IMPULSE RESPONSE FUNCTION ANALYSIS OF UNEMPLOYMENT RATE, INFLATION, POVERTY AND ECONOMIC GROWTH IN INDONESIA
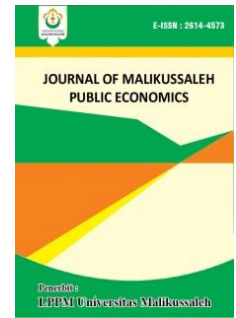
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A R T I C L E I N F O R M A T I O N   **A B S T R A C T**

The purpose of this study is to analyze how the shock or impulse response function of the variables of the unemployment rate, inflation and poverty rate on economic growth within the research period from 1998-2020. The method used is the Impulse Response Function (IRF) through the Vector Error Correction Model (VECM) approach. The results prove that the response given by the unemployment rate (UN) to economic growth due to shocks show a positive response up to the 8th period. The most influential variable on economic growth (PE) is the unemployment rate (UN). Therefore, it is suggestted for the government to provide adequate jobs (as needed) so as to reduce the relatively high unemployment rate and will have an impact on increasing poverty rates in Indonesia.

I. INTRODUCTION

The rate of economic growth in a country is one of main indicators in measuring success of economic development. In several developing countries, including Indonesia, high rate of economic growth is the main goal of country development. One way to realize such economic development is to develop the industrial sector, which is the leading sector, but is attainable by all levels of society. (Arifin, 2011).

The govenment of Indonesia has also established economic growth as one of the targets to be achieved. Several factors affecting economic growth include unemployment, inflation and poverty. Regarding employment indicators, the Central Statistics Agency (BPS) defines that unemployment is a population who does not work but is looking for work or is setting up a new business or people who are not looking for work because they are already working. Theoretically, if people are unemployed and without income, then it is impossible to fulfill their daily needs. If basic needs are not met, it will certainly lead to poverty (Windra, et al, 2016). Continuous increase in commodity prices definitely reslut in inflation Inflation can have both positive and negative effects depending on the severity of the inflation rate. Poverty is currently a major problem in Indonesia which makes poverty elevation an important goal of development in Indonesia. Poverty is a common problem in people's lives

The relationship among unemployment, inflation and poverty rates on economic growth in Indonesia is an interesting phenomenon to be studied as well as a benchmark for how the development of unemployment, inflation, poverty and economic growth from the monetary crisis to the present development period (1998 - 2020). The data on unemployment, inflation and poverty rates and economic growth in the time period (1998 – 2020) are presented in Table 1 below

The data talk us about unemployment, inflation and poverty rate that moves fluctuative and economic growth have the same conditions with the other variables of this study.

Table 1
Economic Growth, Unemployment Rate,
Inflation dan Poverty Rate from 1998-2020

Tahun	Pertumbuhan Ekonomi (%)	Tingkat Pengangguran (%)	Inflasi (%)	Tingkat Kemiskinan (%)
1998	-13,13	5,46	77,6	24,2
1999	0,79	6,36	2,01	23,43
2000	4,92	6,08	9,35	19,14
2001	3,64	8,1	12,55	18,41
2002	4,5	9,06	10,03	18,2
2003	4,78	9,5	5,06	17,42
2004	5,03	9,86	6,4	16,66
2005	5,69	10,26	17,11	15,97
2006	5,5	10,45	6,6	17,75
2007	6,35	9,75	6,59	16,58
2008	6,01	8,46	11,06	15,42
2009	4,63	8,14	2,78	14,15
2010	6,22	7,41	6,96	13,33
2011	6,17	6,8	3,79	12,49
2012	6,03	6,32	4,3	11,96
2013	5,56	5,88	8,38	11,37
2014	5,01	5,7	8,36	11,25
2015	4,7	5,81	3,35	11,22
2016	5,03	5,5	3,02	10,86
2017	5,07	5,33	3,61	10,64
2018	5,17	5,13	3,13	9,82
2019	5,02	5,23	2,72	9,41
2020	5,05	7,07	1,68	9,78

Source: Central Statistics Agency (BPS) (2020)
Table 1 shows that the unemployment rate tend to increase from 2003 to 2008. Based on Okun's theory (Okun's law), the number of unemployed in a country will be inversely proportional to the country's economic growth rate. But what about Indonesia? Why is the rate of economic growth increasing but the number of unemployed is also increasing concurrently? When close examinations towards the foundations of the Indonesian economy from year to year is presentes, it is evident that the foundation of the Indonesian economy may be considere unsteady. This can be seen from the high rates of inflation and poverty. The purpose of this study is to find out how the impulse response of the variables of unemployment, inflation and poverty toward economic growth.

2. THEORETICAL STUDY

Economic growth

Sukirno (2000) states that economic growth is an increase in GDP/GRDP regardless of whether the increase is higher or lower. According to (Amri, 2007), economic growth is a continuous process of improving the economic conditions of a country over a certain period of time. The economic growth of a country or region that continues to improve indicates that the economy of the country or region is developing well. However, economic growth unaccompanied by an increase in employment opportunities will result in unequal distribution of additional income (ceteris paribus), which in turn will result in economic growth with increasing poverty rates (Tambunan, 2009).

Indonesia as a developing country has struggled with the issue of employment. The high unemployment rate is a factor that hinders the developing process in this country (Indra Dewa dan Natha, 2015). This should be overcome in order to avoid serious social and political problems in the future such as rise in crime and disruption country's political stability.

Unemployment

Unemployed are those who integrate themselves into the workforce and are employable, are actively looking for work in certain locations and earn a certain salary, however, fail to obtain the desired jobs (Permana, 2012). Meanwhile, according to Sukirno (2006) unemployment is the inability of the workforce to obtain jobs that they need or want accordingly.

The problem of unemployment is indeed very complex because it can be related to several influential economic indicators such as economic growth and inflation rates. When a country's economic growth increases, it is expected that it will have an effect on decreasing the number of unemployed. Meanwhile, a high inflation rate will affect the increase in the number of unemployed which will ultimately affect economic growth (Alin, 2019).

According to Mankiw (2007) Okun's Law is a negative relationship between unemployment and Gross Domestic Product (GDP). Okun's Law claims that the factors determine the short-run business cycle are very different from the factors that shape the long-term growth of the economy. Okun's law is a negative relationship between unemployment and real GDP, which refers to a decrease in unemployment of 1 percent associated with an additional growth in real GDP of close to 2 percent. This suggests that a country's high/low unemployment rate may be related to that country's GDP growth.

Inflation

Inflation is a symptom of a continuous increase in the general price level. Inflation occurences are generally due to an increase in production costs such as fuel or an increase in worker wages which give rise in production costs which in turn will encourage producers to increase the price of goods sold in the market. If this process lasts for quite some time, it will result in high inflation. Inflation can also be caused by an increase in the quantity demanded, such as during Eid al-Fitr or other holidays when price for most goods is in rise due to increased demand.

According to Parkin and Bede (2004) inflation is an upward shift of rising prices which is basically related to the price. This can also be called the amount of money to purchase the item.

Poverty

Poverty is a condition where a person or group of people is unable to exercise their basic rights to maintain and develop a decent life (Bappenas, 2000). According to (Bapeda, 2011) it is said that poverty is a condition and the inability of a person to fulfill the minimum basic abilities to live with dignity.

3. RESEARCH METHODS

This study uses secondary data which is time series data for a period of 23 years, namely 1998 to 2020. The data used and collected are taken from the Central Statistics Agency (BPS).

4. IMPULSE RESPONSE FUNCTIONS ANALYSIS

The impulse response function (IRF) is used to describe the dynamic motion of a variable due to shocks to other variables during a certain period of time. This is done to see the duration of the shock effect of one variable on another variable until the influence disappears and reaches balance. IRF is applied to observe the contemporary effect of a dependent variable if it gets a shock or innovation from the independent variable by one standard deviation. In addition, IRF can measure the relative strength of various impacts and track the spread and direction of impacts. The first function of this impulse response is to determine the effect of a variable on certain variables in the event of a shock or shock of a variable. The second function is to determine the magnitude of the shock value for the existing variables.

In analyzing impulse response functions (IRF), the authors use several tests, namely:

1. Stationary Test

A unit root test is performed to determine whether a variable is stationary.

2. Optimal Lag Test

Optimal lag check is used to determine the lag length that will be used in the next analysis and will determine parameter estimates for the VECM model (Widarjono, 2017).

3. Cointegration Test

Cointegration test can be interpreted as a long-term equilibrium relationship between variables (Irfan & Wulan, 2014).

4. Vector Error Correction Model (VECM) Method

The Vector Error Correction Model (VECM) method used in this paper aims to see whether unemployment, inflation and poverty will affect economic growth in the long term. The modeling used in this study is VECM, namely

$$\Delta PE_t = \beta_0 + \beta_1 UN_{t-1} + \beta_2 I_{t-1} + \beta_3 P_{t-1} + \varepsilon_t$$

Description:

PE = Economic Growth
UN = Unemployment
I = Inflation
P = Poverty

5. Impulse Response Function (IRF) Analysis Method

Impulse Response Function (IRF) aims to isolate a shock to be more specific, which means that a variable can be affected by a shock or a particular shock (Irfan & Wulan, 2014).

The impulse response function (IRF) is used to describe the dynamic movement of a variable due to shocks to other variables over a certain period of time.

The description is significant in order to perceive the duration of the shock effect of one variable on another variable until the influence disappears and reaches balance. IRF is used to see the contemporary effect of a dependent variable if it gets a shock or innovation from the independent variable by one standard deviation. Additionallly, IRF can measure the relative strength of various impacts and track the pattern and direction of propagation of impacts. The function of this impulse response is mainly to determine the effect of a variable on certain variables when a variable experiences a shock. The second function is to determine the magnitude of the shock value for the existing variables.

5. RESULTS AND DISCUSSION

From the results of research conducted on several independent variables, namely the Unemployment Rate (UN), Inflation (I) and Poverty Level (P), the following results are obtained:

Stationary Test

Tabel 2
Phillips-Perron Fisher Unit Root Test First Different

Variabel	Prob
Pertumbuhan Ekonomi	0,0000
Tingkat Pengangguran	0,0186
Inflasi	0,0000
Tingkat Kemiskinan	0,0028

Source: data processing results,2021

Based on table 2, then all variables of stationary are on first difference level (I(1)). This can be seen from probability for all variables are below or lower than 0.05.

Optimal Lag Test

In determining the optimal lag, values from Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), and Hannan-Quin Criterion (HQ) are used. The optimal lag length that will be selected in this study is in accordance with the criteria mentioned above

Tabel 3
Lag Optimal Test

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-159,0498	NA	65,19159	15,52855	15,72751	15,57173
1	-85,51862	112,0475*	0.282283	10,04939	11,04418*	10,26529
2	-65,96881	22,34265	0.245710*	9,711315*	11,50193	10,09992*

Source : data processing results, 2021

From table 3, the optimum lag value is found in lag 2. If accumulated, the maximum number of stars lies in lag 2. The purpose of the optimum lag is that all research variables influence each other until the previous period. It means that the variable of unemployment rate, inflation and poverty rate affect the variable of economic growth.

Cointegration Test

From the results of the cointegration test carried out, it is obtained:

Table 4
Cointegration Test

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.940593	56.46679	27.58434	0.0000
At most 1 *	0.842197	36.92813	21.13162	0.0002
At most 2 *	0.669678	22.15374	14.26460	0.0023
At most 3 *	0.328100	7.952924	3.841466	0.0048

Source : data processing results, 2021

Based on table 4, all research variables are cointegrated, meaning that there is a long-term relationship between the research variables. This can be seen from the Trace Statistics value of all variables greater than the Critical Value. Likewise, the Max Eigen Statistic value is greater than its Critical Value. Based on table 4, it can also be concluded that the model used is VECM in determining the impulse response of the research variables.

VECM Estimate

Table 5
Long-Term VECM Estimation

Variabel	Koefesien	t-statistik	t-tabel
Tingkat Pengangguran(-1)	0,61781	7,49713	
Inflasi (-1)	0,104153	3,74292	2,0930241
Tingkat Kemiskinan (-1)	-0,730002	-10,8303	

Source : data processing results, 2021

From table 5 it can be explained that in the long term all research variables have a significant effect. The variables of unemployment rate, inflation and poverty rate have coefficient values of 0.61781 , 0.104153 and -0.730002, respectively. This means that when there is a change in the unemployment rate, inflation and poverty rate in the first lag of 1%, it will cause a change in PE in the long term.

Table 6
Short-Term VECM Estimation

Variabel	Koefesien	t-Statistik	t-Tabel
CointEq1	-0.150480	-0.82084	
D(UN(-1))	0.978824	3,56342	
D(UN(-2))	-0.886637	-2,17406	
D(I(-1))	-0.075125	-2,16356	2,0930241
D(I(-2))	0.008265	0.29352	
D(P(-1))	-0.065842	-0.31876	
D(P(-2))	0.106130	0.52336	

Source : data processing results, 2021

The estimation of the short-term, VECM model shows that the unemployment rate (UN) has a significant effect on economic growth (PE) in the first and second lags. This indicates that a one percent change in the unemployment rate (UN) variable in the first and second period will affect economic growth (PE) in the current period. While I (Inflation) has a significant effect on economic growth (PE) in the first lag. It means a one percent change in the inflation variable (I) in the previous first lag will cause economic growth (PE) to change in the current period. While the poverty level variable (P) does not affect economic growth (PE) either in the first lag or in the second lag.

Impulse Response

Table 7
Impulse Response

Response of PE:

Perio…	PE	UN	I	P
1	0.368061	0.000000	0.000000	0.000000
2	0.308016	0.485048	-0.392852	0.007912
3	0.122928	0.454680	-0.133082	-0.104833
4	0.118327	0.729260	0.059538	-0.227836
5	-0.004339	0.681280	-0.129222	-0.228252
6	0.044426	0.620127	-0.006554	-0.264405
7	0.124411	0.401090	-0.167454	-0.177424
8	0.200499	0.179514	-0.292298	-0.086139
9	0.326232	-0.129770	-0.412714	0.042730
10	0.445293	-0.319940	-0.531566	0.165721

Source : data processing results, 2021

Based on table 7 the response given by the unemployment rate (UN) to economic growth due to shocks shows a positive response up to the 8th period. The existence of a shock on the inflation variable (I) will cause a negative response to

economic growth (PE) starting in the 2nd period until the end of the 10th period. While the poverty rate (P) indicates a positive response in the 1st and 2nd periods, but in the 3rd to 8th period the poverty level (P) gives a positive response to economic growth.

Variance Decomposition
Table 8
Variance Decomposition

| Variance Decomposition of PE: | | | | |
Perio…	S.E.	PE	UN	I	P
1	0.368061	100.0000	0.000000	0.000000	0.000000
2	0.787407	37.15143	37.94646	24.89201	0.010097
3	0.933036	28.19507	50.77281	19.76251	1.269606
4	1.213191	17.62804	66.16424	11.92993	4.277783
5	1.415906	12.94270	71.72666	9.591363	5.739280
6	1.568845	10.62245	74.04809	7.814231	7.515228
7	1.642299	10.26736	73.53699	8.170512	8.025138
8	1.691871	11.07890	70.41659	10.68354	7.820966
9	1.777035	13.41269	64.36221	15.07800	7.147111
10	1.941270	16.50084	56.64883	20.13262	6.717714

Source: data processing results, 2021

Analysis of variance decomposition is focused on seeing the effect of the UN, I and P variables on the independent variable, namely PE.

In the first period, it is influenced by the PE itself variable by 100 percent. Although in the observation period the contribution of variance fluctuates, the PE variable is dominant in influencing economic growth itself. The independent variables UN, I, and P do not seem to have effect on the dependent variable PE in the first period with a value of 0%.

Analysis of Variance Decomposition from Table 8 shows that the variable predicted to have the greatest contribution to economic growth (PE) in the next ten years is the unemployment rate (UN) with an average contribution per year of 56.56%, followed by the contribution of inflation. (I) of 12.81% and the poverty rate (P) of 4.85%. The UN's contribution to PE increase from the first year to the tenth year. During the first five years, the contribution of inflation (I) will decrease, but the contribution of inflation (I) will increase in the following year up to the tenth year. Meanwhile, the variable poverty rate (P) gives a fluctuating contribution to economic growth (PE). The highest contribution of the poverty level variable (P) occurr in the sixth year and the lowest contribution even almost no contribution of the poverty level (P) to economic growth (PE) occurr in the second year.

Conclusion
Cointegration test results through the Johansen Co-Integration test show that the four variables are cointegrated.

In the long term, all research variables have a significant effect. The variables of unemployment rate (UN), inflation (I) and poverty rate (P) have coefficient values of 0.61781, 0.104153 and -0.730002, respectively. This means that when there is a change in the variable unemployment rate (UN), inflation (I) and poverty rate (P) in the first lag of 1%, it will cause changes in the variable economic growth (PE) in the long term.

IRF and FEVD analysis shows that the most influential variable on economic growth (PE) is the unemployment rate (UN) with an average contribution per year of 56.56%.

Suggestions
The Indonesian government must provide aids and find solutions to reduce the relatively high unemployment rate which then will have an impact on increasing poverty rates. It is suggested that the governement provide competitive employment opportunities abroad and limiting foreign workers to work in Indonesia. The government must also be more active in carrying out family planning programs in order to control population so that the unemployment rate can be reduced which in turn can boost economic growth in the long term.

The government is also expected to be able to control the amount of money in circulation so that it can be balanced with the level of community needs so that inflation can be maintained at a mild inflation level so that it can have a positive impact on economic growth.

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