

## The Effect of Inflation, Interest Rate, and Indonesia Composite Index (ICI) to the Performances of Mutual Fund Return and Unit Link with Panel Data Regression Modelling

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**Abstract**—The financial market investment in Indonesia is growing rapidly, particularly the growth of mutual fund return market and unit link. After the government issued a regulation on *Reksadana Kontrak Investasi Kolektif* (KIK), the needs of this learning is no longer confined to the institutional investors but it covers wider community. Starting from the development of the financial market investment, the previous studies, and the introductory study conducted by the writers, this study uses several variables; they are inflation, interest rate, ICI, mutual fund returns, and unit link. This study is purposed to analyse the effect of inflation, interest rate, and ICI to the performances of mutual fund return and unit link with panel data. It is also purposed to determine the best regression modelling from panel data which illustrates the linier correlation of inflation, interest rate, ICI and mutual fund returns as well as unit link in order to get the behavioural description and the performances of mutual fund return and unit link as one of the investment instruments in this modern era. The focused objects are the performance of the products of mutual fund return in the kind of stocks from the investment management firms in Indonesia as well as the performance of the products of unit link in the kind of stocks from life insurance companies in certain year, then the data is called cross section data. Meanwhile, if the focused object is on the time, the data of inflation, interest rate, and ICI as well as the performances of mutual fund return and unit link products in recent years is called time series data. The combination of both data, some investment management firms which provide mutual fund return as well as some life insurance companies which provide unit link in Indonesia from 2007 to 2014, is called panel data (pooled data). The result of this study is the best model of mutual fund return and unit link with Fixed Effect (FE) method. The correlation between inflation, interest rate, and ICI to the mutual fund return is 99.30 %. The correlation between inflation, interest rate, and ICI to the unit links is 98.74 %.

**Keywords**—inflation, interest rate, performance, Indonesia Composite Index, mutual fund return, unit link, panel data

### INTRODUCTION

#### a. Background of the study

The financial market investment in Indonesia is growing rapidly, particularly the growth of mutual fund return market in 1995, after the government issued a regulation on *Reksadana Kontrak Investasi Kolektif* (KIK). Unit link has become the phenomenal product in life insurance industry. Today, Unit link products also become prominence for the development of national life insurance.

The previous study conducted by Purwaningsih, et al. [1] showed that the Indonesia Composite Index (ICI) affected significantly to the performance of mutual fund return and unit link. The interest rate and inflation are also the factors which affect the performance of mutual fund return and unit link. Based on that finding, inflation, interest rate, and ICI are used as independent variables.

The model of prediction for the performance of mutual fund return and unit link to the inflation, interest rate, and ICI can be used as basic prediction for some periods. This also can be used to arrange the long term investment plan for education, pension, and other needs. The analysis tool in this study are regression and correlation of panel data. There are several focused objects in analysing the regression and the correlation of panel data; 1) object toward time or individual, then the data is called time series data. 2) objects among individual/in certain time, the data is cross section data. In this case, the data of inflation, interest rate, ICI, the performances of mutual fund return and unit link are obtained from some investment management firms and life insurance company in Indonesia from 2007 – 2014. For instance, if we want to make regression model among inflation, interest rate, ICI to the unit link performances of investment firms in Indonesia or to the performance of mutual fund return in some fund manager in Indonesia. The focused object is individual (insurance company) in Indonesia in certain period, then the data is called cross section data. Meanwhile, if the focused object is on the time, the data of inflation, interest rate, and ICI as well as the performances of mutual fund return and unit link of the insurance company from 2007 -2014 is called time series data. The combination of both data, some investment management firms which provide mutual fund return as well as some life insurance companies which provide unit link in Indonesia from 2007 to 2014, is called panel data (pooled data). Panel

data is the combination of time series data and cross section data. In order to describe the panel data, for example in cross section data, the value of one or more variables is collected for some sample units in certain year. In the panel data, the same cross section units are surveyed in several periods [2].

#### b. Research questions

1. Does the inflation affect the performance of mutual fund and unit link?
2. Does the interest rate affect the performance of mutual fund and unit link?
3. Does ICI affect the performance of mutual fund and unit link?
4. Do the inflation, interest rate and ICI affect the performance of mutual fund and unit link?
5. How is the mathematical correlation of inflation, interest rate, ICI and the performances of mutual fund and unit link?

#### c. Purposes of the study

The purpose of this current study are mentioned as follow.

1. Obtain the empirical data which show the effect of inflation to the performance of mutual fund and unit link.
2. Obtain empirical data which show the effect of interest rate to the performance of mutual fund and unit link.
3. Obtain the empirical data which show the effect of ICI to the performance of mutual fund and unit link.
4. Obtain the empirical data which show the effect of inflation, interest rate, and ICI to the performance of mutual fund and unit link.
5. Obtain the mathematical correlation of inflation, interest rate, ICI and the performance of mutual fund and unit link.

### LITERATURE REVIEW

#### a. Panel Data

Panel data is the combination of cross-sectional data and time series data where the same cross sectional data are measured over time. The analysis of panel data regression is the analysis of regression which is based the panel data to analyse the correlation between one dependent variable and one or more independent variable.

The equation of multiple regression on panel data:

$$y_{it} = \beta_{it} + \sum_{k=1}^{k=K} \beta_{kit} X_{kit} + \varepsilon_{it}$$

Notes:

- $i$  = 1, 2, ..., N  
 $t$  = 1, 2, ..., T  
 $N$  = number of individual unit (the number of insurance company and investment manager)  
 $T$  = the number of time unit  
 $y_{it}$  = the value of the dependent variable for the  $i$ th case in the sample at the  $t$ th time period  
 $X_{kit}$  = the vector of time varying covariates for the  $i$ th case at  $t$ th time period  
 $\beta_{kit}$  = the parameter of  $k$ th for individual  $i$ th case at  $t$ th time period  
 $\varepsilon_{it}$  = random disturbance for the  $i$ th case at the  $t$ th time period

#### b. Inflation

Inflation is a sustained increase in the general price level of goods and services over a period of time. There are three components of inflation, they are the price increases, general, and happened continuously over a period of time.

Types of inflation:

1. Demand-pull inflation, this results from strong consumer demand or the increase of aggregate demand.
2. Cost push inflation, type of inflation caused by substantial increases in the cost of important goods or services.
3. Structural inflation, type of inflation that result from the government's monetary policy.

The effects of inflation are the income redistribution, decrease the economic efficiency, the changes in output and job opportunity, and unstable environment.

#### ICI

Indonesia Composite Index (ICI) is one of the stock exchange indices which is used by Indonesia Stock Exchange (ISE; previously Jakarta Stock Exchange or JSE). ICI was introduced for the first time in 1 April 1983 as an indicator of stock price movement in JSE. These indices cover the movement of all stocks in JSE. The day of ICI basic calculation is 10 August 1982 where the basic value of indices was 100 and the total number of stocks were 13.

#### c. Interest Rate

The interest rate is the amount charged, expressed as a percentage of principal, by a lender to borrower for the use of assets in a certain period. Interest is payment from a borrower to a lender of an amount above payment of the principal sum. There are two kinds of interest; simple interest and compound interest. Simple interest is determined by multiplying the daily interest rate by the principal. Meanwhile, compound interest is earned on prior interest in addition to the principle. Interest rate is categorized into two; fixed interest rate and floating interest rate. Fixed interest rate is a loan where the interest rate does not fluctuate during the fixed rate period of the loan. Meanwhile, floating interest rate is an interest rate that typically change based on a reference rate. One of the common example is LIBOR which the calculation is usually referred to as margin over the base rate.

#### d. Mutual Fund Return

Mutual fund return is the best strategy of investment that allow you to pool your money together with other investor for the purpose of investing in stocks, fixed

deposits, and bonds. Mutual fund return is managed by experienced investment management firms or investment managers.

#### e. Unit Link

Unit link is one of the products of life insurance company which combines investment programs and life insurance. In the other words, unit link is a type of insurance vehicle for individual who wants to get protection of life insurance and take the investment opportunity in stocks market through stocks and bonds. There are two advantages of having unit link; the advantages of life insurance protection and the advantages of dividend which can be withdrawn gradually to finance the family's needs. The characteristic of unit link program is insurance and investment plan. It means that long term investment of unit link is more beneficial than traditional insurance program such as education insurance and pension insurance which have insurance and saving plan. Unit link is managed by the three parties; life insurance company, investment manager, and custodian bank.

### METHODOLOGY

This study was conducted through the following steps.

1. Doing literature review related to the problem of the study.
2. Determining the population and sample of the study.
3. Collecting data of independent variable, those are inflation and interest rates of Bank of Indonesia and *Otoritas Jasa Keuangan (OJK)* or Financial Services Authority (FSA). Collecting data of the daily unit price and fluctuation of ICI unit price in Jakarta Stock Exchange for the recent years as independent variable in panel data regression modelling.
4. Collecting data of the daily unit price and fluctuation of mutual fund unit price in some investment managers in Indonesia for the recent years (2007 – 2014) as dependent variable in panel data regression modelling.
5. Collecting data of the daily unit price and fluctuation of unit link price in some life insurance company in Indonesia for the recent years (2007 – 2014) as dependent variable in panel data regression modelling.
6. Calculating the data and determining the correlation between independent variables to dependent variable.
7. Determining the panel data regression modelling based on the data from Bank of Indonesia, Statistics Indonesia, FSA, some investment managers, and some insurance companies in Indonesia.
8. Descriptive analysis is analysing data based on the statistic from 'Eviews' and 'SPSS'. Analytical analysis is based on the calculation of analytical data from 'Eviews' and 'SPSS' to get best multivariate regression model. Correlational analysis is used to know the factors which are affected the performance of mutual fund return and unit link. this correlation is used to predict the dividend or return.

### FINDING AND DISCUSSION

Below is the result of panel data analysis of 22 mutual fund return companies and six-unit link companies with inflation, interest rate, and ICI from 2007 -2014 as the independent variables. Pool Least Square method (PLS), Fixed Effect method (FE), and Random Effect method (RE) were used in data processing. Those methods resulted the best model; that is Fixed Effect method. The result of data processing which use thefixed effect method is discussed in this paper.

- a. The result of hypothesis evaluation

Regression model with Fixed Effect Method (FE)		
Mutual Fund Return	Unit Link	Mutual Fund and Unit Link
<p>T<sub>statistic</sub> score of inflation variable is -7.188242 with p value 0.0000. It means that partially inflation affects significantly to the performance of mutual fund return with the negative direction.</p> <p>T<sub>statistic</sub> score of interest rate variable is 10.64718 with p value 0.0000. it means that partially interest rate affects significantly to the performance of mutual funds return with the negative direction.</p> <p>T<sub>statistic</sub> score of ICI variable is 78.04594 with p value 0.0000. it means that partially ICI rate affects significantly to the performance of mutual fund return with the positive direction.</p>	<p>T<sub>statistic</sub> score of inflation variable is -11.1142 with p value 0.0000. It means that partially inflation affects significantly to the performance of unit link with the negative direction.</p> <p>T<sub>statistic</sub> score of interest rate variable is 6.2559539 with p value 0.0000. it means that partially interest rate affects significantly to the performance of unit link with the positive direction.</p> <p>T<sub>statistic</sub> score of ICI variable is 75.21105 with p value 0.0000. It means that partially ICI rate affects significantly to the performance of unit link with the positive direction.</p>	<p>1) T<sub>statistic</sub> score of inflation variable is -9.804682 with p value 0.0000. It means that partially inflation affects significantly to the performance of mutual fund return and unit link with the negative direction</p> <p>2) T<sub>statistic</sub> score of interest rate variable is 6.2559539 with p value 0.0000. it means that partially interest rate affects significantly to the performance of mutual fund return and unit link with the positive direction.</p> <p>3) T<sub>statistic</sub> score of ICI variable is 94.71295 with p value 0.0000. It means that partially ICI rate affects significantly to the performance of mutual funds return and unit link with the positive direction.</p>
Simultaneous Evaluation		
<p>F<sub>statistic</sub> score is 6465.081 with p value 0.000000. It means that there is a significant effect between independent variable (inflation, interest rate, ICI) simultaneously to dependent variable (mutual fund return performance).</p> <p>R<sup>2</sup> score is 0.986728. It means that the independent variable (inflation, interest rate, and ICI) explains the variable of the mutual fund return performance for 98.6728%, 1.33 % is explained by other factors which is not included into the model.</p>	<p>F<sub>statistic</sub> score is 10061.37 with p value 0.000000. It means that there is a significant effect between independent variable (inflation, interest rate, ICI) simultaneously to dependent variable (unit link performance).</p> <p>R<sup>2</sup> score is 0.993005. It means that the independent variable (inflation, interest rate, and ICI) explains the variable of unit link performance for 99.30%, 0.70 % is explained by other factors which is not included into the model.</p>	<p>F<sub>statistic</sub> score is 6963.124 with p value 0.000000. It means that there is a significant effect between independent variable (inflation, interest rate, ICI) simultaneously to dependent variable (performance of mutual fund return and unit link).</p> <p>R<sup>2</sup> score is 0.997440. It means that the independent variable (inflation, interest rate, and ICI) explains the variable of the mutual fund return and unit link performances for 98.74%, 01.26 % is explained by other factors which is not included into the model.</p>

Mathematical model (Regression) from Panel Data Processing Result using Fixed Effect Method for Mutual Fund Return and Unit Link

Below is the equation model which is used in this study.

$$Performance_{it} = \beta_0 + \beta_1 Inflation_{it} + \beta_2 Interest\ rate_{it} + \beta_3 ICI_{it} + u_{it}$$

Thus, according to the calculation, it is resulted the regression equation to each mutual fund return product in which the product's names use the following code.

- Product Performance 1 = -0.521323 - 0.008467Inflation + 0.058062Interest Rate + 1.024863ICI
- Product Performance 2 = 0.616795 - 0.008467Inflation + 0.058062Interest Rate + 1.024863ICI
- Product Performance 3 = -0.634113 - 0.008467Inflation + 0.058062Interest Rate + 1.024863ICI
- Product Performance 4 = -0.624288 - 0.008467Inflation + 0.058062Interest Rate + 1.024863ICI
- Product Performance 5 = 1.767948 - 0.008467Inflation + 0.058062Interest Rate + 1.024863ICI
- Product Performance 6 = -1.210230 - 0.008467Inflation + 0.058062Interest Rate + 1.024863ICI
- Product Performance 7 = -0.956436 - 0.008467Inflation + 0.058062Interest Rate + 1.024863ICI
- Product Performance 8 = 1.064275 - 0.008467Inflation + 0.058062Interest Rate + 1.024863ICI
- Product Performance 9 = 0.748782 - 0.008467Inflation + 0.058062Interest Rate + 1.024863ICI
- Product Performance 10 = 0.441278 - 0.008467Inflation + 0.058062Interest Rate + 1.024863ICI
- Product Performance 11 = 0.050921 - 0.008467Inflation + 0.058062Interest Rate + 1.024863ICI
- Product Performance 12 = -0.210449 - 0.008467Inflation + 0.058062Interest Rate + 1.024863ICI
- Product Performance 13 = -0.441236 - 0.008467Inflation + 0.058062Interest Rate + 1.024863ICI
- Product Performance 14 = -0.553065 - 0.008467Inflation + 0.058062Interest Rate + 1.024863ICI
- Product Performance 15 = 0.365554 - 0.008467Inflation + 0.058062Interest Rate + 1.024863ICI
- Product Performance 16 = -0.559513 - 0.008467Inflation + 0.058062Interest Rate + 1.024863ICI
- Product Performance 17 = -0.078777 - 0.008467Inflation + 0.058062Interest Rate + 1.024863ICI

## CONCLUSION AND SUGGESTION

### a. Conclusion

According to the analysis and discussion, it can be concluded as follows.

1. The result if hypothesis evaluation shows that inflation affects negatively and significantly to the performance of mutual funds return and unit link. It means that the increase of inflation rate will decrease both the performance of mutual fund return and unit link.
2. The interest rate affects positively and significantly to the performance of mutual fund return and unit link. It means that the increase of the interest rate automatically will increase the performance of mutual fund return and unit link. Similarly, the decrease of the interest rate will automatically decrease the performance of mutual fund return and unit link.
3. ICI affects positively and significantly to the performance of mutual funds return and unit link. It means that the increase of ICI automatically will increase the performance of mutual fund return and

unit link. Similarly, the decrease of ICI will automatically decrease the performance of mutual fund return and unit link.

4. Simultaneously, inflation, interest rate and ICI affect significantly to the performance of mutual fund return and unit link. It means that the fluctuation of inflation, interest rate, and ICI simultaneously affect the fluctuation of the performance of mutual fund return and unit link.
5. Based on the R square in F test, the performance of mutual fund return can be explained by inflation, interest rate, and ICI for 98.6728%. the remnant (1.33%) is explained by other factors which is not included into the model.
6. Based on the R square in F test, the performance of unit link can be explained by inflation, interest rate, and ICI for 99.30%. the remnant (0.70%) is explained by other factors which is not included into the model.
7. Based on the R square in F test, the performance of mutual fund return and unit link can be explained by inflation, interest rate, and ICI for 98.74%. the

remnant (1.26%) is explained by other factors which is not included into the model.

b. Suggestion

According to the analysis, it is suggested that the investors need to pay attention to the fluctuation of inflation, interest rate, and ICI to the performance of mutual fund return and unit link. It is important because the analysis result shows that the three factors significantly affect the performances of mutual fund and unit link. Thus, the investor can prevent loss because of the decrease of mutual fund return and unit link performances. In contrast, the investor can get profit if they can estimate the positive effect of fluctuation of inflation, interest rate, and ICI to the performances of mutual fund and unit link.

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