The Effect of Money Supply, Interest Rate, and Exchange Rate on Inflation in Indonesia 2001-2013

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Abstract
This study aims to determine the effect of money supply, interest rate and exchange rate on inflation in Indonesia. Data analysis model used in this research is Multiple Regression Analysis Test. The data used are annual data from 2001 until 2013. The results show that the money supply, interest rate and exchange rate have an influence on inflation in Indonesia. From the results of processing showed R2 = 0.549 can be interpreted that the money supply, interest rate and exchange rate able to explain 54.9% inflation. While as much as 45.1% in influenced by other variables that are not included in the study.

Keywords: inflation, money supply, interest rate, exchange rate

Introduction
Every country in the world must have the same goal that is to improve the welfare of the community. But in an effort to improve the welfare of people in a country must experience various economic problems one of them is inflation. Inflation is a condition in which prices are increasing in general and continuously (Miskhin 2003:246). Inflation is a major issue of vital concern to governments in every country including Indonesia.

As one of the developing countries inflation in Indonesia is quite high, this of course can lead to the emergence of other economic problems. The following is a graph of inflationary developments in Indonesia from 2001-2013.

From the picture above can be seen how the inflation in Indonesia from 2001-2013. Inflation in Indonesia 2001-2013 fluctuated. The monetary crisis in 1997 caused
inflation in Indonesia to be quite high, even the current inflationary state was included in hyperinflation. However, in 1999 and subsequent years of inflation in Indonesia have started to improve this is due to the efforts to deal with the crisis one of the tight money policy (tight money policy). In 2001 Indonesia's inflation was 12.55% and then decreased to the following years. However, in 2005, inflation again increased to 17.11%, this is the effect of the increase in fuel prices.

One way to reduce inflation is to regulate the Amount of Money Supply in Indonesia. Inflation is greatly influenced by the money supply. In the short term, money supply growth will have an impact on rising inflation and output levels, but the increase will be lower than the money supply growth. While in the long run, the rate of money growth is constant, expectation has been adjusted to actual inflation and output so that it can be concluded that inflation will not occur if there is no addition of money supply (Dornbusch, 2004).

In addition to the money supply, interest rate also affect inflation. A very high interest rate increase, on the one hand, will be effective against reducing money supply, but on the other hand will increase lending rates for the real sector (Atmadja, 1999). Therefore, interest rates can trigger inflation.

The problem of inflation in Indonesia is also influenced by the exchange rate. As a country that imports many industrial raw materials, exchange rate instability will have an impact on capital flows or investment and international trade in Indonesia. With the weakening of the rupiah caused the Indonesian economy to be shaky and hit by the economic crisis and confidence in the domestic currency. With the drastic spikes in the exchange rate this will make the producers difficulties to get raw materials, capital goods and capital goods that have a high import content so that then will have an impact on rising costs to import goods for the purposes of the production process that will affect the level the domestic price are a reflection of the inflation rate. Therefore, the exchange rate (exchange rate) is also one of the factors that can affect inflation in Indonesia (Saputra, 2013).

From the above explanation, it is known that inflation is an economic problem of Indonesia for a long time. So the authors are interested to investigate about inflation in Indonesia. The purpose of this study is to determine whether there is influence of money supply, interest rates and exchange rate against inflation in Indonesia in 2001-2013.

**Literature Review**

Economists have defined inflation differently. Inflation is an increasing trend of goods in general, which is caused by the amount of money in circulation is too much compared to the goods and services available (Firdaus, 2011: 115). An increase in the price of one or two items alone can not be called inflation unless the increase extends to (raises) most of the price of other goods (Boediono, 2003).

The Quantity Theory by Irving Fisher explains that inflation can only happen if there is an increase in the volume of money in circulation, without any increase in the money supply will only raise prices for a while only. When the amount of money does not increase, inflation will stop by itself, whatever the initial cause of the price increase. Secondly, the rate of inflation is determined by the rate of increase in the money supply and by the psychology (hope) of the community regarding future price increases (Boediono, 2003). The continued high rate of money supply growth will result in high inflation rate and low money supply growth in turn will result in low inflation rate. Furthermore, the statement that inflation is a monetary phenomenon implies that high inflation rates will not continue if not accompanied by a high rate of money supply growth (Dornbusch and Fischer, 2004: 58).
In addition to influencing the money supply, inflation is also influenced by interest rates and exchange rates. According to Yodiatmaja (2012: 3) changes in interest rates will affect some macroeconomic variables which are then passed on to inflation. Miskhin (2009: 111) says when a country’s currency appreciates the goods produced by the country abroad become expensive and foreign goods in the country become cheaper. Conversely, when a country’s currency depreciates, the country’s goods abroad become cheaper and foreign goods in the country become more expensive. This means that if there is depreciation of the value of a country’s currency against the currency of another country will result in increased costs to import goods such as consumer goods, capital goods and raw materials for use in the production process. To cover the cost of imports that become expensive domestic producers will raise the price of their products so that will lead to price increases in the level of domestic prices which is a reflection of the inflation rate. It can be concluded that there is a positive relationship between exchange rate and inflation rate.

Inflation is one of the economic issues worth examining. Several studies on inflation have also been conducted. Andrianus (2006) analyzed the factors influencing inflation, the independent variables studied included the Deposit Interest Rate (DEP1), the Rupiah to Dollar Rate, the Money Supply, and the Gross Domestic Product and concluded that there are two variables affecting inflation, exchange rates and interest rates. Manggi (2013) analyzed the factors affecting inflation with the full inflation model concluding the result of the equation of cointegration equation shows that in the long run the variable of money supply, interest rate, and world oil price have significant effect to inflation rate in Indonesia.

Another study was conducted by Wahjuanto (2010) which concluded that from the period of 1995-2009, the money supply and interest rate had a significant effect on the inflation rate of Indonesia, while the government expenditure and foreign exchange rate had no significant effect on the inflation rate in Indonesia. In addition Lutfi and Hidayat (2006) concluded that in the 1997 study period: 3 - 2005: 2 interest rates and exchange rates significantly influenced inflation in Indonesia in the short term, while interest rates had an effect on both the short and long term long.

Research Method
Data and Data Sources
Type of data from this study secondary data using annual data from 2001 to 2013. Variables used in this study are inflation as a dependent variable, money supply, interest rate and exchange rate as an independent variable.

Sources of data are taken from the website of Bank Indonesia (BI), Indonesian Central Bureau of Statistics , journals, reports and other sources related to this research.

Multiple Regression Analysis Test
Multiple linear regression is an appropriate method of analysis when the study involves one dependent variable that is thought to relate to one or more independent variables. Multiple linear regression analysis model used to test the hypothesis is as follows:

\[ Y = b_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \epsilon_t \]

Description
\[ b_0 \] = Constants
\[ \beta_1, \beta_2, \beta_3 \] = Constants Regression for X1, X2, X3
\( \epsilon \) = Standard error  
\( Y \) = Inflation  
\( X_1 \) = Money Supply  
\( X_2 \) = Interest Rate  
\( X_3 \) = Exchange Rate

**Results and Discussion**

**Multiple Regression Analysis Test**

Multiple regression analysis is used to predict how things are going (downs) the dependent variable, when two or more independent variables are manipulated (Sugiono, 2011: 275). In this research, multiple regression analysis is used to find the effect of money supply, interest rate, and exchange rate against inflation in Indonesia 2001 – 2013.

**Table 1. Result of Multiple Regression Analysis.**

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>-11.874</td>
</tr>
<tr>
<td>Money Supply</td>
<td>.086</td>
<td>.197</td>
</tr>
<tr>
<td>Interest Rate</td>
<td>.874</td>
<td>.236</td>
</tr>
<tr>
<td>Exchange Rate</td>
<td>1.152</td>
<td>.801</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Inflation

The results of processing data in a multiple linear regression model as follows:

\[ Y = -11.874 + 0.086 X_1 + 0.874 X_2 + 1.152 X_3 + \epsilon \]

With description:

\( Y \) : Inflation  
\( X_1, X_2, X_3 \) : Money Supply, Interest Rate, and Exchange Rate

**Interpretation model:**

a. The value of the constant of the above equation is equal to -11,874 which shows the inflation rate by ignoring the factors \( X_1 \), \( X_2 \), and \( X_3 \).

b. The coefficient of money supply \( (X_1) = 0.086 \), show that the money supply variable \( X_1 \) has a positive effect on Inflation in Indonesia. This means that every time an increase in the money supply \( X_1 \) of 1 percent, then the Indonesian Inflation will increase by 0.086 percent.

c. The interest rate coefficient \( (X_2) = 0.874 \), shows that the interest rate variable \( X_2 \) has a positive effect on Indonesia Inflation. This means that any increase in interest rates on inflation by 1 percent, then the inflation of Indonesia will increase by 0.874 percent.

d. The exchange rate coefficient \( (X_3) = 1.152 \), indicating that the exchange rate variable \( X_3 \) has a positive effect on the Indonesian Inflation. This means that any increase in the exchange rate against inflation by 1 percent, then Indonesia’s inflation will increase by 1,152 percent.
**F-test**

According to Ghozali (2011; 98), F test statistic basically indicates whether all non-independent or variable are included in model have same effect together-dependent variables against/bound. The results of the calculation of the F test in this research are:

**Table 2. Result F test.**

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>126.858</td>
<td>3</td>
<td>42.286</td>
<td>5.865</td>
<td>.017a</td>
</tr>
<tr>
<td>Residual</td>
<td>64.888</td>
<td>9</td>
<td>7.210</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>191.746</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Exchange Rate, Interest Rate, Money Supply

The table above show the value of F test is 5.865 with a significant level of 0.017. While F table at 95% confidence level (α = 0.05) is 4.26. Because both calculations F test > F table and its significance level 0.017 < 0.05 shows free variable that is amount of money (X2), interest rate (X3) and exchange rate (X3) simultant is significant to dependent variable that is Inflation Indonesia Y) in 2001-2013.

**T-test**

According to Ghozali (2011; 98), t-test statistical basically shows how much effect one independent variable individually in the dependent variable explained. T-test results in this research are:

**Table 3. T-test Result.**

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
</tr>
<tr>
<td>1 (Constant)</td>
<td>-11.874</td>
<td>7.688</td>
</tr>
<tr>
<td>Money Supply</td>
<td>.086</td>
<td>.197</td>
</tr>
<tr>
<td>interest Rate</td>
<td>.874</td>
<td>.236</td>
</tr>
<tr>
<td>Exchange Rate</td>
<td>1.152</td>
<td>.801</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Inflation

a. t test of money supply variable

From the data above is known that t test (0.435) < t table (1.833), with a significant value of 0.645 which is above 0.05. This means that the money supply does not affect the inflation in Indonesia

b. t test of interest rate variable
Based on the above data is known $t$ test (3.708) > $t$ table (1.833), with a significant value of 0.005 below 0.05. This means that interest rates affect inflation in Indonesia.

c. $t$ test of exchange rate variable
From the data above is known that $t$ test (1.438) < $t$ table (1.833), with a significant value of 0.184 which is above 0.05. This means that the exchange rate is not influential to inflation in Indonesia.

**Determination Test**
According to Arikunto (2010:239), the coefficient of determination reflects the influence of the independent variables change in the run changes in the dependent variables together, with the aim to measure the truth and good relationship between variables in models used. Results of the test determination in this study are:

**Table 4.** Determination test result.

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.813&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.662</td>
<td>.549</td>
<td>2.68511</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Exchange Rate, Interest Rate, Money Supply  
b. Dependent Variable: Inflation

From the result of data processing shown in Table 4 shows that $R^2 = 0.549$ can be interpreted that the independent variables are Money Supply, Interest Rate, and Exchange Rate able to explain 54.9% to dependent variable that is Inflation. While as much as 45.1% influenced by other factors that are not examined.

**Conclusions**
Based on the analysis result can be concluded that:
1. Based on the results of multiple linear regression test, it is known that the money supply, interest rate and exchange rate have a positive effect on inflation in Indonesia 2001-2013.
2. Based on the results of the f test, it is known that the money supply, interest rate and exchange rate simultaneously have a significant effect on inflation in Indonesia in 2001-2013.
3. Based on $t$ test results, it is known that the money supply is not and the exchange rate does not partially affect the inflation of Indonesia in 2001-2013 but the interest rate variables partially affect the inflation of Indonesia. It turns out that in fact when the increased Money Supply is not necessarily followed by the increase in prices of goods and services so as not to affect people's purchasing power. This makes the public tend to prefer holding money rather than spending it. On the exchange side, the Rupiah Exchange Rate Changes to the US Dollar can be anticipated by the Government by disbursing the foreign exchange reserves held to cover the difference in trade costs.

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References


