

## **Analysis of the Effect of Inflation, Interest Rates, and Exchange Rates on Gross Domestic Product (GDP) in Indonesia**

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### ***Abstract***

*Economic growth can be defined as an increase in the ability of a country or region in providing for the economic needs of the population. High or low economic growth can be measured by calculating the gross domestic product (GDP). This study uses inflation, interest rates, and exchange rates as a supporting variable of GDP. There is a significant negative relationship of interest rates on GDP and a significant positive relationship of the exchange rates on the GDP, while inflation is not a significant influence on GDP.*

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**Keywords:** *GDP, inflation, interest rates, exchange rates*

## **1. Introduction**

Economics is a reflection of human behavior, referred to as "rational self-interest" (McConnell and Brue, 2008). Rational self-interest can be interpreted as an increase in income, rents, interest, and profit that makes a person able to meet their needs. Every individual tries to reach a standard of satisfaction by the consumption of goods or services, by allocating power, money, or time to achieve satisfaction. The problem lies in the limitedness of resources. Scarcity and availability of goods and services within a country will reflect the level of economic growth. High or low economic growth can be measured by calculating the gross domestic product (GDP) of the country concerned. Rodrik (2009) proves that GDP is affected by currency exchange rates (exchange rate) of a particular country. Udoka and Roland (2012) states that the interest rate is one of the determinants of economic growth. The statements made by researchers above can prove that the interest rate and the exchange rate can influence economic growth.

Various countries are in the developing stages such as Indonesia can be said to have economic growth that is quite vulnerable to the turmoil in developed countries like the United States (Bank Indonesia, 2013). However, in this case Indonesia is considered to have a significant economic growth and able to survive. This can be seen by the Indonesian stability amid the global crisis in 2008, which Indonesia is able to continue its economic growth, especially after the 2008 crisis ended (Bank Indonesia, 2013).

## **2. Research Objectives**

This research is aimed towards the understanding of variables such as; inflation through GDP, interest rate through GDP, exchange rate through GDP, interest rate through inflation, and inflation through exchange rates. Through the variables above we can somewhat predict the economy by taking decisions in our business and investments.

## **3. Theory and Hypotheses**

### **3.1 Gross Domestic Product (GDP)**

GDP is a good indicator of a country's microeconomic status and development (Haggart, 2000). GDP can be seen from two sides such as the expenditure approach and the income approach. First we will look at the expenditure approach. It takes account of all goods and services within a given time period. A good example will be such as household items that we buy daily, purchases from a foreign investor and services (Andolfatto, 2005). In the other hand the income approach a be best described as the level of worker's compensation, rent, interest rates,

income of a particular business, tax of a produced goods and import level (McConnel and Brue, 2008).

### **3.2 Exchange Rates**

Exchange rate is a value that a currency has compared to another currency (Krugman, 2001). Tiwari (2003) stated that exchange rate can be divided into two categories, fixed exchange rate and flexible exchange rate. In a fixed exchange rate, it is set by the government, whereas flexible exchange rate is set by the market with or without the influence of the government in the effort to stabilize the monetary (Kuncoro, 2001).

### **3.3 Interest Rates**

In the theory of economy, interest rate can be described as a value that is gained in the effort of a value that has been saved or invested. These rates will reflect the interaction between exchanges of money (Patterson dan Lygnerud, 1999). There are short term and long term rates according to Patterson dan Lygnerud (1999). Short term rates is influenced by the Central Bank, thus money is being monopolised accordingly. In long term rates however, shows the condition of the current economy and the possibility of inflation. Both of the rates are linked and work with one another. According to *Certified Public Accountant (CPA) Australia* there are two ways of measuring the risks of interest rates, they are: sensitivity analysis and repricing profiles.

### **3.4 Inflation**

Inflation is best described as an increase in price as general, where inflation decreases purchasing power from a currency (McConnel and Brue, 2008). There are a few causes of inflation where aggregate demand increases faster than aggregate supply, therefore increasing the cost of goods and services. The imbalance of aggregate demand and supply is linked to the government's deficit, expansion of bank's interest rates and the increase of foreign demand (Haberler, 1960). Inflation also increases the price of goods and the price of work labor thus the cost of goods and selling price increases (Sukimo, 2000). Inflation has a few indicators such as Consumer Price Index (CPI), Wholesale Price Index (WPI), and Implicit Price Index (deflator GDP) (Majalah Tempo, 2002).

## **4. Research Hypothesis**

### **4.1 The relationship between inflation with GDP**

Suva and Fiji (2004) states that inflation and GDP has a negative outcome. At a certain level of inflation there will be positive outcome towards GDP. A low level of inflation will not have a significant effect on GDP, in fact it might even be a positive effect. A too high level of inflation

however, will have a negative impact on GDP (Li, 2003). An increase in inflation will decrease the GDP per capita and investors (Barro, 1995).

H1: Inflation has an effect on GDP.

#### **4.2 The relationship between interest rates with GDP**

Looking from the GDP's point of view, Udoka and Roland (2012) agrees that interest rates are one of the factors indicating economic growth of a Country, however an increase in interest rates also shows a shrinking GDP. The good news is that their research shows that interest rates do not have a significant impact in economic growth. An increase in interest rates will cause a decrease in real growth rates, this research however is done in Europe (Giovanni et al., 2009).

H2: Interest rates have an influence on economic growth.

#### **4.3 The relationship between exchange rates with GDP**

Rodrik (2008) found that there is a relation between exchange rates with economic growth to form positive relationships. Ito, Isard and Symasnsky (1999) found that high economic growth rates supported by adequate export growth, thus increasing the value of exchange rates due to increased demand for the national currency. Good deal exchange rate will help the liquidity of capital markets so that investing world come to move forward, which in turn achieved the desired economic growth (Wong et.al, 2005).

H3: Exchange rates have an influence on economic growth.

#### **4.4 The relationship between interest rates with inflation**

Interest rates are part of monetary policy, money supply reflected in the market, and as a means of neutralizing inflation (Asghapur et al., 2014). Asghapur, Kohnehshahri and Karami. (2014) agreed that interest rates have a negative relationship to inflation. It is also supported by Kandel, Ofer, and Sarig (1996) which states that interest rates negatively correlated to inflation. Fisher Hypothesis (1930) says that interest rates reflect fluctuations in inflation. On the other side of the interest rates can also have a positive relationship as expressed by Mishkin (1988) and Gibson (1982). Ghazali (2003) found that there is no significant relationship between interest rates with inflation.

H4: Interest rates have an influence on inflation.

#### **4.5 The relationship between interest rates to exchange rates**

Decreasing the amount of money in circulation then result in the increase of the currency, but lower levels of investment and consumption, so it can be said that interest rates have a negative relationship to the exchange rates (Jordaan, 2013). On the other hand, Hakkio (1986), Berument and Gumay (2003) states that an increase in interest rates could also have an impact on the

increase in exchange rates. The movement of interest rates will stimulate the attractiveness of the asset, so the demand for assets will increase and the demand for money will also increase (Hakkio, 1986).

## **5. Research Methods**

### **5.1 Types of Research**

The type of research used in this study is a quantitative study. Quantitative methods are based on numerical or quantitative information and is usually associated with statistical analysis (Jane Stocks, 2003).

### **5.2 Data Collection Techniques**

Data collection technique is the method to collect data needed to answer the research formulation (Noor, 2012). The data collected and used in this study is that the data is secondary to the method of documentation. Sources of inflation, interest rates and exchange rates data are from Bank Indonesia. And GDP data source is from Kementrian Perdagangan RI.

### **5.3 Methods of Data Analysis**

This study used the Partial Least Square (PLS) to test the hypothesis. The model used is the path analysis developed by Sewall Wright (1934) with the aim to explain the direct and indirect result of several independent variables on the dependent variable. This model is useful to determine the structural relationship between the independent variables and the dependent variable. Path analysis not only captures the independent variables and the dependent variable but also looks for the most significant relationship between these variables. Data were used from June 2005 until December 2013.

## **6. Results and Discussion**

### **6.1 Descriptive Analysis**

Based on data processing, then the maximum, minimum, mean, and standard deviation value are show in this table :

Variabel	Minimum	Maksimum	Mean	Standar Deviasi
<i>Economic Growth</i>	713.000	2.367.928,70	1.485.548,01	511.402,71
<i>Inflation</i>	2,59	17,79	7,45	3,95
<i>Interest Rate</i>	5,75	12,75	7,91	2,03
<i>Exchange Rate</i>	8.547,37	11.625,26	9.493,53	759,84

R-square value for GDP is 0.209. It means that interest rates, exchange rates and inflation variable can describe 20,9% of economic growth and the rest is explained by other variables related but not used in this study. At the exchange rate variable known value of R-Square of 0.162, which means that the percentage of variable interest rate and inflation in explaining the magnitude of the diversity of variable exchange rate amounted to 16.2% and the rest is explained by other variables related to the exchange rate but not used in the study this. And the last one on the variable inflation of 0.317 which means that the percentage of the interest rate variable in explaining the magnitude of the diversity variable is inflation of 31.7% and the rest is explained by other variables related to inflation but not used in this study.

From the R-square value generated on the structural model of the overall assessment of goodness of fit can be calculated by the value of  $Q^2$ . The value of  $Q^2$  has the same meaning as the coefficient of determination (R-Square) in the regression analysis, which means if the value of the higher  $Q^2$  then the model can be said to be more fit to the data.  $Q^2$  value calculation is as follows:

$$\begin{aligned} \text{Value of } Q^2 &= 1 - (1 - R12) \times (1 - R22) \times (1 - R32) \\ &= 1 - (1-.209) \times (1-.162) \times (1-.317) \\ &= 1 - (0.791) \times (0.838) \times (0.683) \\ &= 0.205 \end{aligned}$$

From the calculation, the result for  $Q^2$  is was 0.205. This means that the magnitude of the diversity of all the research data that can be explained by the structural model is 20.5%, while 79.5% is explained by other factors not used in the model. Based on these results, a structural model of the research can be said to have had the goodness of fit is good.

## 6.2 Hypothesis Testing

Hypothesis testing is acceptable if t-statistic more than 1,96 ( $\alpha = 5\%$ ) and is shown in this table :

Hipotesis	Pengaruh	Koefisien Path	t hitung	Keterangan
H <sub>1</sub>	<i>Inflation</i> □ GDP	0,040	0,848	Ditolak
H <sub>2</sub>	<i>Interest Rate</i> □ GDP	-0,457	9,076	Diterima
H <sub>3</sub>	<i>Exchange Rate</i> □ GDP	0,214	3,477	Diterima
H <sub>4</sub>	<i>Interest Rate</i> □ <i>Inflation</i>	0,563	15,370	Diterima
H <sub>5</sub>	<i>Interest Rate</i> □ <i>Exchange Rate</i>	-0,077	1,720	Ditolak
H <sub>6</sub>	<i>Inflation</i> □ <i>Exchange Rate</i>	0.440	15,174	Diterima

### **6.2.1 The effects of inflation on GDP**

The results of inner weight on the effect of inflation on GDP generate a path coefficient of 0.040 with a t-statistic of 0.848 which is smaller than the value of the constant 1.96. This indicates that there is no significant influence of inflation on GDP.

Inflation process will continue as long as the number of requests exceeds the number of bids (Kairani, 2013). Umaru and Zubairu (2012) states that inflation does not impact on GDP, but GDP was the one who gave the impact on inflation. Average - Average inflation in Indonesia was 7.45% which is included in the mild inflation or creeping inflation (Atmaja, 1999). Creeping inflation will not be a significant impact on the economy (Li, 2003). This can be explained by the Monetarist that reveals the quantity Theory of Money (QTM), which is  $MV = PY$ . In this theory, the money supply would only affect the price level of goods and services, where the money supply will determine exchange rates and inflation are formed. This indicates that changes in the money supply in the market will not affect the production of goods and services, only values are changing (Umaru and Zubairu, 2012).

### **6.2.2 Effects of Interest Rates on GDP**

The results on the effect of the inner weight between interest rates on GDP generate a path coefficient of -0.457 with a t-statistic of 9.076 which is greater than the value of determination of 1.96. This indicates that there is a significant negative effect between the interest rate of GDP or higher interest rates when the GDP will decline.

International Fisher Effect theory says that countries with a high interest rate will be followed by a high rate of inflation as well (Ersan, 2008). Additionally, inflation also results in increased poverty (Dyarini and Rachman, 2013). Makiv (1999) stated that high inflation will make the company's production costs tend to increase and decrease production capacities, so that the output of the product is also declining (Dyahrini and Rachman, 2013). When interest rates increase, then investment decreases, and vice versa. This is because the ratio of investment risk and the interest rate offered. If the interest rate decreases, then the investment will increase (Banerjee, 2009), While the amount of investment is a mirror for the company to produce a product. As investment increases, then the company can produce more products that subsequently led by state tax revenue also increased. Economic growth through increased production will be reflected in GDP. Increased production can be regarded as an increase in GDP (Rahmanta, 2012).

### **6.2.3 Effects of Exchange Rate on GDP**

The results on the effect of the inner weight between exchange rates against GDP generate a path coefficient of 0.214 with a t-statistic of 3.477 which is greater than the value of constant

1.96. This indicates that there is a significant positive effect on GDP between exchange rate, or exchange rates when GDP increases, also increases.

Economic growth is usually caused by high levels of investment and higher exports (Ito, Isard and Symasnsky, 1999). Laporan Kebijakan Moneter Bank Indonesia (2013) noted an increase in exports during the year 2013. USD as the currency of international transactions used in export activity will lead to increased conversion of foreign currency into national currency. While the value of the rupiah continued to depreciate, then the employer will utilize foreign exchange gain to increase profits and generate more output. As noted Ito, Isard and Symasnsky (1999) that investment can also have an impact on economic growth. Noted that foreign investment in Indonesia has increased. For example, foreign investment in Indonesia by the Americans in 2010 stood at US. \$ 0.93 billion, in the year 2011 amounted to US \$ 1.5 billion, in the year 2012 was US. \$ 1.2 billion, and in 2013 was US \$ 2.4 billion (Biro Koordinasi Penanaman Modal Indonesia). Increased exports and investment will stimulate the conversion of foreign currency transactions into the national currency. In this case, the holder of foreign currency would gain from foreign exchange due to the depreciation of the rupiah.

#### **6.2.4 Effects of Interest Rate on Inflation**

Results of inner weight on the interest rate effect on inflation generates a path coefficient of 0.563 with a t-statistic of 15.370 is greater than the value of determination of 1.96. This indicates that there is a significant positive effect between the interest rate to inflation or if the interest rate increases, inflation will show a decline.

Inflation can occur when the amount of money in circulation is much, compared to the amount of goods and services offered or when there is loss of confidence in the national currency, (Winardi, 1995). The loss of confidence in the national currency indicated by the rupiah depreciation against the USD (Bank Indonesia, 2013). High interest rate which will reduce the level of investment (Bernanke and Kuttner, 2003). This behavior will make the productivity decline that then impact on the output of goods and services. While inflation will increase if the supply of goods and services is greater than demand.

#### **6.2.5 Effects of Interest Rate on Exchange Rate**

The results on the effect of the inner weight between the interest rate on the exchange rate produces a path coefficient of -0077 with t count of 1,720 is less than the value of determination of 1.96. This suggests that there is a significant positive effect between the interest rate on the exchange rate or higher interest rate when the exchange rate is not necessarily going to come megalami change.



This is due to fluctuations in the exchange rate is often caused by non-economic factors that are difficult to measure (Atmaja, 2002). For example, political and security conditions of a country. Indonesia currently adopts a fully floating exchange rate / free (freely floating system). That is the position of the exchange rate against foreign currencies (especially USD) is determined by the mechanism and market forces (Wibowo and Amir, 2005). Thus, the determination of interest rates by the government no longer controlling the value of the largest in the formation of the exchange rate as before. In a freely floating system, the law of supply and demand will apply. Fluctuations in the exchange rate will depend on demand and supply conditions in the national currency of the foreign exchange market (Atmaja, 2002). Several economic factors that affect the exchange rate, among others (Atmaja, 2002), the difference in the level of inflation (the general price level) and Balance of International Payments.

#### **6.2.6 Effects of Exchange Rate on Inflation**

Results inner weight on the exchange rate effect on inflation generates a path coefficient of 0.440 with a t-statistic of 15.174 is greater than the value of determination of 1.96. This indicates that there is a significant positive influence on the exchange rate when the exchange rate of inflation or the higher the inflation will be higher as well.

The higher inflation rates in Indonesia, the rupiah exchange rates against other currencies will depreciate (Widiastuti, 2011). One reason is the rise in world oil prices in 2005, so that the national fuel also rose slowly and causing the rupiah against the U.S. dollar became weaker (Puspitaningrum, Zadak, and Zahroh 2014). Positive relationship between inflation and exchange rates can also be explained by the theory of Purchasing Power Parity (PPP). PPP theory explains that the exchange rates are established in a country depends on the ratio of the prices of goods and services a country (Bank of Canada Review, 2002).

When seen from the calculation above, interest rates have a positive correlation to inflation. Investors have their own behavior in response to changes in interest rates. High interest rate will reduce the level of investment (Bernanke and Kuttner, 2003). So that productivity and output also declined, remained in a state where the demand occurs and then the excess of demand. Excess of demand will have an impact on price increases and inflation because the amount of money in circulation is not balanced by the number of goods and services offered (Winardi, 1995). In the case of Indonesia, inflation has a positive effect on GDP. This is because Indonesia is able to cope with the excess of demand by importing from abroad. Increasing the level of imports can be seen from the data published by the Kementrian Perdagangan RI, where the number of imports in 2010 stood at 121,690.06, later in the year 2011 stood at 14786.31 and continued to increase until

the year 2012 to 15974.25. Increased imports into control over inflation rates in Indonesia, so that its value does not soar and Indonesia remained at the stage of mild inflation or creeping inflation. Creeping inflation usually occurs in developing countries and is in a period of development, thus attracting more investors who see business opportunities in the country. Investment will stimulate economic development of a country (Ito, Isard and Symasnsky, 1999), so that GDP will increase.

On the other hand, rising imports is not balanced by an increase in exports. Indonesia's total exports tend to decrease according to the Ministry of Trade. Recorded since the year 2011 the total exports amounted to 16958.05, and 15835.99 recorded in 2012, and continued to decline until in 2013 it stood at 15213.98. Increasing imports can cause payments deficit. Deficit balance of payments is a signal that there has been a flow of funds out, so the impact on excess demand for foreign currency in the national economy. So the value of the domestic currency weakens against foreign currencies (Atmaja, 2002). The weakening of the rupiah may lead to increased GDP due to the flow of foreign direct investment in Indonesia continues to increase. Seeing Indonesia as a business opportunity and is part of a developing country with a mild inflation. Foreign investment is likely to increase from the number of USD invested by America to Indonesia. Recorded in 2010 amounted to US \$ 0.93 billion, in 2011 amounted to US \$ 1.5 billion, in 2012 amounted to US \$ 1.2 billion, and in 2013 was US \$ 2.4 billion (Biro Koordinasi Penanaman Modal Indonesia). The value of investments such as foreign currencies are converted into the domestic currency then provide more benefits as a result of foreign exchange, so that production can continue and be improved in order to increase in GDP.

## **7. Conclusions and Recommendations**

### **7.1 Conclusion**

1. There is a significant positive relationship between inflation and interest rates to GDP.
2. There is no significant relationship between the exchange rate of the GDP and the interest rate on the exchange rates.
3. Inflation indirect influence and a good mediator to connect between the interest rates of the GDP.

### **7.2 Suggestion**

1. This study only uses interest rate, inflation, and exchange rate as a factor affecting GDP in Indonesia. Therefore, further research may add other factors such as, political conditions or non-economic factors also may affect GDP.

2. Samples and timescales can be extended in order to improve the accuracy of the research results.

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