

## **ANALYSIS OF IMPACT OF YIELD, INTEREST RATES, U.S FED RATES, AND INFLATION ON PRICE OF GOVERNMENT BONDS IN INDONESIA**

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### **ABSTRACT**

*Global factors are increasingly important as a cause of international capital flows. It is almost impossible for emerging markets to protect themselves from external influences on their financial markets. Indonesia as emerging market is influenced by some monetary policies adopted by the U.S Federal Reserve Bank. The plan of tapering and Fed rate increase adopted by the Federal Reserve Bank in the last three years made local currencies turned into the depreciation stage, increasing capital outflow from emerging markets. It created huge impact on government bond prices in Indonesia and can be seen through the relationship of some factors with bond prices. This research analyzes the impacts of BI rates, Fed rates, and inflation rates on six government bonds classified into three periods during November 2013 to October 2016 when tapering and Fed rates became critical issues. It finds that in all periods bond prices are significantly influenced by only BI rates, but BI rates, Fed rates and inflation rate have negative effect on bond prices during the observation period.*

**Keywords:** Bond Prices, Fed Rates, BI Rates, Inflation, Fixed Rate Bond, Indonesian Government Bond

## 1. Introduction

The capital market is a place where the facility is provided to move funds from one party to another through trading. It is essential for companies and governments to raise funds by issuing or selling bonds or shares to the public as source of funding, and is also important for investors in making profit. Bond is one form of investments in financial instruments, which is in very large numbers in many countries including the United States and Indonesia. Ross, Westerfield, and Jaffe state that the U.S Treasury securities market is the largest market in the U.S in terms of trading volume, which is higher than the New York Stock Exchange (2015 p. 256).

In Indonesia bonds have an important role as a source of funding in the growing economy today. The Indonesian government is actively taking bonds as the primary source for long-term financing to strengthen the financial system in the state and reduce the potential financial crisis as ever occurred in Asia in 1997. It is trying to close the budget deficit government spending through borrowing from domestic sources. Domestic financing can be achieved by the issuance of government bonds (Surat Utang Negara/SUN), so that the government can advance the bond market in Indonesia through Indonesia Financial Services Authority (Otoritas Jasa Keuangan) and the Directorate General of Budget Financing and Risk Management (DJPPR) by creating regulations that stimulate the growth of bond trading. The government annually issues bonds to fund the increase in its outstanding government bonds in market. The increase of Indonesian government fixed rate bonds from 517,142 billion rupiahs in December 2011 and jumped to 1,394,906 billion rupiahs within 6 years or increase approximately 270% in October 2016. This shows that government bonds are

selected by investors because they have a lower investment risk when compared to corporate bonds.

In Indonesia more investors buy bonds as investment instruments recently, especially government bonds that have a risk free or very little risk. Usually insurance companies and financial institutions buy bonds in very large quantities in their portfolios. According to Asia Bond Monitor Report November 2016 issued by the Asian Development Bank, the number of Indonesian government bonds (SBN) circulating in the third quarter of 2016 as many as 1,866,325 billion rupiahs, an increase of 29.4% compared to the same period in 2015.

Indonesian corporate bonds also increased by 14.9% to 286,710 billion rupiah in 2016 compared to the same period in 2015. This illustrates that the magnitude of the bond market in Indonesia is predicted to continue to increase especially after the interest rate cut by the Indonesian government recently. The trend of bond increase in volume should be opportunity for investors to make profit or capital gain even though there are risks contained therein, namely interest rate risk and default risk.

Governments and companies issue bonds to the public to provide returns in the form of coupon payments. Before issuing bonds, they always compare various other alternatives as a source of funding to determine whether the bonds have cheaper borrowing costs than others. Investors who have funds can buy bonds as an investment instrument to make a return with generally lower risk than stocks. Investors can use the bonds as tool to channel funds to obtain a return in the form of capital gains and coupon payments in the bond markets.

Every investment instrument has the characteristics, which differ from one another. Bonds generate fix income for investors, and on the other hand the other investors demand rapid growth and prefer stocks as investment instrument.

Stocks are proof of ownership of a company, which means that shareholders are as owners in the company, and have the right to the company's profits. The term period of the stock is unlimited, as long as the shareholders still hold shares of the company then they have the right to receive dividend without expiry date on the shares. Shareholders earn revenue on the profits of companies called dividend in certain periods but bond is a proof of debt instrument and has limited period of time or expiry date. However, bondholders will receive coupon interest payments on the specific period and the nominal value of the bonds upon maturity date. Bondholders will continue to receive coupon payments no matter a company makes profit or loss, and capital gain if the price of the bonds is higher than the purchase price. Otherwise, bondholder suffers loss if the price of the bond is below the purchase price.

Investors must possess the ability to assess whether the price of bonds overpriced or underpriced. Bond is considered overpriced if the market price is higher than the cash value of all coupons received plus the nominal value. In contrary, the bond is considered underpriced when the market price is lower than the cash value of all coupons received plus the nominal value when sold. It concludes that the bond has a fair price if it reflects cash value in the present value of all coupons received plus the nominal value. Investors must have the ability to accurately calculate bond price and analyze factors influencing bond prices in order to avoid loss in this investment.

Trading in the capital market is very closely linked to interest rates, where

many companies today including government prefer to issue bonds as source of capital. Bonds are debt securities issued by institutions with a nominal value (par value) and have a maturity date certain. Bond is the issuer promise to pay coupon in the time period and certain nominal value at the time of maturity. The bond issuer can be state-owned enterprises, private, or government. One type of bonds traded in the capital market in very large transaction volumes today are coupon bonds with a fixed interest rate.

Fixed rate bonds as one type of bond offer the opportunity to obtain consistent results over time for certain period and the opportunity for capital gains when sold before maturity date. Investing in bonds also requires considerable knowledge about bonds and good information about macroeconomics to be able to analyze the factors that influence the fluctuations in bond prices. At the time of the market interest rate down then they will tend to choose to issue bonds because the cost of capital is relatively smaller than selling shares that have the possibility of a decline ownership after being sold to the public. In general, the main factors underlying selecting a private company to issue bonds as an alternative long-term funding is there is no effect on ownership of the company or its operation. Stock issuance, on the other hand, puts additional stock shares in circulation, which means that future earnings of company must be shared among a larger pool of investors. This can result in a decrease in earnings per share (EPS), giving less money to owners. EPS is one of the financial ratios that investors look at when evaluating a company's health. A declining EPS number is generally not viewed as a good sign of favorable development.

Sojeva (2015) states the advantages of financing through the issuance of bonds: (1) the cost of debt (interest) remains the

same until the end of bond maturity. Holders of bonds do not participate in the business profits so they will not suffer loss when company does; (2) the expected percentage of the return is usually lower than preferential stocks; (3) shareholders still hold the control over the company if it uses debt financing. Moreover, interest payments on debt are deductible in company's taxable income; (4) bond contract contains provisions conditional on the debt prior to maturity may help in creating a reliable financial structure for the business.

Factors affecting the change in bond prices are different relative to the factors that influence stock prices because the bond has certain characteristics that are different from stocks. Significant factors affecting bond prices in are: coupon rates, interest rates, yields, inflation, and other factors such as the condition of the economy of a country and other countries that influence its social economic condition.

One of significant factors that could affect the bond price changes is coupon (Kempf and Uhrig-Homburg 2000). The lower the coupon rate is; the greater volatility of bond price is in certain time to maturity. Bond issuers always give a coupon rate attractive to make investors interested in buying the bond. In mathematical approach can be concluded that the coupon rate has positive influence on bond prices (Zubir 2012). The higher the coupon rate, the higher the rate of change in bond prices, so that the effect of the coupon rate on the bond price change is positive. In terms of the coupon payment there are two types of common bonds in the market with different pricing model, bond without coupon (zero coupon bond) and bond with coupon or level coupon bond (Livingstone & Zhou 2003).

Bond price is the price at this time (in present value) from cash flow received by investor discounted at a market interest

rate. Cash flows from zero coupon bonds are recorded at principal plus interest at the maturity date. While cash flow from coupon of level coupon bond consists of the sum received by investors each period plus the value of the principal at maturity date. Besides these two models there are also perpetual bond that has no maturity date. The issuer of bond has no obligation to retire the bonds or called non-redeemable, but the bondholder will always receive interest payments forever. This type of bond is rarely sold in the bond markets (Elali & Trainor 2009, p.169). Each type of bonds has different formula to calculate the real price in the capital market.

The other factor that affects bond price is the interest rate. Bond price moves in the opposite direction to interest rates but price changes are not the same for all bonds. Changes in interest rates affect a greater or lesser percentage price changes are not as nice interest rate at the time of increases or decreases. When everything else held constant, rising interest rate results in larger discounts or smaller premiums, but declining interest rates cause smaller discounts or larger premiums (Bremmer & Kesselring 1992).

Yield is the other factor (yield to maturity) that can affect the fluctuation of bond price. Yield is the return on the bond investment if investors hold the bond until date of maturity. When yields rise above the coupon rate at certain time, the price of bonds will adjust so investors considering the purchase of a bond can realize some additional interest. Otherwise, investors will not be interested to buy the bonds because it offers below market yields (Fabozzi 2013). According to Zubir (2012), the yield of one bond can be different from the one of other bonds for some reasons: default risk, time span before date to maturity, tax rate on cash inflow from bonds, rights of company or government to settle their debts before

date of maturity, and value of the coupon rate.

The next factor that influences bond price is inflation rate. Inflation is a process of rising prices in general and constantly associated with market mechanisms that can be caused by various factors such as increase consumption, excess liquidity in the market, or the lack of distribution of goods affecting prices. In economics, inflation is not only about increase of prices, but how the price increase of one good can influence price of the other goods.

In general, inflation has a positive and negative impact. If inflation is light, it has a positive effect can stimulate the economy and increase investment. Conversely, if inflation becomes heavy it can worsen the condition of the economy. Inflation occurs due to excessive total demand for goods, which is usually triggered by a flood of liquidity in the market resulting in high demand and increase in prices.

Inflation is an event where increase in prices in general and continuously. The price increase of one or two items alone cannot be called inflation unless the increase is widespread on other goods. Indicator often used to measure the rate of inflation is the Consumer Price Index (CPI). CPI changes over time show the price movement of goods and services consumed by people. In Indonesia survey on goods and services in CPI has been done on the basis of Cost of Living Survey (SBH) conducted by the Indonesia Central Statistics Agency (BPS). BPS monitors the development of prices of goods and services on a monthly basis in several cities in Indonesia. If inflation is high, usually the Bank of Indonesia (BI) tends to increase interest rates to curb inflation.

The other inflation indicators based on international best practice are: (1)

Wholesale Price Index (WPI) is an indicator that describes the magnitude of price changes of wholesale commodities traded in a country/ region, (2) Gross Domestic Product Deflator (GDP) level measurement of final goods prices (final goods) and services produced within a country. Deflator GDP is generated by dividing the GDP at nominal prices to GDP at constant prices (Bank of Indonesia 2016).

As one of the emerging markets, Indonesia's economy is strongly influenced by political and economic policies of internal and external. Internal factor is the issues of politics and economics that influence government policy in determining interest rates and also the effect of inflation that affects bond prices. External factors have enormous impact on the Bank of Indonesia rates (BI rates) is the measures taken by the US Government in determining the U.S Federal Interest Rate (Fed rates). In quantitative research on the relationship of BI rates and the Fed rates, Siahaan and Hidayat (2015) formulated hypotheses research on co-integration relationship between the level of BI rates and Fed rates, and the causality between BI rates and Fed rates. Data used are secondary data from the Fed rates and BI rates from period 2008 to 2013. The result from co-integration test indicates that BI rates and Fed rates have a long-term equilibrium relationship besides the Granger Causality test found a uni-directional relationship in which the Fed rates affect BI rates. This means the US Fed rate has an impact on the BI rate, which is closely affecting on fluctuations of bond prices.

Another event that affected investors in emerging markets is tapering. Tapering is the central bank activities used to improve the conditions for economic growth. Tapering activities are primarily pointed at interest rates and at the management of

investor expectations regarding what those rates will be in the future. These can include changes to conventional central bank activities, such as adjusting the discount rate or reserve requirements, or more unconventional ones, such as Quantitative Easing (QE).

For example, when in late May 2013 former U.S Fed Chairman Ben Bernanke started to hint that the Federal Reserve Bank would cut fiscal stimulus funds that have flowed into the market from U.S \$ 85 billion to U.S \$ 75 billion per month called (tapering) since the United States hit by the financial crisis that triggered the collapse of a residential mortgage company, subprime mortgage and largest investment banking firm Lehman Brothers. This policy led to six months of uncertainty and speculation on international markets before the Federal Reserve Bank finally provided clarification by announcing to taper its asset purchases in December 2013. Quantitative easing is an alternative monetary policy in which a central bank purchases government securities or other securities from the market in order to drop interest rates and increase the money supply. During the six months of uncertainty Indonesia's benchmark Jakarta Composite Index fell from a high of 5,155.09 points on 20 May 2013 to a low of 4,174.83 on 9 December 2013, losing nearly 20 percent of its value. After the US Fed's tapering decision was made in December 2013, however, the Jakarta Composite Index rebounded quickly intervening and hit a new record in the next three months (Kompas, 2013).

Emerging markets reacted to the U.S Fed on the tapering policy causing stock markets fell, currencies depreciated, bond yields increased and many portfolio flows turned negative in all emerging markets. Fortunately, these same variables rebounded on the Fed's decision to postpone the tapering in September 2013.

After negative response to the tightening of monetary policy of US Federal Open Market Committee (FOMC) announcement on June 19, the emerging markets profited most from the US Federal Reserve's unexpected decision to postpone tapering in September 2013.

Another external issue is the increase of Fed rate in 2014 and 2015 that hit hard the bond market in Indonesia because investors in market predicted Rupiah would depreciate against U.S Dollar (Kontan 2015). Candra (2015) conducted research with conclusion that capital outflow can increase bond yield, which implies the decline of bond prices and the increasing of the government's risk of borrowing. Moreover, domestic exchange rate volatility (Rupiah) is one of the considerations when foreign investors make a decision about investing their capital in the domestic bond market. This is one of reasons why bond prices tend to decline when Rupiah depreciates along with significant capital outflow of foreign investors.

Besides the external factor mentioned above, the internal factor also can have impact on bond price volatility because of the fluctuation of market interest rate affecting yield of bond either in short or long period. On 18 November 2014 Indonesian Government increased the gasoline price for 31% so that core inflation rose from 4.02% previously to 4.21% in November and 5.04% in March 2015. By the rules of high-risk high-return, then when inflation risks rise, investors will ask for higher yields. Most significantly the impact is on fixed income instruments, which are very sensitive to inflation and interest rates. Price of bond will decline due to higher yield. As the result of increase of gasoline price and inflation, BI rate hikes to 7.75% in December 2014 and January 2015 to balance the increase of inflation.

## 2. Literature Review

### 2.1 Investment

Investment is current agreement in currency for period of time to derive future payments that will compensate the investor for the expected rate of inflations and the uncertainty of future payments. It is an activity to place funds in financial asset during a certain period with objective to increase value of investment. Investment decisions are very important because they are invariably concern with future survival, growth, and prosperity of organization. Investment must be made not only to maintain the wealth of investor but more importantly to increase it. To meet this objective, it is crucial for investor to have knowledge of investment and make optimal decisions that are based on the best information available and use the most appropriate appraisal techniques. Investors must consider all these factors when investing their fund in financial assets beside inflations:

1. Taxation
2. Length of investments
3. Risk and uncertainty

There is strong relationship that exists between return and risk in investments either in stocks or bonds. Theoretically, the higher the expected return the higher the level of risk will be. The lower the level of risk is, the lower the expected return will be. This theory forms the investor attitude to risk (Davies, Boczko, & Chen, 2008):

1. Risk averse: investors that prefer for low risk and low return investment.
2. Risk neutral: investors that are indifferent to the level of risk faced.
3. Risk taking: investors with high tendency for high risk in exchange to generate high return.

To compare the risk of stocks and bonds, in period from 1925 to 2012 the statistic of wealth indexes of investment in the U.S

Capital Markets shows that long term government bonds increase is far below the level of increase in small company stocks. For example, if investor bought \$1 of one government bond in 1925 and \$1 of small company stock at the same time, in year 2012 the investor will receive \$18,364.60 from investment in stock but only \$123.12 from government bond. It proves that small company stocks with high risk will generate far higher return than government bond in long period.

### 2.2 Capital Market

Financial securities are largely traded in capital market as a concrete financial market for long-term funds. Capital market is different from the money market, which is related mainly to short-term financial instruments and the market abstract. Instruments used in capital markets generally include bonds and stocks. Capital market is a place in the physical sense organized a so-called trading securities or stock exchange. Stock exchange is an organized system that brings sellers and buyers effects done either directly or through representatives. One functions of stock exchange is to maintain the continuity of the market and create a reasonable price effect through mechanism supply and demand in the market (Pakpahan, 2003).

### 2.3 Bond

Bond is a financial investment instrument which provides fixed income and returns the return is fixed for a certain period until the maturity date stipulated at the time the bond was issued. It is a contract between borrower and lender (bond holder). The borrower (bond issuer) receives a fixed amount of money (the principal) at time 0, and pays the interest periodically (based on coupon rates) and the principal at maturity (Elali & Trainor, 2009, p.167).

Investors who have a conservative nature tend to invest in the bond market during fluctuation condition. In general, bond investment buyers today are dominated by

insurance companies, pension funds, mutual fund managers and investment managers who prefer the security of fund investment. Bond is classified as fixed income securities because of the magnitude of the interest rate, maturity and interest payment period is already known from the beginning. However, there are two factors that cause bond ratings uneasy task (Elton, Gruber, Brown & Goetzmann 2007):

1. Timing of cash flows has changed because of the financial instrument that accompanies these bonds causing the payment less certain. Bonds issued by option (callable bond) may influence the timing of payments and cash flow that will be paid to high risk and cash flow are uncertain.
2. The interest rate used to discount the bond cash flow becomes volatile. Bond prices will rise as interest rates falls and this is true vice versa. Along with the market value of interest rate fluctuations bond price will also keep changing.

There are four types of bond:

1. Government bonds: government debt to other parties that are used to fund the construction. Government bond is the most substantial in the most liquid bond market and are considered unlikely to have a default risk because payment is guaranteed by the government.
2. Corporate bond: debt securities issued by the company and being traded in the financial markets. The company's ability to pay the coupon and principal loan is determined by its ability to generate profits. Because it usually bonds issued have a guarantee.
3. Mortgage bond: debt securities issued by companies with real estate collateral owned.
4. Municipal bond: debt securities issued by local or provincial governments. Bond has a default risk depends on the

state government-owned corporation that guarantees the bond.

## **2.4 Characteristics of Bond**

There are some general characteristics of bonds:

1. Principle value: the issuer will clearly state how much funding is required through the sale of bonds at the issuance. It is the amount that bond issuer agrees to repay the bondholder at the maturity date (Fabozzi 2013, p. 14). It is referred to par value, redemption value, or face value.
2. Term to maturity: number of years over which the issuer promises to meet the condition of obligation. It refers to the date that debt will stop to exist when the issuer will redeem by paying all outstanding principal. The shorter the term of the bonds it will be increasingly attractive to investors because it is considered to have small risk. At maturity the issuer is obliged to settle the payment of the principal of the bonds.
3. Coupon rate: interest rate that issuer agrees to pay each year. The annual amount of interest paid to bondholder during the term of bond is called coupon. The coupon rate multiplied by the principal of the bond provides the amount of coupon in currency. For example, a bond with 10% annual coupon rate and principal value of Rp 1,000,000 will pay annual interest of Rp 100,000. The interest rate is usually determined by comparing the rate of bank interest rates. Type the coupon can be shaped fixed rate and variable rate for an alternative option for investors.
4. Coupon payment frequency: the obligation to pay the coupon can be done on a quarterly, semi-annually or annually.
5. Call and put option: option that is embedded in bond which is right of issuer to buy back (call) bonds prior to



maturity date or right of investor to sell back (put) bonds to issuer at par value (Zubir 2012, p.4).

## **2.5 Bond Classification**

Bond can be classified into two based on coupon (Manurung & Tobing 2010, p. 2):

1. Bond with coupon rate based on the index in the money market (floating rate) and the rate may vary from time to time or variable rate bond.
2. Bond with a fixed rate coupon that has the same coupon rate since issuance date until the maturity date (fixed rate), for example Indonesia Government Fixed Rate bond (FR Series).

Furthermore, according Manurung and Tobing (2010), bond can be grouped by issuer:

1. Government bonds classified as central government and municipal bonds.
2. Corporate bond.

In terms of rating, bond can be divided into two types (Ross, Westerfield, & Jaffe 2015, p. 255):

1. Grade bond: bonds that are rated and included in the ranking eligible for investment (investment grade), including investment grade ratings are AAA, AA, and A by Standard & Poor's or AAAA rankings, Aa and A by Moody's.
2. Non-Grade bond: bonds that are rated but not including proper rankings for investment (non-investment grade). Generally, bond rating is BBB, BB and B by Standard & Poor's or Bbb, Bb and B by Moody's.

Based on system of interest payments on the bonds is divided into two types (Zubir 2012, p. 15):

1. Bond with coupon (coupon bond) which interest is paid periodically in quarter, semi-annual, or annual basis. The bond with portion, which can be separated to take interest is called coupon bond. So, coupon is a special part of a bond that defines the amount of annual interest. Each one symbolizes one-time interest coupon that can be taken.
2. No coupon bond (zero coupon bond) that does not have a coupon, so investors will not receive periodic interest, but the interest is paid directly at once at the time of purchas

## **2.6 Factors That Influence Bond Price**

### **2.6.1 Market Interest Rate**

The interest rates are very volatile, so when interest rates go up or down, bondholders will suffer losses and gains. Loss and profit are the reason why investing in bonds with a coupon remains a risky investment, although it is often considered an investment with little risk. Investors are also aware of the sensitivity of bond prices due to changes in market interest rates.

In Indonesia, market interest rate (BI rate) is determined by Bank of Indonesia. BI rate is the interest rate that reflects the policy stance of monetary policy set by Bank of Indonesia and announced to the public. BI rate is announced by Bank of Indonesia every month and implemented on monetary operations conducted by it through the management of liquidity in the money market to achieve the operational target of monetary policy. The operational objective of monetary policy is reflected in the development of money market and the interest rates are expected to be followed by the development in interest rates on deposits, and bank lending rates. Bank of Indonesia will generally lower the BI rate when inflation is expected to

decline; otherwise it will raise the BI rate when inflation is expected to exceed the target (Bank of Indonesia, 2016).

### **2.6.2 The U.S Federal Interest Rate**

As a country included in EMEs, Indonesia experienced a tremendous influence of changes in monetary policy taken by the U.S Federal Reserve Bank. Quantitative Easing program effective before 2013 had impacts of QE policy on regional bond yields and lowered bond yields in Indonesia besides affecting on emerging Asian economies, foreign exchange rates, stock prices, including changes in interest rates, and credit spreads (Morgan 2011). The same effect also occurred when Federal Reserve Bank announced tapering of assets purchases in 2013-2014. The Federal Reserve Bank's decision to taper was responded by tremendous market reaction in many EMEs based on countries characteristics, including economic fundamentals and financial structures. Some countries with stronger economic fundamentals and financial markets to the tapering announcements experienced smaller currency decline and smaller increases in government bond yields (Mishra, Moriyama, N'Diaye, & Nguyen 2014).

Bond market is tightly related to the fluctuation of market interest rates. When market interest rates get lower many debtors will get loans with low rates then the result is local economic growth and bond market development.

### **2.7 Inflation**

Inflation is a situation where there is an increase in the money supply or the increase in liquidity in the economy. The definition refers to the common symptoms caused by an increase in the money supply in a country thus causing price increases. Inflation can be defined as a tendency of increase in prices of goods and services in general and continuously. There are two important insights that are keys in

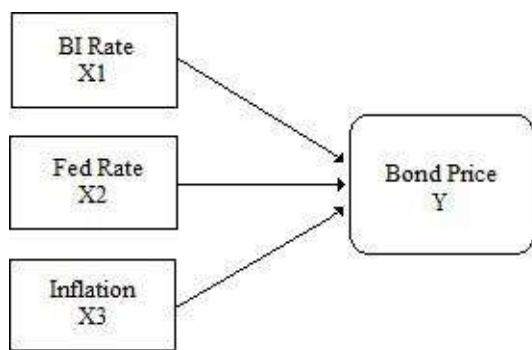
understanding inflation: (1) the increase in prices in general, and (2) occur continuously. Inflation should be contained in an element of price increases, and further price increases are prices in general. Only the price increases that take place in general that can be referred to as inflation. It is important to differentiate the price increase on certain goods and services. Inflation is price increase in general, which means that inflation should describe the rise in price of a large number of goods and services consumed within a country. The second key word is continuously. The increase in prices that occurs due to seasonal factors or just once and has no further effect cannot be called inflation. Judging from the main factors that cause inflation, inflation can be outcome from supply side, the demand side, as well as expectations. Factors that also cause inflation can be a combination of these three factors. As a result of rising prices of goods and services, the value of currency will decrease and purchasing power of the currency is becoming getting weaker. The decline in the purchasing power will further impact the capital market, the business world, as well as the income and expenditure budget government.

### **3. Research Method**

The study used the hypothetical-deductive method involves steps of identifying problems, defining problem statements, hypothesizing, determining measures, the data collection, the data analysis, result, and conclusion. Deductive reasoning always starts with a theory and then it applies this theory to specific cases. When a theory is tested to determine whether it is able for explaining a particular problem, it is a hypothesis testing (Sekaran & Bougie 2013). This study developed a model form of research that aims to test the hypothesis of the research that has been determined in previous chapters in addition to explaining the position of the variables that were analyzed and the

relationship between one variable with another variable. Developed research will explain the causal relationship between variables and be able to make useful managerial implications in accordance with the study variables.

The types and sources of data used in this research is secondary data in the form of quantitative BI data rates, coupon rates, yields (monthly average), Fed rates, and bond prices (monthly average). The data used in this study are obtained from the website Bloomberg, Indonesia Stock Exchange, Bank of Indonesia, and the U.S Federal Reserve Bank.



**Figure 1.** Research Model

The regression model used as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

where:

$Y$  : Bond price

$\alpha$  : the intercept of regression equation

$\beta_1, \beta_2, \beta_3$  : The regression coefficient

$X_1$  : BI rates (market interest rates)

$X_2$  : U. S Fed rates

$X_3$  : Inflation rates

The relationship between market interest rates (BI rates) with bond prices indicates that the BI rates influence bond prices in negative correlation (Fabozzi 2013). Similar relationship also occurs between other independent variable of Fed rates, and inflation with bond prices. When market interest rate drops to balance inflation decrease, then interest rates will

trigger increase of bond prices. As Siahaan and Hidayat (2015) states there is uni-directional relationship that Fed rate affects the interest rate of Bank of Indonesia (BI Rate), then BI rates will move in the same direction as Fed rates. In conclusion, all independent variables have significant negative effect on bond prices in bond markets. Research model shows the relationship of four independent variables that influence bond prices.

### 3.1 Variable Operationalization

The period of data for all dependent and independent variables is from November 2013 to October 2016. Classification of variables needs to be done to provide an overview and reference in the research. Based on the formulation of the problem and the proposed hypotheses, the variables in this research can be identified as follows:

1. Independent variables: variables that affect or trigger changes or the emergence of the dependent variable. In this research, the independent variables are:
  - a. BI rates or market interest rate measured in percentage on monthly basis and issued by Bank of Indonesia.
  - b. Fed rates are measured in percentage on monthly basis and issued by the U.S Federal Reserve Bank.
  - c. Inflation is measured in percentage from monthly inflation and issued by Indonesian government agency (BPS).

Dependent variable: variable that is influenced by the independent variables. In this research dependent variable is the price of bonds. The goal of research is to understand and describe the dependent variable before explaining its variability (Sekaran & Bougie 2013, p. 69). The

dependent variable is bond prices measured in market value, stated in Rupiah on daily basis, and averaged into monthly basis.

### 3.2 Population and Sample

Population refers to events or things of interest that need to be investigated to the make inferences in research. The population consists of subjects or objects that have certain characteristics that are applied by researchers to learn and then drawn conclusions. The population in this study is the Indonesian fixed-rate government bonds sold in Indonesia Stock Exchange. Sample is a part of a group from the population (Sekaran & Bougie 2013). Sample is part of the population that has similar characteristics and is considered to represent the population. Government bonds that can be sample are:

1. All bonds are fixed-rate government bonds with semi-annual coupons.
2. All bonds have been traded in Indonesia Stock Exchange at least from 01 November 2013 to 31 October 2016 (observation period), and the data of prices, coupons, time to maturity, and yields are available.
3. All bonds are classified based on the maturity period since 2016:
  - a. Short term period: between 5 to 10 years.
  - b. Medium term period: between 10 to 15 years.
  - c. Long term period: more than 15 years.
4. All bonds have highest transaction volume from June to November 2016 based on maturity period.
5. Because of the basic characteristic of all bonds significantly influenced by market interest rates and time to maturity, only six bonds are selected as sample based on the maturity period and two bonds for each term period.
6. Data of Fed rates from 01 November 2013 to 31 October 2016 are acquired from the U.S Federal Reserve Bank.

7. Data of BI rates, Fed rates, inflation rates and bond prices are monthly basis or monthly average from 01 November 2013 to 31 October 2016.
8. Data of BI rates and inflation rates are obtained from Bank of Indonesia and BPS respectively, and data of bond prices from Indonesia Stock Exchange and Bloomberg.

Based on the existing data from Indonesia Stock Exchange, all population is 39 fixed-rate bonds (FR) with semi-annual coupon. But because the characteristics of each bond are affected by interest rates and time to maturity, then only 6 bonds are used as sample, which represent all population due to the same characteristics. The size of transaction volumes becomes standard to select the sample as it indicates the reflection of fair value of bonds traded in market. The six bonds are classified into short, medium, and long term as follows:

1. FR 53 (13.64%) and FR 70 (9.67%): short term.
2. FR 56 (16.14%) and FR 59 (6.67%): medium term.
3. FR 68 (5.28%) and FR 54 (0.87%): long term.

Six bonds have highest volume compared to others in the same term period and represent 52.28% of total transaction volume from June to November 2016.

### Hypothesis

Hypothesis can be defined as an uncertain statement or tentative assumption, which predicts that the expectation can be found in empirical data (Sekaran & Bougie, 2013). Hypotheses are derived from the theory as basis of conceptual model and are frequently relational in nature. So, hypotheses can be defined as logically conjectured relationship between more than one variable expressed in form of testable statements. By testing all hypotheses and verifying the conjecture

relationship, it is expected that solution can be generated to correct the existing problem. The hypotheses for the questions are:

$H_1$ : BI rates (market interest rates) have negative influence on prices of Fixed Rate (FR) bonds issued by Indonesian Government.

$H_2$ : The U.S Fed rates (Fed rates) have negative influence on prices of Fixed Rate (FR) bonds issued by Indonesian Government.

$H_3$ : Inflation rates have negative influence on prices of Fixed Rate (FR) bonds issued by Indonesian Government.

#### 4. Results and Discussion

**Table 1.** Multiple Regression Linear Test Result (Significance at  $\alpha = 5\%$ )

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	134.237	11.429	11.745	0.000
BI_RATE	-3.765	1.385	-2.719	0.008
FED_RATE	-2.967	5.194	-0.571	0.570
INFLATION	-0.114	0.218	-0.523	0.603

**Source: Processed Secondary Data**

Based on the data in Table 1, the multiple linear regression equation is:

$$\text{PRICE} = 134,24 - 3,76\text{BI\_RATE} - 2,97*\text{FED\_RATE} - 0,11*\text{INFLATION}$$

Based on the multiple linear regression equation above, the constant value is 134.237. It means if all independent variables are zero, the government bond price worth 134. 237.Variable BI Rate, Fed Rate and Inflation have negative value and it indicates they have negative effect on bond price changes with coefficient of -3.765, -2.967, and -0.114 respectively.

##### 4.1 BI Rates

During period from December 2013 to October 2014, BI rates tend to be flattening on 7.50% while the bond prices fluctuated between 80 and 110. In January

2014 all bond prices dropped to the lower point as result of tapering issue prior to September 2013. However, after the cancelation of tapering in September 2013 and the US Fed's tapering decision made in December 2013 all bond prices rebounded quickly and kept hiking to the highest level in February 2015, only slightly declined in October 2014. Although BI rates in November 2014 to January 2015 increased from 7.50% to 7.75%, the bond prices did not move in opposite way due to some issues occurred related to appreciation of Indonesia Rupiah and the increase of Fed rates.

In last quarter of 2014, Bank of Indonesia intervention managed to trigger Rupiah to strengthen against the U.S during that period. The rupiah strengthening became the primary driver of rising prices in the secondary market government securities beside the Fed statement to withstand the increase interest rate until next year. The U.S Federal Bank Governor Janet Yellen decided to postpone raising interest rates in a period yet to be determined. The decision is considered capable of reducing market uncertainty. Investors in market reacted to this positive issue and hold their investment or increase it in Indonesia financial securities, and the impact is the increase of bond.

In contrary, bond prices dropped after February 2015 to anticipate the issue of Fed rate increase and depreciation of Rupiah. From February to September 2015, bond prices decline to the lowest point in September after Rupiah weakened against U.S Dollar. The negative issue of higher Fed rate in near future also worsened the depreciation of Rupiah and pushed the bond prices to the lowest level in September. BI rates stayed at 7.50% from March to September 2015. Once again, bond prices did not move in negative relationship with BI rates.

Bank of Indonesia decided to reduce BI rate to 7.36% in January 2016 to increase

money supply and growth of economy as part of its monetary policy. The decline of BI rate kept continuing until October 2016 to 6.50%. Investors respond it as positive signal to buy more government bonds and make more capital gain from the low-price bonds. Starting in January bond prices hiked to the highest point in September 2016. This supports the previous research by Wijaya (2014) who concluded that market interest rate negatively influences bond price.

#### **4.2 Fed Rate**

Fed rate did not hike but stayed on 0.25% since November 2013 to November 2015, but the issue of its increase was very powerful to influence government bond prices in Indonesia. As one of emerging markets, Indonesia economy is supported by the large size of foreign investment and very sensitive to U.S economy condition and Federal Reserve Bank policy. From previous paragraph about BI rate, when only a plan about the increase of Fed rate stated by Federal Reserve Bank investors are very reactive and Rupiah instantly becomes fluctuated. During November 2013 to November 2015, shows that bond prices fluctuation influenced by other variables and issue instead of Fed rate. Quantitative Easing, tapering, depreciation of Rupiah, and Indonesia's trade of balance (surplus/deficit) affect the fluctuation of bond prices, although Fed rate was increased to 0.50% in mid-December 2015. Bond price continued rising until the last quarter because investors in market responded more to the reduction of BI rates since January 2016. These circumstances in observation period support previous research conducted by Siahaan and Hidayat (2015) who conclude Fed rate and BI rate have positive relationship and both have negative influence on bond prices.

#### **4.3 Inflation**

When inflation increases, the nominal rate and market interest rate automatically will

increase, and yields of bond move to the same direction as market interest rate causing the bond price declined. Inflation gradually diminishes the purchasing power of a bond's future cash flows because the higher current rate of inflation and the higher expected rates of inflation resulting the higher the yields will rise across the yield curve, as bond investors will ask higher yield to compensate for inflation risk. Bond prices increased during that time as result of lower yield demanded by investors and lower inflation risk. The pattern when yield and bond prices move in opposite way supports the research conducted by Kurniasih and Restika (2015) concluding that inflation and BI rates have positive influence on government bond yield it means that inflation have negative relationship with government bond prices.

#### **5. Conclusion**

BI rates have negative effect on all bond prices in short, medium and long term. Theoretically, when BI rates (market interest rates) get higher, bond prices will decline, and during observation period bond prices are affected by negative sentiment such as tapering by the U.S Federal Reserve Bank, the increase of Fed rates, the exchange rate of Rupiah against U.S Dollar, and other issues that make investors to anticipate the investment risk in Indonesia. However, BI rates have significant influence on bond prices in all terms.

Fed rates have no relationship with bond prices in all terms. Fed rates negatively influence bond prices in all terms meaning that the increase of Fed rates will be followed by the decrease of bond prices in all terms. The result is the same as the theory and past researches stating Fed rate and BI rate have positive relationship but they have negative effect on bond prices.

Inflation rates have no relationship with bond prices in all terms but they have

negative effect on bond prices. If inflation gets higher, then the bond prices will decline.

Even though during the observation period there are external factor affecting financial market in Indonesia such as negative sentiments, tapering program, and Fed rate increase, but there is no abnormality related to correlation of bond prices with variable BI rates, Fed rates, and inflation. All three variables have negative correlation with bond prices in accordance with bond theory and past researches.

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