

THE RELATIONS BETWEEN MACROECONOMIC FLUCTUATION, WORLD GOLD PRICE, AND ISLAMIC STOCK RETURNS IN INDONESIA

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Abstract- *Capital market as one of the promising economic instruments is the investment object that quite interesting, but still not much glimpsed by Indonesian people. Recorded only about 4% of people who know about the capital market, and based on an index of literacy in services and financial sector, the utilization rate of capital market products and services only reached 0.11%. Meanwhile, the market share of Islamic stocks has mastered 50% of the shares in the Indonesian Stock Exchange. Thus the Jakarta Islamic Index (JII) as one of sharia stock index may be a reference to an attractive investment for the Muslim majority of Indonesian people (87.18%). On the other hand, gold that has a long history and relations with the Islamic economic world is still a favorite commodity to invest. World Gold Council noted that Indonesia becomes the highest gold consumer in Southeast Asia. However, despite being one of the safest investment due to its value tends to rise, but the gold return tends to be lower than stock returns. Meanwhile the year 2009 was a year with a positive vision for the Indonesian economy after the global crisis of 2008. Various economic indicators experienced a positive trend, as inflation reached 2.78%, the lowest in the history of the Indonesian economy. As well as the performance of the Indonesian capital market, IHSG in 2009 increased by 87% from the previous year, the highest in ASEAN. By contrast, the exchange rate of has weakened against US dollar over the years, with the exception of 2010 which is capable strengthened to Rp8.900, - per US dollar. Also the nominal GDP has increased from year to year. This research aimed to determine the effect of macro-economic factors that have been mentioned, that are inflation, exchange rate and GDP, as well as the price of gold toward stock returns in companies listed in JII from 2009 to 2014. The data used in this research is the annual secondary data of each variable. By using panel data regression method, this research found that inflation, exchange rates and the gold price has a significant effect on stock returns in JII, while GDP has no significant effect. But simultaneously, all four of these variables have a significant effect and are able to explain as much as 62% of the information on the stock return of companies listed in JII, the rest of 38% is explained by other variables outside the four independent variables in this research. This research is also expected can give consideration to investors who want to invest in the capital market, especially Islamic stock in JII.*

Keywords: *capital market, stock returns, inflation, exchange rates, gross domestic product, the price of gold, panel data regression, Jakarta Islamic Index*

Introduction

The development of the Islamic capital market to date has progressed, causing the intentions of the investors to invest in the Islamic capital market. Asset growth of Islamic stocks from year to year increased significantly. Based on data from Otoritas Jasa Keuangan (OJK) and the General Director of Debt Management at the Finance Ministry of Indonesia in August 2014, the assets reached Rp2.860 trillion. And the market share of Islamic stocks on the assets of Islamic finance industry reached 58.55%. This position is the highest compared with other assets of Islamic finance industry. Meanwhile the market shares of Islamic stocks have mastered 50% of the shares on the Indonesia Stock Exchange (IDX).

In the Indonesia Stock Exchange, sharia stocks can be seen in the Daftar Efek Syariah (DES) and the Jakarta Islamic Index (JII). DES and JII is a collection of stocks that do not conflict with Islamic/sharia principles in the capital market. The difference is, to enter into JII issuers should have a share with a

maximum ratio of liabilities to assets of 90%, and the top 60 stocks in order of the average world market capitalization during the last 1 year. After going through several stages, so there are 30 listed companies that enter into JII index.

Generally, in connection with stock investing, investors choose stocks of several companies that are eligible to be selected based on certain criteria. Investors invest for anticipated future returns, but those returns rarely can be predicted precisely. There will almost always be risk associated with investments. Naturally, if all else could be held equal, investors would prefer investments with the highest expected return. Then, stocks that have high demand by the investor will experience the increase of price and stock returns, and vice versa (Bodie, Kane, & Marcus, 2013)

There are two main factors that affect the behavior and performance of stocks. First is the internal factors including growth rate, ability to sell products and the level of competition. The second is related to external factors including inflation, interest rates, currency fluctuation, global competition, and political factors (Khan & Zuberi, 1999). In accordance with Khan and Zuberi, the impact of economic fundamentals as external factors on stock prices and stock returns has been a long debated issue amongst the academicians and professionals.

Indonesia as the country with the largest Muslim population in the world based on The Pew Forum on Religion & Public Life research in 2010 with total Indonesian Muslim of about 205,000,000 or 12.7% of the total Muslim around the world, is a huge market for the development of Islamic financial industry. Sharia investment in capital markets that are part of the Islamic financial industry has an important role to increase the market share of Islamic finance industry in Indonesia. Meanwhile, Islamic world has a long history linked with gold. In the era of Prophet Muhammad SAW, Muslim used gold coin for transactions that we know by the name of Dinar. In modern era when paper money is used, gold became one of the favorite commodities to invest due to its physical form which is untreatable and indestructible, it will not cause inflation and it is also not vulnerable to exchange rate (Muhammad, 2011). According to Meera (2002), gold dinar investment was first introduced in 1983 by Professor Omar Ibrahim Vadillo, a founder of the Morabeteen International Organization in South Africa with the objective of unification of the economy among Islamic countries.

As well as in Indonesia, Ibrahim, a commodity analyst from Indonesia Commodity and Derivatives Exchange (BKDI) said that gold investment prospects in Indonesia is quite high because gold is one of the most popular types of investment. The value of this precious metal is likely to rise from year to year so it is a kind of a safe and profitable investment. This is also corroborated by the survey of the world gold council in which Indonesia is the largest buyer of gold (in form of jewelry) in Southeast Asia (Taqiyyah, 2013).

This study takes span a period of 6 years from 2009 as the beginning of the revival after the global crisis until 2014.

Literature Review

Investment

Investment related to the decision to allocate some funds, within a certain time, with the hope of getting returns in the future. Jones (2007) suggested that investment is the commitment of a number of funds to hold one or more assets for some period of time in the future.

Stock Analysis

There are two basic types of stock analysis as a guide for investors, each type has its own advantages. Both the analysis is fundamental analysis and technical analysis. Fundamental analysis usually starts with a study of past earnings, examine the company's financial statements, economic analysis, evaluation of firm's quality management, and also the prospects for the industry (Bodie,

Kane, and Marcus, 2013). Technical analysis is a security analysis methodology for forecasting the direction of prices through the study of past market data, primarily price and volume (Kirkpatrick & Dahlquist, 2006).

Return

Based on Investopedia definition, return is the gain or loss of a security in a particular period. The return consists of the income and the capital gains relative on an investment. It is usually quoted as a percentage. In finance, return is a profit on an investment. It comprises any change in value, and interest or dividends or other such cash flows which the investor receives from the investment (Oxford Dictionary).

$$\text{Return} = \frac{\text{ending price} - \text{beginning price}}{\text{beginning price}}$$

Macroeconomics

Macroeconomics is a branch of economics that addresses the behavior of the economy in the aggregate, such as prosperity and recession, the output of goods and services, the total economy, the rate of output growth, inflation and unemployment, balance of payments and the exchange rate (Dornbusch, Fischer, & Mulyadi, 1981). Among the economic aggregative variables are much disputed in the macro economy, among others: the level of national income, the level of employment, household consumption expenditure, saving, national investment, the sheer number of money in circulation, the price level, interest rate, balance of international payments, national capital stock, government debt (Soediyono, 1981).

Exchange Rate

In finance, an exchange rate (also known as a foreign-exchange rate, forex rate, FX rate or Agio) between two currencies is the rate at which one currency will be exchanged for another. It is also regarded as the value of one country's currency in terms of another currency (O'Sullivan & Sheffrin, 2003). According to Fabozzi & Francis (1996) an exchange rate is defined as the amount of one currency that can be exchange per unit of another currency, or the price of one currency in items of another currency. The official currency used in Indonesia is the rupiah (IDR). While the foreign currency used internationally is the American dollar (USD). The exchange rate data used in this research is the mid value of the USD currency to IDR currency.

Inflation

According to Blanchard (2000), inflation is a sustained increase in the general price level of goods and services in an economy over a period of time. When the price level rises, each unit of currency buys fewer goods and services. Consequently, inflation reflects a reduction in the purchasing power per unit of money, a loss of real value in the medium of exchange and unit of account within the economy (Walgenbach, Hanson, & Dittrich, 1987).

Gross Domestic Product (GDP)

Gross Domestic Product (GDP) is a calculation used by a country as the main measure for the activity of national economy, but basically the entire GDP measures the volume of production of a region (country) geographically. Meanwhile, according to McEachern (2000), GDP means measure the market value of final goods and services produced by the resources that are in a country during a certain period, usually one year. GDP can also be used to study the economy from time to time or to compare several economies at a time.

Gold Price

According to Cambridge Business English Dictionary (2015), gold price is the price at which gold is being traded on the gold market. Gold is a chemical element with the symbol Au (from Latin:

aurum) and atomic number 79. In its purest form, it is a bright, slightly reddish yellow, dense, soft, malleable and ductile metal, used in jewelry and decoration and to guarantee the value of currencies.

Jakarta Islamic Index (JII)

Jakarta Islamic Index or so-called JII is one of the stock indices in Indonesia, which calculates the average price index of stocks for the type of stocks that meet the criteria of Sharia. Each period, amounting to 30 (thirty) shares that meet the criteria of sharia entering JII. This index use the base date of January 1, 1995 with a base value of 100.

JII formation goal is to increase the confidence of investors to invest in sharia-compliant stocks and provide benefits to investors in carrying out Islamic law to invest in the stock exchange. JII also expected to support the process of transparency and accountability of sharia-compliant stocks in Indonesia. JII be the answer to the desire of investors who wish to invest according to Islamic law. In other words, JII is a guide for investors who wish to invest their funds in sharia without fear mixed with usury funds. In addition, JII can be a barometer of performance (benchmark) in selecting *halal* stock portfolios.

Related Research

The impact of economic fundamentals on stock prices and stock returns has been a long debated issue amongst the academicians and professionals. According to the Efficient Market Hypothesis (Fama, 1970), in an efficient market, all the relevant information about the changes in macroeconomic factors are fully reflected in the current stock prices and hence, investors would not be earned abnormal profits in such markets. Many researchers believe that some macroeconomic variables, such as higher interest rates, high inflation and the high exchange rate fluctuations led to companies experiencing financial difficulties which could degrade the financial performance, so the impact is the decline of the company value. The company value can be represented by stock price which leads to the stock return.

In several researches, Pareira (2010) proved that there is a negative relationship between inflation and stock prices. In other hand, Triayuningsih (2003) mentioned that the inflation rate has no significant effect on stock returns on the manufacturing company's stock price. Kurihara (2006) who examined the relationship between macroeconomic variables and stock prices in Japan, found that domestic interest rates do not affect the stock price changes significantly, but the exchange rate has positive and significant impact on stock prices in Japan. According to Gupta, Chevalier, & Sayekt (2000), they found that there is evidence that there is no strong relationship between the stock price and exchange rate. Meanwhile in particular, past gold returns play a crucial role in explaining the dynamics of conditional return and volatility of Chinese stock market and should thus be accounted for when forecasting future stock returns (Arouri, Lahiani, & Nguyen, 2015).

Schwert (1989), studied the relationship between economic activity and stock returns by examining the correlation between volatility in economic activity and volatility in stock prices. He found the evidence that stock market volatility depends on the health of the economy. Using monthly data the model showed that average volatility increased by a significant 189 per cent in times of recession. Hence, given these divergent views and results, the debate in the literature on the link between stock prices and the economy remains inconclusive.

Conceptual Framework

So since the variables named at least has an effect to the stock price and stock return based on the explanation above, the conceptual framework and the hypothesis of this research can be stated as follows:

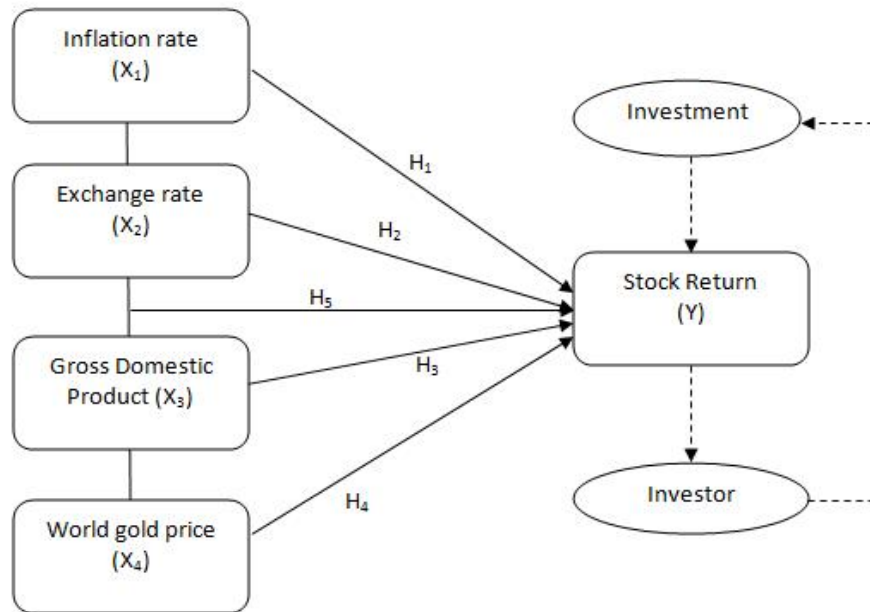


Figure 1. Conceptual Framework

Where: H₁ = Inflation rate has significant effect to stock returns.
 H₂ = Exchange rate has significant effect to stock returns.
 H₃ = GDP has significant effect to stock returns.
 H₄ = Gold price has significant effect to stock returns.
 H₅ = Inflation rate, exchange rate, GDP, and gold price simultaneously have significant effect to stock returns.

Methodology

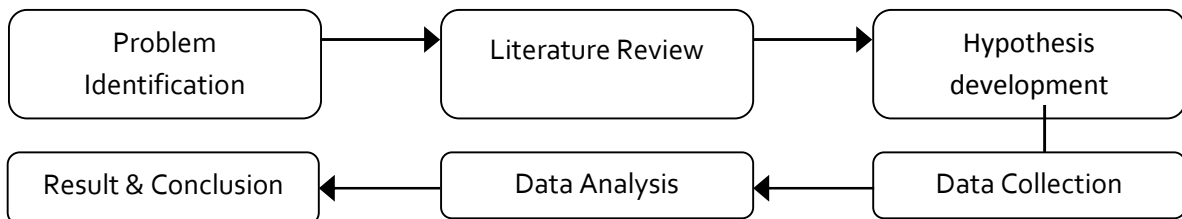


Figure 2. Research Methodology

Problem Identification: This step is to search and explain the problem.
Literature Review: There are some theories used in this research as a basic and foundation that were obtained from several sources such as textbooks, scholarship journals and articles, previous research papers, and internet.
Hypothesis Development: Based on the explanation in the previous chapter, the hypothesis of this research can be stated.
Data Collection: The data gathering process that related with the main research topic.
Data Analysis: Analyzing and calculated data as the core of this research.
Result & Conclusion: Shows the result of this research objective and conclude it to answer the entire research problem.

Independent & Dependent Variables

Independent variables used in this research are mentioned below:

1. Inflation rates, symbolized as "X₁"
2. Exchange rates, symbolized as "X₂"
3. Gross Domestic Product or refers to GDP, symbolized as "X₃"

4. World gold price or refers to gold price, symbolized as "X₄"
 Dependent variable used in this research is:

1. Stock returns, symbolized as "Y"

Data Collection

Data used in this research are annual secondary data. The data are related with companies' fundamental performance including stock prices, macroeconomic data, and world gold prices that listed below:

1. Open price and adjusted closing price of companies continuously listed on Jakarta Islamic Index from 2009 to 2014 (obtained from yahoo finance)
2. Indonesia inflation data from 2009 to 2014. (obtained from BPS)
3. USD-IDR mid value as exchange rate data from 2009 to 2014 (obtained from BI)
4. Gross Domestic Product (GDP) data of Indonesia from 2009 to 2014. (from BPS)
5. World gold price data from 2009 to 2014. (from kitco)

Population & Sample

The sample of this research is obtained by using Judgment Sampling Method. Judgment Sample is a type of non-random sample that is selected based on the opinion of an expert. Results obtained from a judgment sample are subject to some degree of bias, due to the frame and population not being identical (Deming, 1990). This method allows author to determine categories for sampling to conduct the research that are:

1. Companies as member of the population that is continuously registered in Jakarta Islamic Index from the period of December 2008 - May 2009 until December 2014 - May 2015.
2. Companies that not-delisting during the observation period, which is from 2009 to 2014.

Therefore, based on the categories above, 9 companies are matched as sample in this research. The sample is listed below:

Tabel 1. Research Sample

No.	Code	Companies Name
1	AALI	Astra Agro Lestari
2	INTP	Indocement Tunggul Prakarsa
3	ITMG	Indo Tambangraya Megah
4	KLBF	Kalbe Farma
5	LSIP	PP London Sumatra Indonesia
6	PTBA	Bukit Asam
7	SMGR	Semen Indonesia
8	TLKM	Telkom Indonesia
9	UNVR	Unilever Indonesia

Data Analysis Methods

Sugiyono (2008) stated that data analysis is an activity after the data collected. This research uses classified secondary data to facilitate analysis. According to Sugiyono (2008), Multiple Linear Regression Analysis is used to predict how changes in the value of the dependent variable when the independent variable value increased or decreased in value. This analysis is used to involve two or more independent variables between the dependent variable (Y) and independent variables (X₁, X₂,

and X_3), this method is used to determine the strength of the relationship between several independent variables simultaneously to relevant variables and expressed by formula. The data used is usually an interval or ratio scale.

Sugiyono (2008) formulates multiple linear regression analysis as follows:

$$Y = a + b_1X_1 + b_2X_2 + \dots + b_nX_n$$

Where: Y = dependent variable (the predicted value)

X_1 = independent variable

X_2 = independent variable

a = constant (Y value if $X_1, X_2 \dots X_n = 0$)

b = regression coefficient (value increase or decrease)

Panel Data

According to Stock & Watson (2003), panel data, also called longitudinal data or cross-sectional time series data, are data where multiple cases (people, firms, countries etc) were observed at two or more time periods. There are two kinds of information in cross-sectional time-series data: the cross-sectional information reflected in the differences between subjects, and the time-series or within-subject information reflected in the changes within subjects over time. Panel data regression techniques allow researcher to take advantage of these different types of information. According to Baltagi (2005), there are balanced and unbalanced in panel data. A balanced data set is a set that contains all elements observed in all time frames (have the same time period). Whereas unbalanced data is a set of data where certain years, the data category is not observed. Since the all elements observed in this research have the same time period, then the balanced panel data is used in this research.

Panel data regression has the same goal with the multiple linear regression, that is predicting the value of the intercept and slope. The use of the panel data in regression will generates different intercept and slope in each entity and each period of time. Panel data regression model to be estimated require assumptions against intercept, slope and disturbance variables.

To estimate the parameters of the model with panel data, there are three techniques (models) that are often offered (Widarjono, 2007), namely:

1. Common Effect Model (CE). This technique is the simplest to estimate parameters of panel data model, which combine cross section data and time series as a single unit regardless of the time difference and the entities (individuals) where the approach that is often used is a method of Ordinary Least Square (OLS). Common Effect Model ignores differences in individual dimensions and time, or in other words, the behavior of the data among individuals is same even in the different time.
2. Fixed Effect Model (FE). Fixed Effect model approach assumes that the intercept of each individual is different among individuals while the slope is fixed (same). This model uses dummy variables to capture intercept differences among individuals.
3. Random Effect Model (RE). The approach used in Random Effect Model assumes every company has different intercepts, where the intercept is random or stochastic variable. This model is particularly useful if the individual (entity) were sampled randomly selected and representative of the population. This technique also considers that the error may be correlated throughout the cross section and time series.

According to Widarjono (2007), there are three tests to choose the model of panel data estimation, these test will be performed using software Eviews6:

1. F tests (Chow test), used to choose Common Effect Model or Fixed Effect Model.
2. Hausman test, used to choose Fixed Effect Model or Random Effect Model.

3. Lagrange Multiplier (LM) test, used to choose Common Effect Model or Random Effect Model.

The research advantages using panel data is the data used becomes more informative, has greater variability, lower collinearity among variables, many degrees of freedom (degree of freedom) and more efficient (Hariyanto, 2005). Data panel can detect and measure the impact better, where it cannot be done by the cross section and time series method. Panel data allow to studies more complex about the behavior in the model so that the panel data test does not require the classical assumption test (Gujarati, 1992).

The Relationship Strength

Determination analysis (R^2): According to Sugiyono (2008), analysis of determination in linear regression is used to determine the percentage contribution of the influence of the independent variables (X_1, X_2, \dots, X_n) simultaneously to the dependent variable (Y). This coefficient shows the percentage of variation of the independent variables used in the model is able to explain the variation of the dependent variable. R^2 is equal to 0, then there is no influence given the percentage contribution of independent variables on the dependent variable, or a variation of the independent variables used in the model does not explain the slightest variations in the dependent variable. Instead R^2 is equal to 1, then the percentage of donations given influence of independent variables on the dependent variable was perfect, or variations of the independent variables used in the model explains 100% variation of the dependent variable.

The Significance of Independent Variable

Simultaneously Significance Testing (F-Test): According to Ghozali (2005) statistical F-test basically indicates whether all the independent variables defined in the model have influence together (simultaneously) on the dependent variable.

Simultaneously, hypothesis testing is done by testing the F-test. The test form is:

1. $H_0: b_1 = b_2 = \dots = b_k = 0$, meaning that all the independent variables are not significant explanatory or no effect on the dependent variable and
2. $H_a: b_1 \neq b_2 \neq \dots \neq b_k \neq 0$, meaning that all variables is a significant independent explanatory to the dependent variable, or in other words all the independent variables have an effect on the dependent variable.

This test is done by comparing the significance of the F count with the provisions of:

1. If the significance < 0.05 then H_a accepted
2. If the significance > 0.05 then H_a is rejected

Comparing the calculation results (value of F) with F table. If the calculated F value is greater than the value of F table, so H_a is received and vice versa.

Partially Significance Testing (t-Test): Partial test is to test whether each independent variable has an influence or not on the dependent variable. The test form is:

1. $H_0: b_i = 0$, meaning an independent variable is not significant explanatory or no effect on the dependent variable, and
2. $H_a: b_i \neq 0$, meaning an independent variable is a significant explanatory variable on the dependent or in other words, the independent variables have an influence on the dependent variable.

How to do a t-test is to compare the significance of the t with provisions of:

1. If the significance < 0.05 then H_a is accepted, and
2. If the significance > 0.05 then H_a is rejected

As well as by comparing the value of statistic t with t table, if the statistical value of $t > t$ table then H_a received while the value of statistic $t < t$ table then H_a is rejected.

Result and Analysis
Descriptive Analysis
Dependent Variable: Stock Returns

Tabel 2. Stock Returns 2009-2014

No	Company	Stock Returns (Y)					
		2009	2010	2011	2012	2013	2014
1	AALI	1.087	0.127	0.043	-0.031	0.379	0.156
2	INTP	2.044	0.195	0.278	0.359	-0.062	0.159
3	ITMG	2.290	0.689	-0.133	0.247	-0.261	-0.371
4	KLBF	1.796	1.214	0.342	0.671	0.164	0.316
5	LSIP	1.783	0.686	-0.021	-0.034	-0.089	0.166
6	PTBA	1.331	0.371	-0.097	-0.222	-0.310	0.416
7	SMGR	1.173	0.217	0.515	0.430	-0.083	0.141
8	TLKM	0.500	0.006	0.165	0.641	0.345	0.306
9	UNVR	0.428	0.490	0.296	0.108	0.207	0.158
Average		1.381	0.444	0.154	0.241	0.032	0.161
Max		2.290	1.214	0.515	0.671	0.379	0.416
Min		0.428	0.006	-0.133	-0.222	-0.310	-0.371

The stock return of 9 companies listed in Jakarta Islamic Index (JII) within period of 2009-2014 can be seen on the table 2 above. In 2009, the average return is 1.381 or 138%, and the maximum return is 2.290 or 229% which come from PT Indo Tambangraya Megah (ITMG) while the minimum return is 0.428 or 42.8% come from PT Unilever Indonesia Tbk (UNVR). This 2009 average return is the highest among others period, it can be explained that Indonesian economy was experiencing a recovery at that time. According to Badan Pusat Statistik (BPS), inflation in 2009 reached the lowest in history that is 2.78%. The performance of the stock market also showed an increase, Index Harga Saham Gabungan (IHSG) rises 87% or the highest in ASEAN compared to 2008 where there was global crisis. While the exchange rate on average in one year during 2009 appreciated 15% and is categorized high in Asia.

In 2010, the average return decreased to 0.444 or 44.4% with the highest return of 1.214 which come from PT Kalbe Farma Tbk (KLBF) and lowest return of 0.006 or 0.6% which come from PT Telekomunikasi Indonesia Tbk (TLKM). The average return in 2011 is 0.154 with the highest return of 0.671 and lowest return of -0.133. The average return in 2012 is 0.241 with the highest return of 0.671 and lowest return of -0.222. Then in 2013, the average return is 0.032 with the highest return of 0.379 and lowest return of -0.310. And the average return in 2014 is 0.161 with the highest return of 0.416 and lowest return of -0.371.

According to the figure 2 above, it can be concluded that in a long term, the average stock returns of 9 companies listed in JII from 2009 to 2014 is descending.

Independent variables

Independent variables used in this research are inflation rate, exchanger rate, GDP and world gold price. The table below shows the descriptive statistic of each independent variable.

Tabel 3. Independent Variables 2009-2014

Year	Inflation Rate (X ₁)	Exchange Rate (X ₂)	GDP (X ₃)	Gold Price (X ₄)
2009	0.028	9400.000	5606203.400	155852.455
2010	0.070	8991.000	6446851.900	448700.892
2011	0.038	9068.000	7419187.100	281187.191
2012	0.043	9670.000	8230925.900	353929.814
2013	0.084	12189.000	9087276.500	761513.771
2014	0.084	12440.000	10094928.900	843936.056
Average	0.058	10293.000	7814228.950	474186.696
Max	0.084	12440.000	10094928.900	843936.056
Min	0.028	8991.000	5606203.400	155852.455

The number presented is annual data of independent variables with inflation rate is presented in ratio, exchange rate is the mid value from USD to IDR, the GDP is presented in billion IDR, and world gold price is converted from USD to IDR per ounce (Oz).

Multiple Linear Regression

This analysis aims to figure out the effect of independent variables that are inflation rate, exchange rate, GDP, and gold price on the dependent variable that is stock returns in JII within period of 2009-2014. Multiple Linear Regression with balanced panel data is used to analyze the effect. Since the data has various range value (not only in ratio), the data need to be normalized or standardized to bring all of the variables into proportion with one another. Normalization is a systematic step to ensure that the database structure allows for general purpose querying and free of insertion, update and deletion anomalies which may cause a loss of data integrity (EF Codd, 1970).

To normalize data, traditionally this means to fit the data within unity, so all data values will take on a value range of 0 to 1. Since some models collapse at the value of zero, the author used a unity-based normalization. The following equation is used to implement a unity-based normalization:

$$X_{i, 0 \text{ to } 1} = \frac{X_i - X_{\text{Min}}}{X_{\text{Max}} - X_{\text{Min}}}$$

Where: $X_{i, 0 \text{ to } 1}$ = The data point i normalized between 0 and 1

X_i = Each data point i

X_{Min} = The minimum among all the data points

X_{Max} = The maximum among all the data points

Panel Data Regression Models and Hypothesis Testing

The Multiple Regression result with balanced panel data using Eviews6 is available in 3 estimation models that are Common Effect Model (CE), Fixed Effect Model (FE), and Random Effect Model (RE). There are three tests that can be used as a tool in selecting a panel data regression model (CE, FE or RE) based on characteristics of the data, namely: F Test (Chow Test) to choose between CE and FE model, Hausman Test to choose between FE and RE model, and Lagrange Multiplier (LM) test to choose between CE and RE model.

F Test (Chow Test)

F or test Chow test is a tool to select whether to use the CE or FE model. If the probability value (Prob.) for Cross-section F is more than the significance level or $> \alpha$ used in this research, then the

model to choose is CE, but if $\alpha < \alpha$ then choose FE model. The following is the result of F test using Eviews6:

Redundant Fixed Effects Tests			
Equation: Untitled			
Test cross-section fixed effects			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	0.798468	(8,41)	0.6073
Cross-section Chi-square	7.818742	8	0.4514

Figure 3. F Test Result

According to the F test result above, the probability of Cross-section F is 0.6073. With significance level (α) of 0.05, it can be concluded that the probability is more than 0.05 therefore the CE model should be chosen.

Lagrange Multiplier (LM) Test

Since the F test results CE become the model chosen, therefore the Hausman test does not need to be performed because the usage is to select FE or RE model. Meanwhile LM test is a tool to choose whether to use CE model or RE model. The first step is finding the residual data from CE model, and then finding LM value using the following equation:

$$LM = \frac{nT}{2(T-1)} \left(\frac{\sum_{i=1}^n (T \bar{e}_i)^2}{\sum_{i=1}^n \sum_{t=1}^T \hat{e}_{it}^2} - 1 \right)^2$$

Where: n = number of companies
 T = number of periods
 e = residuals data

Afterward, LM value will be compared with the value of Chi Square table with degrees of freedom (df) as the number of independent variables and alpha or significance level of 5% (determined in advance). If the value of LM > Chi Square table then the selected model is RE, and if the value of LM < Chi Square table then the selected model is CE.

From residual data and LM calculation using Microsoft Excel based on the equation above, it is founded that the LM value is 2.575, meanwhile the Chi Square table value with degree of freedom = 4 and $\alpha = 0.05$ is 9.488, it means the result is LM < Chi Square table therefore CE model is chosen.

Common Effect Model (CE) & Summary

Dependent Variable: STOCKRETURNS
 Method: Panel Least Squares
 Date: 08/22/15 Time: 16:44
 Sample: 2009 2014
 Periods included: 6
 Cross-sections included: 9

Total panel (balanced) observations: 54

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.872886	0.066900	13.04759	0.0000
INFLATION	-0.414008	0.124591	-3.322934	0.0017
EXCHANGERATE	0.602900	0.172365	3.497818	0.0010
GDP	-0.428603	0.345760	-1.239594	0.2210
GOLDPRICE	-0.537095	0.221971	-2.419668	0.0193
R-squared	0.618654	Mean dependent var		0.351148
Adjusted R-squared	0.587523	S.D. dependent var		0.353980
S.E. of regression	0.227342	Akaike info criterion		-0.036705
Sum squared resid	2.532526	Schwarz criterion		0.147461
Log likelihood	5.991023	Hannan-Quinn criter.		0.034321
F-statistic	19.87304	Durbin-Watson stat		1.658076
Prob(F-statistic)	0.000000			

Figure 4. Common Effect Model

Based on the F test (Chow Test) and LM test result, the Common Effect (CE) model is used for this research. So here is the hypothesis testing summary obtained using CE model:

Tabel 4. Hypothesis Testing Summary (Common Effect Model)

Variable	Coefficient	t-Stat (Prob.)	Significantcy	R ²
C	0.872886	0.0000	Significant	0.618654
Inflation	-0.414008	0.0017	Significant	
Exchange Rate	0.602900	0.0010	Significant	
GDP	-0.428603	0.2210	Not Significant	
Gold Price	-0.537095	0.0193	Significant	

According to the summary table above, we can conclude that inflation rate, exchange rate, and gold price have significance effect partially on stock returns. With significance level of 0.05, this is indicated by the value of t-Stat probability which is less than 0.05. Meanwhile, GDP has no significance effect partially to stock returns since its t-Stat probability > 0.05 which is 0.2210. Simultaneously, according to table 6 (Common Stock Model), all the independent variables has significance effect on stock returns which shown by the F-stat probability that is 0.000000 or less than 0.05. And based on R-squared value (R²), this model can explain 62% variation occurs on stock returns.

Refers to summary table above, regression equation in this research can be determined, that is:

$$Y = 0.872886 - 0.414008 X_1 + 0.602900 X_2 - 0.428603 X_3 - 0.537095 X_4$$

Where:

Y = Stock Returns

X₁ = Inflation Rate

X₂ = Exchange Rate

X₃ = Gross Domestic Product (GDP)

X₄ = World Gold Price

Regression coefficients on the independent variables indicate how much the change in the dependent variable (Y) if the independent variable (X) increases by 1 unit and other variables assumed to be constant, depending on the plus or minus the coefficient of the independent variables. Regression coefficient is plus, it means that the independent variable (X) has positive correlation to dependent variable (Y). If regression coefficient is minus, it means that independent variable (X) has negative correlation to dependent variable (Y). The further explanations stated as follows:

1. According to the equation above, the constant coefficient is 0.872886. It means that if each independent variable (X) equal to zero, then the stock returns (Y) will be 0.872886 or 87%.
2. The coefficient of X₁ is minus, it means that inflation rate has negative correlation to stock returns (Y). Coefficient of X₁ equals to 0.414008, it means that if other independent variables assumed to be constant, every increasing in inflation (X₁) as much as 1 unit will decrease the stock returns by 0.414008 or 41%.
3. The coefficient of X₂ is plus, it means that exchange rate has positive correlation to stock returns (Y). Coefficient of X₂ is 0.602900, it means that if other independent variables assumed to be constant, every increasing in exchange rate (X₂) as much as 1 unit will increase stock returns by 0.602900 or 60%.
4. The coefficient of X₃ is minus, it means that GDP has negative correlation to stock returns (Y). Coefficient of X₃ is 0.428603, it means that if other independent variables assumed to be constant, every increasing in inflation GDP (X₃) as much as 1 unit will decrease the stock returns by 0.428603 or 43%.
5. The coefficient of X₄ is minus, it means that gold price has negative correlation to stock returns (Y). Coefficient of X₄ equals to 0.537095, it means that if other independent variables assumed to be constant, every increasing in gold price (X₄) as much as 1 unit will decrease the stock returns by 0.537095 or 54%.

Conclusions

Based on the discussion and analysis result in the previous chapters, it can be conclude that:

1. With confidence level of 95%, partially: inflation rate, exchange rate, and world gold price significantly affect stock returns of the companies listed JII within period of 2009-2014. Meanwhile the GDP has no significant effect to the stock returns.
2. Simultaneously: inflation rate, exchange rate, GDP, and gold price have significant effect to the stock returns of the companies listed in JII within period of 2009-2014, with the regression model: Stock Returns = 0.872886 - 0.414008 inflation rate + 0.602900 exchange rate - 0.428603 GDP - 0.537095 gold price. This model however can explain 62% of the variation occurs in the stock returns while the other 38% variation might be explained another variable that not be mentioned in this research.
3. Inflation rate, GDP, and gold price have negative correlation to the stock returns while exchange rate has positive correlation to the stock returns of the companies listed in JII within period of 2009-2014.
4. Exchange rate is the dominant factor (variable) influences the stock returns of the companies listed in JII in the period of 2009-2014 since it has higher regression coefficient among other variables (most influencing among others): exchange rate > gold price > GDP > inflation.

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