is conducted as variables are cointegrated. It supposed to observe data causality flows' direction.

Table. 13 Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Probability
BIR does not Granger Cause RJII10	55	4.77691	0.00142
RJII10 does not Granger Cause BIR		3.84448	0.00563
CPI does not Granger Cause RJII10	55	6.15336	0.00021
RJII10 does not Granger Cause CPI		1.04090	0.40584
OIL does not Granger Cause RJII10	55	1.99894	0.09752
RJII10 does not Granger Cause OIL		4.03536	0.00423
VOL does not Granger Cause RJII10	55	1.42348	0.23466
RJII10 does not Granger Cause VOL		0.72098	0.61122

Source: Data Analysis Result

Table. 13 proves evidence on the presence of unidirectional causality from BIR, CPI and OIL to JII10 stock returns at $\alpha = 0.05$ and bilateral causality from BIR to JII10 stock returns at $\alpha = 0.1$. Furthermore no granger causality is found in trading volume (VOL) and JII10 stock returns.

In the other word, it is concluded that unidirectional causality flowing from Bank Indonesia interest rate and costumer price index to JII10 stock returns and those

lag-length relationship causing to crucial relation. Therefore investor is suggested to be more cautious in investment decision making. In addition, significant causality among Oil price and JII10 stock returns defines market movement on the basis of fundamental and real economic activity. Meanwhile the insignificant causality among Trading Volume and JII10 stock returns indicates market sentiment is not reflected from it trading volume.

7.10. Impulse Response and Variance Decomposition Analysis

After the cointegration relationship is found among dependent and independent variables. Impulse Response and Variance Decomposition Analysis is conducted. The lag order of *VAR* is chosen base on the value of SC, AIC and HQ. Here is the IRF and Variance Decomposition Analysis examination result:

Graph. 4 Impulse Response Result

Response to Cholesky One S.D. Innovations
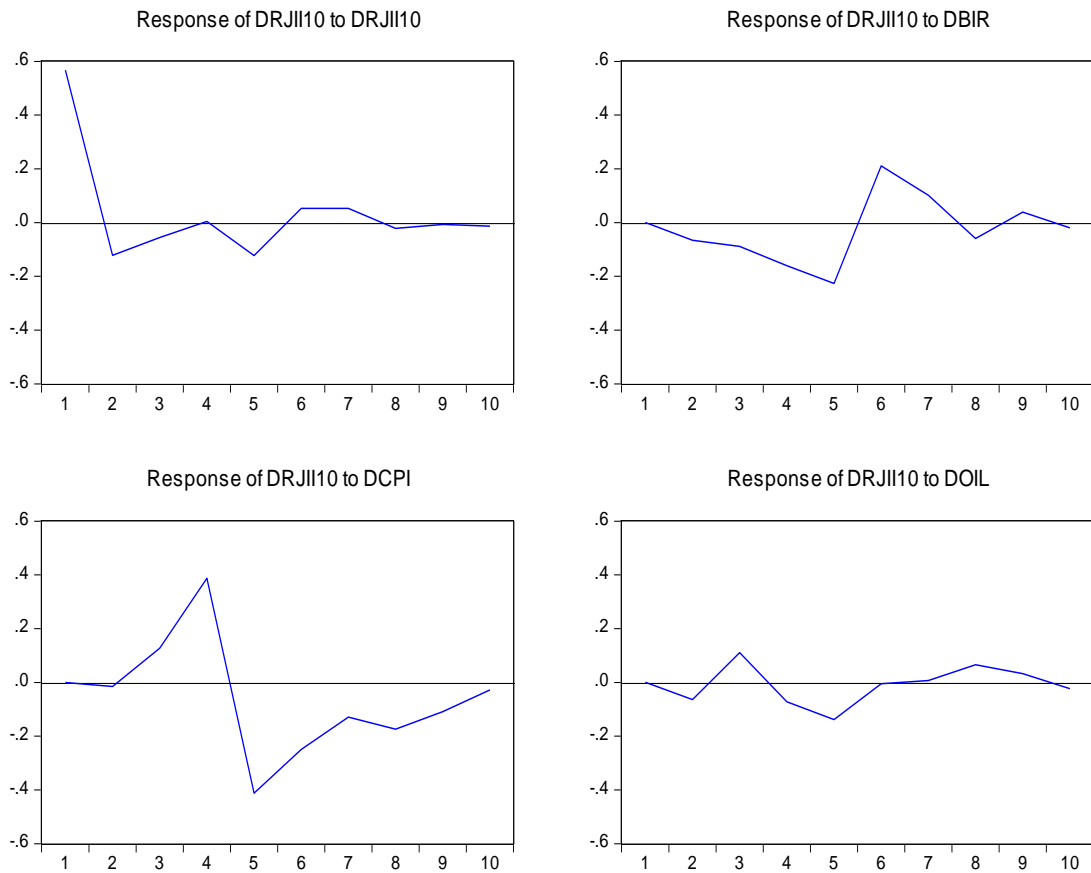
Source: Data Analysis Result

The above results defines a volatile responses of BIR, CPI and OIL to JII10 stock returns. The horizontal exist represents 10 months period of time while the vertical exist represents the change of variables due to the presence of shock variables from the independent variables. The 2nd figure defines the changes of RJII10 variable in response to the existence of shock variable of BIR. The response of RJII10 to BIR is relatively volatile. The 1st month the response of BIR shock variable to JII10 stock

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returns is 0.000000. It become negative in the 2nd until 5th month which is -0.065953, -0.088791, -0.160523 and -0.226894 respectively. The positive response is found in the next $6^{th}, 7^{th}$ and 9th month which is 0.211188, 0.101303 and 0.039193 respectively. Meanwhile in the 8th and 10th month the negative response is found in which -0.059110 and -0.019874.

The 3rd figure defines the change of RJII10 variable in response to the existence of shock variable of CPI. The response of RJII10 to CPI is relatively less volatile than the 2nd figure. The positive responses are found in the 1st, 3rd and 4th months which are 0.000000, 0.127463 and 0.387729 respectively. Meanwhile the negative responses are found in the 2nd, $5^{th}, 6^{th}, 7^{th}, 8^{th}, 9^{th}$ and 10th months which are -0.014907, -0.412334, -0.249658, -0.129252, -0.174465, -0.108699 and -0.028179 respectively.

The 4th figure defines the change of RJII10 variable in response to the existence of shock variable of OIL. The response of RJII10 to OIL is relatively similar to the 2nd figure. The positive responses are found in the 1st, $3^{rd}, 7^{th}$, 8th and 9th months which are 0.000000, 0.110304, 0.006771, 0.065282 and 0.032304 respectively. Meanwhile the negative responses are found in $2^{nd}, 4^{th}, 5^{th}, 6^{th}$ and 10th months which are -0.064028, -0.072311, -0.137933, -0.005304, -0.005304 and -0.023720 respectively.

Table. 14 Variance Decomposition Analysis Result

Variance Decomposition of DRJII10:				
Period	S.E.	DRJII10	DBIR	DCPI	DOIL
1	0.567483	100.0000	0.000000	0.000000	0.000000
2	0.587904	97.49110	1.258493	0.064292	1.186114
3	0.620495	88.32009	3.177432	4.277544	4.224935
4	0.752572	60.04350	6.709687	29.45147	3.795333
5	0.906662	43.21104	10.88547	40.97413	4.929360
6	0.965285	38.42046	14.39002	42.83769	4.351827
7	0.980621	37.52232	15.01061	43.24553	4.221536
8	1.000142	36.11914	14.77967	44.61679	4.484399
9	1.007335	35.60950	14.72074	45.14633	4.523431
10	1.008287	35.55873	14.73181	45.13922	4.570235

Source: Data Analysis Result

Table. 14 defines variable decomposition of DRJII10. It explains how DBIR, DCPI and DOIL influence DRJII10. In the 1st month DRJII10 is 100% influenced by itself. Furthermore, the influence of variable DRJII10 to DRJII10 itself is decreased to 35.55% in the 10th month. Table. 4.7.1 also defines that variable DRJII10 is 0.00% influenced by DBIR in the 1st month. And so, the influence of DBIR to DJII10 is increased to 14.73% in the 10th month. The influence of DCPI to DRJII10 also exposed in table. 4.7.1 It explains 0.00% DCPI influence to DRJII10 in the 1st month. It influence is increased to 45.13% in the 10th month. In the end Table. 4.7.1 also explains the influence of DOIL to DRJII10. DOIL influence 0.00% of DRJII10 in the 1st period. Its influence is increased to 4.57% in the 10th month.

Variance Decomposition Analysis result explains that variable DCPI is the most capable variable to influence DRJII10 rather than variable DBIR and DOIL. Altogether in the 10th month variance decomposition results are 14.73 for DBIR, 45.13 for DCPI and 4.57% for DOIL. DCPI had the largest percentage influence to DRJII10.

7.11. *Vector Autoregressive VAR(5)* **Estimation and Model**

The previous stationary test defines that all variable are stationary in the first difference. Therefore all variable are changed in to their first difference form.

Table. 15 *Vector Autoregressive VAR(5)* Estimation Result

	DRJII10	DBIR	DCPI	DOIL
DRJII10(-1)	-0.198222	-0.001013	-0.012244	0.032522
	(0.17025)	(0.00492)	(0.01576)	(0.02151)
	[-1.16431]	[-0.20575]	[-0.77675]	*[1.51223]****
DRJII10(-2)	-0.147897	-0.005107	-0.005681	0.055130
	(0.11627)	(0.00336)	(0.01076)	(0.01469)
	[-1.27204]	[-1.51916]	[-0.52777]	*[3.75372]**
DRJII10(-3)	0.001702	0.002797	0.005101	0.042096
	(0.13969)	(0.00404)	(0.01293)	(0.01765)
	[0.01219]	[0.69250]	[0.39442]	*[2.38566]**
DRJII10(-4)	-0.161570	-0.001522	0.015239	0.002776
	(0.13666)	(0.00395)	(0.01265)	(0.01726)
	[-1.18227]	[-0.38520]	[1.20440]	[0.16079]
DRJII10(-5)	-0.032813	0.003043	0.000710	0.013921
	(0.13890)	(0.00402)	(0.01286)	(0.01755)
	[-0.23623]	[0.75762]	[0.05521]	[0.79339]
DBIR(-1)	-3.805408	0.486216	-0.604481	0.606848
	(5.73708)	(0.16589)	(0.53118)	(0.72471)
	[-0.66330]	*[2.93092]**	[-1.13799]	[0.83737]
DBIR(-2)	-4.109641	-0.308758	0.491398	0.027602
	(6.39982)	(0.18506)	(0.59255)	(0.80842)
	[-0.64215]	[-1.66846]	[0.82930]	[0.03414]
DBIR(-3)	-8.028628	0.414746	-0.069416	-0.717100
	(6.12417)	(0.17708)	(0.56702)	(0.77360)
	[-1.31097]	*[2.34207]**	[-0.12242]	[-0.92696]
DBIR(-4)	-8.502750	-0.103764	0.190611	0.198953
	(6.22269)	(0.17993)	(0.57615)	(0.78605)
	[-1.36641]	[-0.57668]	[0.33084]	[0.25311]
DBIR(-5)	9.540010	0.065867	-0.155580	0.474849
	(5.54387)	(0.16031)	(0.51330)	(0.70030)
	[1.72082]**	[0.41088]	[-0.30310]	[0.67806]
DCPI(-1)	-0.233352	-0.018810	0.641313	0.190388
	(1.72886)	(0.04999)	(0.16007)	(0.21839)
	[-0.13497]	[-0.37627]	*[4.00641]**	[0.87178]
DCPI(-2)	2.547521	0.035618	0.061971	0.206689

	DRJII10	DBIR	DCPI	DOIL
	(2.08691)	(0.06034)	(0.19322)	(0.26362)
	[1.22071]	[0.59025]	[0.32072]	[0.78405]
DCPI(-3)	6.353452	-0.017599	0.049398	-0.116166
	(2.10592)	(0.06089)	(0.19498)	(0.26602)
	[3.01695]*	[-0.28901]	[0.25335]	[-0.43668]
DCPI(-4)	-11.32038	0.020869	0.081035	0.017250
	(2.34312)	(0.06775)	(0.21694)	(0.29598)
	[-4.83133]	[0.30802]	[0.37353]	[0.05828]
DCPI(-5)	-1.124576	0.017199	-0.253676	0.015951
	(2.62161)	(0.07581)	(0.24273)	(0.33116)
	[-0.42896]	[0.22688]	[-1.04510]	[0.04817]
DOIL(-1)	-0.912396	0.033534	-0.073877	-0.028992
	(1.35610)	(0.03921)	(0.12556)	(0.17130)
	[-0.67281]	[0.85517]	[-0.58839]	[-0.16925]
DOIL(-2)	1.474893	-0.000903	-0.057008	0.089098
	(1.36082)	(0.03935)	(0.12600)	(0.17190)
	[1.08383]	[-0.02296]	[-0.45246]	[0.51831]
DOIL(-3)	-0.386569	0.051210	-0.019537	-0.178715
	(1.24649)	(0.03604)	(0.11541)	(0.15746)
	[-0.31013]	*[1.42079]***	[-0.16928]	[-1.13501]
DOIL(-4)	-0.963839	0.001920	0.060531	-0.043540
	(1.13060)	(0.03269)	(0.10468)	(0.14282)
	[-0.85250]	[0.05872]	[0.57824]	[-0.30486]
DOIL(-5)	0.346475	0.031954	-0.010833	0.130421
	(1.13124)	(0.03271)	(0.10474)	(0.14290)
	[0.30628]	[0.97686]	[-0.10343]	[0.91269]
C	18.27901	-0.183035	2.017676	-1.520541

Source: Data Analysis Result

Where t-table value of 0.01 is 2.39608, t-table value of 0.05 is 2.00404, t-table value of 0.1 is 1.67303 and t-table value of 0.2 is 1.29713.

* = significant in 0.01, ** = significant in 0.1 and *** = significant in 0.2

Table. 15 provides result of *Vector Autoregressive VAR(5)* estimation. It defines that Bank Indonesia Interest Rate coefficient is -0.183035; meaning that, it had negative influence to JII10 stock returns. In the other hand Costumer Price Index coefficient is 2.017676; means it had positive influence to JII10 stock returns and Brent Oil Price coefficient is -1.52054; it implies negative influence of Brent Oil Price to JII10 stock returns. Eventually, *VAR* estimation produced these forecasting models:

Model1:
$$Y_{1t} = -0.198222\,Y_{1t-1} - 0.147897\,Y_{1t-2} + 0.001702\,Y_{1t-3} - 0.161570\,Y_{1t-4} - $$
$$0.032813\,Y_{1t-5} - 3.805408\,Y_{2t-1} - 4.109641\,Y_{2t-2} - 8.028628\,Y_{2t-3} - $$
$$8.502750\,Y_{2t-4} + 9.540010\,Y_{2t-5} - 0.233352\,Y_{3t-1} + 2.547521\,Y_{3t-2} + $$
$$6.353452\,Y_{3t-3} - 11.320398\,Y_{3t-4} - 1.124576\,Y_{3t-5} - 0.912396\,Y_{4t-1} + $$
$$1.474893\,Y_{4t-2} - 0.386569\,Y_{4t-3} - 0.963839\,Y_{4t-4} + 0.34675\,Y_{4t-5}$$
$$+ 18.27901\beta$$

Where, Y_1 is JII10 Stock Returns and t is lag length.

Model 2:
$$Y_{2t} = -0.001013\,Y_{1t-1} - 0.005107\,Y_{1t-2} + 0.002797\,Y_{1t-3} - 0.001522\,Y_{1t-4} + $$
$$0.003043\,Y_{1t-5} + 0.486316\,Y_{2t-1} - 0.308758\,Y_{2t-2} + 0.414746\,Y_{2t-3} - $$
$$0.103764\,Y_{2t-4} + 0.065867\,Y_{2t-5} - 0.018810\,Y_{3t-1} + 0.035618\,Y_{3t-2} - $$
$$0.017599\,Y_{3t-3} + 0.020869\,Y_{3t-4} + 0.017199\,Y_{3t-5} + 0.033534\,Y_{4t-1} - $$
$$0.000903\,Y_{4t-2} + 0.051210\,Y_{4t-3} + 0.001920\,Y_{4t-4} + 0.031954\,Y_{4t-5} - $$
$$0.183035\,\beta$$

Where, Y_2 is Bank Indonesia Interest Rate and t is lag length.

Model 3:
$$Y_{3t} = -0.012244\,Y_{1t-1} - 0.005681\,Y_{1t-2} + 0.005101\,Y_{1t-3} + 0.015239\,Y_{1t-4} + $$
$$0.00710\,Y_{1t-5} - 0.604481\,Y_{2t-1} + 0.491398\,Y_{2t-2} - 0.069416\,Y_{2t-3} + $$
$$0.190611\,Y_{2t-4} - 0.155580\,Y_{2t-5} + 0.641313\,Y_{3t-1} + 0.061971\,Y_{3t-2} + $$
$$0.049398\,Y_{3t-3} + 0.08135\,Y_{3t-4} - 0.253676\,Y_{3t-5} - 0.073877\,Y_{4t-1} - $$
$$0.057008\,Y_{4t-2} - 0.019537\,Y_{4t-3} + 0.060531\,Y_{4t-4} - 0.010833\,Y_{4t-5} + $$
$$2.017676\,\beta$$

Where, Y_3 is Costumer Price Index and t is lag length.

Model 4
$$: Y_{4t} = 0.032522\,Y_{1t-1} + 0.055130\,Y_{1t-2} + 0.042096\,Y_{1t-3} + 0.002776\,Y_{1t-4} + $$
$$0.013921\,Y_{1t-5} + 0.606848\,Y_{2t-1} + 0.027602\,Y_{2t-2} - 0.717100\,Y_{2t-3} + $$
$$0.198953\,Y_{2t-4} + 0.474849\,Y_{2t-5} + 0.190388\,Y_{3t-1} + 0.206689\,Y_{3t-2} - $$
$$0.116166\,Y_{3t-3} + 0.017250\,Y_{3t-4} + 0.015951\,Y_{3t-5} - 0.028992\,Y_{4t-1} + $$
$$0.089098\,Y_{4t-2} - 0.178715\,Y_{4t-3} - 0.043540\,Y_{4t-4} + 0.130421\,Y_{4t-5} - $$
$$1.520541\,\beta$$

Where, Y_4 is JII10 Trading Volume and t is lag length.

7.12. Summary on *VAR(5)* Estimation Result

The *VAR(5)* estimation result can be summarized in the following description. Bank Indonesia Interest Rate had negative influence to JII10 stock returns it is indicated by the negative coefficient in the *VAR(5)* estimation result -0.183035 and

confirms this study hypothesis. Similar to the interest rate the international oil price had negative influence to JII10 stock returns it is indicated by the negative coefficient in the *VAR(5)* estimation result -1.520541 and confirms this study hypothesis. Meanwhile, the costumer price index (CPI) had positive influence to JII10 stock returns it is indicated by the positive coefficient in the *VAR(5)* estimation result 2.017676 and contradicts the hypothesis of this study. This contradiction is supported by the Indonesia national economic speedy recovery after the global economic recession in 2008. The increase in CPI reflects the higher profit of JII10 companies consisting of main industry (Infrastructure, telecommunication, pharmacy and consumption). The higher price implies the higher demand of goods and services and further increase sales of JII10 companies.

7.13. *Vector Autoregressive VAR(5)* Forecasting

The research model of this study is used to forecast JII10 stock returns in year 2013. The *Vector Autoregressive VAR* is used lag 5 in the forecasting. The forecasting result is defined in the following table:

Table. 16 *VAR(5)* JII10 Stock Returns Forecasting Value year 2013

Forecasting VAR			
Year	RJII10 (IDR)	FRJII10 (IDR)	Year
2012.1	441	99	2013.1
2012.2	173	254	2013.2
2012.3	132	-1	2013.3
2012.4	295	175	2013.4
2012.5	113	-302	2013.5
2012.6	-11	-199	2013.6
2012.7	186	-203	2013.7
2012.8	253	-83	2013.8
2012.9	-66	-17	2013.9
2012.10	93	-90	2013.10
2012.11	192	-84	2013.11
2012.12	-174	-112	2013.12

Source: Data Analysis Result

Table. 16 defines the increasing and decreasing of JII10 stock returns. It forecasted general negative stock returns in JII10 compared to the previous year 2012. Negative trend is occurred from March until December 2013. The highest depression occurred in May 2013 which is -302. JII10 stock returns is predicted to have positive affect only in January and February 2013 which are 99 and 254 IDR. It forecasted general negative stock returns in JII10 compared to the previous year 2012. This negative sentiment might be caused by the continuous decreasing in Bank Indonesia interest rate and the fluctuating price of oil. But it may be not become major influence to JII10 stock returns. Indonesia as one of the emerging market is highly influenced by foreign capital, national economic condition, global economic condition and the speculative action of traders existing in the stock market.

The JII10 negative stocks returns are confirmed by the several phenomena occurred in the Indonesia stock market. In the end of May to June 2013 there is huge foreign capital outflow in Indonesia stock exchange market and the potential uncertainty after the increasing in subsidized petroleum price.

5.1 Conclusion

This study is started by descriptive statistics examination. It is followed by the Augmented Dickey Fuller - Unit Root testing and continued with the cointegration and causality testing. Furthermore, Impulse Response and Variance Decomposition Analysis are conducted. In the end, this study occupied *Vector Autoregressive Model* estimation and forecasting of 2013 value of JII10 stock returns.

The descriptive statistics examination defines that all variables of the study exhibit positive mean. It defines that RJII10 and Oil price is negatively skewed while BIR, CPI and Trading Volume are positively skewed. Before conducting the ADF unit root test the lag length is determined in lag 5 based on the comparison result of SIC, AIC and Automatic *Eviews7* leg length determination. It is derived lag 5 as the most appropriate lag to continue this study.

The ADF test in lag 5 confirms the stationary of all variables at the first difference. The further Johansen-Juselius Cointegration test defines the long term relationship between JII10 stock returns and the selected macroeconomic variables in 95% confident level (α = 0.05). The Granger Causality test defines the causal relationship among JII10 stock returns and CPI, BIR and Oil. Meanwhile, Trading Volume is excluded from the model because it had no causal relationship. The Impulse Response and Variance Decomposition analysis defines that CPI is the most capable variable in influencing JII10 stock returns rather than BIR and Oil. CPI able to explain 45.13% of JII10 stock returns. Meanwhile BIR and Oil are capable to explain 14.73% and 4.57% of JII10 stock returns respectively.

In long term relationship the *Vector Autoregressive Model Estimation* concludes negative influence of Bank Indonesia Interest rate and Brent International Oil price to JII10 stock returns. Meanwhile it defines positive influence of Costumer Price Index to JII10 stock returns. It contradicts study hypothesis of negative relationship between CPI and stock returns; however, this contradiction might be caused of Indonesia national economic growth that lead to the increasing in Indonesia purchasing power. Therefore the higher price index implies the higher demand of the 10 companies' product and so increased their sales. This increasing in sales lead to direct increasing in their profit.

Eventually, the *VAR(5)* forecasting predicts negative stock returns potential in 2013. It might be caused of the continuous decreasing of Bank Indonesia interest rate and the fluctuating international oil price. Bank Indonesia interest rate as the Indonesia national benchmark of commercial bank contributes major role to determine the rate of saving interest and credit interest. It drives investor to determine their investment portfolio. This study accept the other variables such as foreign direct investment, national economic stability, international economic condition and traders

speculative behavior as the determinant variable that caused into negative sentiment in JII10 2013 stock returns.

5.2. Recommendation

Regarding to the study conclusion the researcher recommends to stock market investors to be aware of the latest condition and phenomena occurred in the market. It is important to observe Bank Indonesia interest rate, costumer price index and oil price before any decision to expand investment portfolio.

The negative forecasting value of JII10 stock returns reflects the negative sentiment in the stock market. The researcher recommends long term investor to take this as a golden time to buy and collect the stocks and enrich their stock portfolio. In particular for domestic investor it becomes the rare occasion to enter and add their capacity over the foreign investor. When Indonesia stock market is dominated by domestic investor it will minimize capital outflow effect that always occurred from time to time.

The researcher recommends Bank Indonesia and Financial Services Authority (OJK) to be consistent in maintaining and produce the prudent monetary regulations in order to prevent toxic asset from financial engineering. The prudent regulation in capital market aims to protect national financial and riel economy from international negative domino effects such as exchange rate risk, market risk, default risk, arbitrage risk and hot money effect.

The researcher recommends future research to be conducted in particular to other capital market income (dividend). It becomes interesting subject of research that not many researchers ever studied.

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