

Evaluating the Economy Growth by Supply Chain Strategies and Testing the Validity of Okun's Laws in Indonesia

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Abstract- With globalization and integration of the world economy, the concept of extended enterprise has taken root, leading to an increasingly important role played by the entire supply chain management, including procurement, logistics and distribution for ensuring a consistently high degree of customer satisfaction in terms of quality, delivery and cost. Unemployment is one of the main problems in developing countries, including Indonesia. This study aims to evidence the state pattern of the relationship between unemployment, supply chain strategy, and economic growth by investigating the accuracy of the Okun's Law and the Phillips' Curve in Indonesia. Time series data are sourced from the World Bank. As an addition to the independent variable, the dependency ratio is acknowledged to investigate unemployment based on the premise that a high dependency ratio will reduce the unemployment rate. The analysis model used in this study is the Error Correction Model (ECM). The results of this study are inflation rates, economic growth, and dependency ratios attained to be positively related to unemployment, and it illustrates that the Okun' Law and Phillips' Curve are not accurate to be applied in Indonesia.

Keywords- Supply chain strategy, Unemployment, Inflation Rate, Economic Growth, Dependency Ratio, Okun Law, and Phillips Curve.

1. Introduction

The success of a country's economic performance based on the supply chain strategy can be observed from the output, unemployment rate, and inflation. Those three macro variables are interrelated if the real output produced by a country exceeds the potential output that will trigger inflation. It means that there has been (in the process) more than usual use of labor used to urge the output beyond its potential output. The negative relationship between the real output gap and the potential output to unemployment Quality by Okun law [1]. This Okun law phenomenon also occurs in several countries with various conditions, in Australia [2], in 13 developed countries, in European Union countries [3], in Spain [4], and in Nigeria [5]. Economic growth and unemployment condition that reflected in Okun law are also noticed in the case in Indonesia. The relationship between economic growth

and changes in unemployment, as stated by Okun, law, occurs in Indonesia [6]. However, the results of [7] tended to indicate that economic growth in Indonesia is not a quality economic growth. Quality economic growth is economic growth that can improve people's welfare and absorb the workforce.

The problem of unemployment is highly complicated to be discussed and is an important issue because it can be associated with several indicators. The economic indicators that influence the unemployment rate include economic growth in the concerned country, inflation rates, and the number of wages in force. If in the economic growth of a country has increased, it is expected to influence on reducing the number of unemployed. If the wage level rises, it will also affect the number of unemployed people. While a high inflation rate will affect the increase in the number of unemployed [8].

Referring to the Philips' curve approach, [9] confirmed that there is a negative but not significant relationship between inflation and unemployment in Indonesia in 1986-2016. It happened because inflation in Indonesia is not caused by the increase in the amount of aggregate demand (demand-pull inflation) which will ultimately reduce the unemployment rate, but the increase in inflation in Indonesia is generally caused by rising production costs such as fuel prices, electricity tariffs or fees other production (cost-push inflation).

The Okun Law states that each reduction in unemployment is one percent so that real GDP will rise 2, 5 percent. Thus, policymakers must consider the losses from unemployment and problems that arise when the inflation rate is high. Policymakers must decide how much unemployment can be received and how much inflation can be tolerated to achieve internal balance [10]. For the case in Indonesia, [11] explained that the source of an important variation in unemployment was the shock of unemployment itself, while the shock associated with inflation and economic growth was relatively small. In[12] has detected a long-term and negative causal relationship between inflation and the unemployment rate (case in the Philippines). It reveals that there is empirical evidence that unemployment is the cause of the unemployment-inflation relationship.

This study will elucidate the relationship between variables unemployment, inflation, and economic growth in Indonesia. Furthermore, this study will

introduce the dependency ratio as an explanatory variable based on the premise that a high dependency ratio will occur to reduce unemployment [13].

If the number of unemployed decreased, then more people work, the economic growth will increase. However, if unemployment increases, economic growth will decrease. Increasing economic growth means the production of goods and services produced increases [14]. Therefore, between economic growth and unemployment have a close relationship, the higher the economic growth, the unemployment rate will be relatively lower [15]. The economic growth will help reducing high unemployment rates [16].

Unemployment is one of the main problems that occurs not only in less developed and developing countries but in developed countries as well. It explains the level of poverty that a household must support. This study pursues to determine the relationship between unemployment and inflation and economic growth. The unemployment and inflation relationship will be explained by the Phillips curve, while the Unemployment and Economic Growth relationship will use the Okun Law. By focusing more on the Okun Law, because the Phillips Curve has often been used in Indonesian case studies.

2. Method

2.1 The Unemployment

The more obvious determinant factor of a country's standard of living is the amount of unemployment it has. People who desire to work but cannot get a job do not contribute to the production of goods and services in the economy. If a country tries to keep its workers from as much unemployment as possible, the level of GDP will be higher than if the country left some of its workers unemployed.

According to [17], the relationship between the unemployment rate and output growth is negative. In [18] argued that the relationship between inflation and unemployment is unidirectional. According to [19] Okun Law proved to be invalid in the Indonesian economy, because it was different from the original coefficient.

2.2 The Inflation Rate

Inflation is an increase in the price level that occurs continuously that affects individuals, entrepreneurs, and government. Inflation is generally regarded as an important problem that must be resolved immediately and often becomes the main agenda of politics and policymaking.

According to [20], inflation is a process of increasing prices in force in an economy while the inflation rate is the percentage increase in the prices of goods in a certain period.

2.3 Supply chain and Economic Growth

One of the measures commonly used for output is the Gross Domestic Product (GDP). GDP can be seen as the total economy of each person in the economy or as total expenditure on the output of economic goods and services [21]. It can be said that if a country's economic growth increases, it will increase the production of goods and services, with an increase in

the production of new goods and services will increase the need for human resources. Moreover, if the opposite happens, then the decline in economic growth will cause an increase in unemployment.

2.4 The Dependency Ratio

The dependency ratio is the ratio between the population aged 0-14 years, added by the total population of 65 years and over (both referred to as not the labor force) compared to the number of population aged 15-64 years (labor force). (Statistical Reference Information System, Statistics Indonesia)

The dependency ratio can be applied as an indicator that can roughly indicate the economic condition of a country, whether it is classified as a developed country or a developing country. The dependency ratio is one of the essential demographic indicators. The higher percentage of the dependency ratio shows the higher burden that must be borne by the productive population to finance the lives of the population that is not yet productive and no longer productive.

2.5 Okun's Law

Okun stated that for every 2 percent of the decline GNP from its potential GNP, the unemployment rate jumped by 1 percent. So if the GNP was at first 100 percent of the potential and then to 98 percent, the unemployment rate jumped from 6 to 7 percent. Then In [21] stated that the percentage change in real GDP is equal to 3 percent less than two times the change in the unemployment rate. If the unemployment rate remains the same, real GDP grows by about 3 percent; this normal growth refers to population growth, capital accumulation, and technological progress.

In [22] stated that if the GNP grows by 2, 5 percent above the trend that has been achieved in a given year, the rate of decline will decrease by 1 percent. The above statement is better known as Okun's law, although it is too naive to say the law because it does not have a specific basis to become a law. However, the statement is sufficient to provide information or empirical evidence. Based on the results of the study, there is a negative relationship between the rate of economic growth and the unemployment rate.

Research conducted by [23], the data that used was a time series with the OLS (Ordinary Least Square) method as the data analysis method. The study concluded that Okun's law proved invalid in the Indonesian economy because it was different from the original coefficient of Okun's law.

In [24] elucidated that inflation has a positive and not significant effect on educated unemployment in the province of Central Java, Indonesia. Similar conditions were also expressed by [24], where an increase in inflation would increase the number of educated unemployed. However, in contrast to the findings of [3], who argued for the case in Sulawesi, Indonesia applies Philips' law that is inflation does not have a significant effect on the unemployment rate and had a negative value. It shows that inflation and unemployment conditions are different between regions in Indonesia.

[4] utilized the gap equation and HP filter technique. It was found empirical evidence that there was a negative

and significant relationship between GDP and unemployment in the short-term which reinforces the Okun's law. For the long-term, the Cointegration Test and ECM were used to demonstrate that GDP and unemployment are co-integrated with each other in the long run.

In [8] used OLS and found that the unemployment rate was negatively related to inflation and economic growth, it confirmed the enactment of the Okun's law and Phillips curve in the Philippines in the 1980-2009 period and found that the dependency ratio was negatively related to unemployment although it was not significant.

3. Research methods

3.1 Data analysis method

The method used in this study was the Error Correction Model (ECM), as used by [9]. ECM assumed the existence of a long-term equilibrium relationship between two or more economic variables. In the short term, however, what happens is disequilibrium. With the error correction mechanism, a proportion of disequilibrium in one period is corrected in the next period. The adjustment process becomes a tool to reconcile short-term and long-term behavior. Based on this concept, long-term relationships can be estimated through short-term relationships.

The estimation model that will be used is as follows:

Long-term:

$$UE_t = \beta_0 + \beta_1 INF_t + \beta_2 GROWTH_t + \beta_3 DR_t + \epsilon_t \quad (1)$$

Where:

UE	= Unemployment Rate
B0	= Constant
$\beta_1 \beta_2 \beta_3$	= Long-term Regression Coefficient
INF	= Inflation Rate
GROWTH	= Economic Growth Rate
DR	= Dependency Ratio
ϵ_t	= Error Term

The ECM model used in this study was the Domowitz-Elbadawy ECM model, which did not require the stationarity of its variables. The Domowitz-Elbadawy ECM model in this study is as follows:

$$\Delta UE_t = \gamma_0 + \gamma_1 \Delta INF_t + \gamma_2 \Delta GROWTH_t + \gamma_3 \Delta DR_t + \gamma_4 INF(t-1) + \gamma_5 GROWTH(t-1) + \gamma_6 DR(t-1) + \gamma_7 ECT_{t-1} \quad (2)$$

where:

$$\gamma_0 = \lambda \beta_0$$

Short-term Coefficient:

$$\gamma_1; \gamma_2; \gamma_3$$

Long-term Coefficient:

$$\gamma_4 = -\lambda(1 - \beta_1)$$

$$\gamma_5 = -\lambda(1 - \beta_2)$$

$$\gamma_6 = -\lambda(1 - \beta_3)$$

Adjustment coefficient:

$\gamma_7 = \lambda$, is ECT Coefficient (Error Correction Term) (in the equation)

$$ECT_{t-1} = INF_{t-1} + GROWTH_{t-1} + DR_{t-1} - UE_{t-1}$$

3.2 Data and Data Sources

Based on the approach, this research used a quantitative approach. The data used as material to support research was the secondary data, which included Unemployment Rate data as the dependent variable and Inflation Rate, Economic Growth Rate, and Dependency Ratio as independent variables. This research took place in Indonesia. In this study, the data sources were obtained from the World Bank, the Central Bureau Statistics, Bank Indonesia, and the Centre for Data and Information of the Manpower Office.

4. Results

From the ECM regression results (see appendix), it appears that the coefficient value of the ECT variable is 0.24, and significant is observed from the probability value of 0.02. That is, the estimated model is the ECM model.

4.1 Classic Assumption Violation Detection

Based on the results of the detection of classical assumption violations with various tests, it was found that the model is free from classical assumption violations, except for multicollinearity. That is because there are the same independent variables in the Domowitz-Elbadawy ECM model, even though the transformation is different. However, these multicollinearity symptoms do not interfere with the overall model. The results of the classic Assumption violation detection results are shown in Table 1.

Table 1: Classic Assumption Violation Detection Results

Classic Assumption	Test	Stat	Prob	Conclusion
Residual normal distribution	Jarque-Bera	JB = 1.62	0.45	Residuals are normally distributed
Autocorrelation	Breusch-Godfrey	Chi2 = 3.67	0.3	Autocorrelation symptoms are not detected
Heteroscedasticity	White	Chi2 = 3.96	0.79	Symptoms of Heteroscedasticity symptoms are not detected
Linearity	Ramsey	F = 2.68	0.12	Linear Model
Multicollinearities	VIF	D(INFYOY) = 17.51 D(GROWTH) = 15.86 D(DEPRAT) = 12.93 INFYOY(-1) = 39.34 GROWTH(-1) = 13.26 DEPRAT(-1) = 38.81 ECT = 91.46	-	Multicollinearities are detected

4.2 Model Goodness Test

The F-statistic F-test probability value is 0.067 (less than 0.1). Thus, the hypothesis which stated that the model does not exist is rejected. Meanwhile, the R2 value of 0.395 shows that 39.5% of changes in the open unemployment rate are caused by changes in economic growth, inflation, and dependency ratios, while other variables outside the model explain the remaining 60.5%.

4.3 Test Validity of Influence

Based on the results of the partial significance test (t-test), it was attained that the variables that significantly affected the open unemployment rate were inflation and dependency ratio, while economic growth did not present any influence. The results of the partial significance tests are shown in Table 2

Table 2 Test Results t

Variable	Coef.	Std. error	Prob	Evidence
D(INFYOY)	0.08	0.04	0.055	Significant on α 10%
D(GROWTH)	0.13	0.11	0.276	Not significant
D(DEPRAT)	2.32	0.89	0.016	Significant on α 5%

5. Discussion

Effect of supply chain on Unemployment Rate

Based on the results of the study above, it can be concluded that the inflation rate variables in the short and long-term have a positive influence on the level of open unemployment.

This result is in accordance with research conducted by [12], which stated that inflation has a positive relationship to unemployment for cases in Nigeria.

In [21] explained that rising world oil prices cause an increase in inflation so that raw materials rise and the company's operating costs also increase. It will make the company reduce operational costs, one of which is by reducing employees. If inflation is not immediately addressed, it will increase the amount of Unemployment in Indonesia.

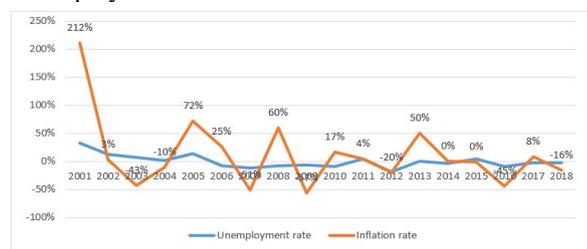


Figure 1: Inflation Growth and Unemployment Rate in Indonesia

Based on Figure 1, it can be ensured that the inflation rate in Indonesia over the past 18 years has tended to decline. However, there are fluctuations in the middle of the period, so the price level does not always decrease. Based on demand theory, an increase in the price of goods will reduce the purchasing power of consumers so that consumers will reduce the number of goods purchased. Thus, producers tend not to increase

their production so they will not absorb much labor, and this can trigger unemployment.

Therefore, A.W. Phillip's analysis through a curve known as the Phillips Curve does not match the conditions of inflation and unemployment in Indonesia. For this reason, it is not appropriate if changes in the number of unemployed people in Indonesia are negatively related to inflation.

The problem of unemployment is not trivial. If the problem is ignored, there will be more poor people in Indonesia. For this reason, the government is expected to be able to concentrate more on finding ways to stabilize the inflation rate in Indonesia.

The Economic Growth Rate of the Unemployment Rate

Based on the results of the study above, it can be concluded that the variable of economic growth in the short and long term does not influence the unemployment rate.

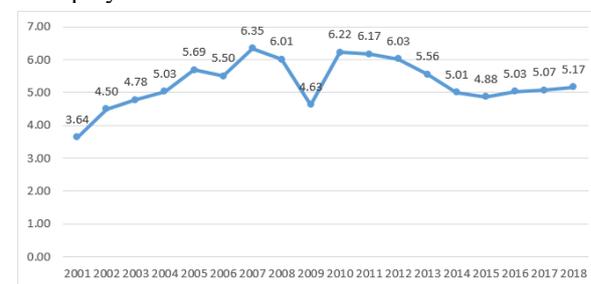


Figure 2: Indonesia's GDP Growth 2001-2018

Based on Table 2, it emerges that Indonesia's GDP has continued to increase since 2010, but its growth has tended to decline. The declining GDP growth indicates an inconsistent increase in production capacity so that employment opportunities do not always occur. However, GDP growth that is never negative indicates that there is always an increase in the value of goods and services so that it can also be said that employment opportunities also increase.

This result is not in accordance with the study conducted by [7], which stated that economic growth partially has a positive effect on unemployment. It is likely to occur because Indonesia tends to be capital intensive, which is the use of higher capital and the use of more modern technology rather than using human resources. Capital intensive occurs because the expertise and education of the workforce are still low, while companies want to maximize profits and achieve production efficiency.

Research by [21] revealed that there is a positive influence between economic growth and unemployment. It is because even though economic growth continues to increase, but unemployment will not experience a significant decline, it can also be associated with an increase in the workforce driven by population growth. The increase in the labor force was not accompanied by the opening of employment opportunities so that there was a surge in the labor force.

This result is different from Okun's Law theory, which is a negative relationship between unemployment and

economic growth, where every two percent increase in economic growth will reduce one percent unemployment. Then it can be concluded that the legal theory cannot be applied in Indonesia.

The government and related parties are expected to be able to increase economic growth and create quality economic growth. That is, economic growth is not only high but can also create a real sector to develop to create jobs and improve community welfare.

Dependency Ratio to Unemployment Rate

Based on the results of the study, it can be concluded that the dependency ratio variables in the short-term and long-term have a positive effect on the unemployment rate. This result is in accordance with research from [19] dependency ratio that was noticed to be positively related to unemployment, although only significant in the short-term. It is possible for an additional increase in population that exceeds the workforce to be eligible for further case studies. It will influence in making policies regarding labor and population.

The dependency ratio has dropped from year to year, and it is because the current workforce is the success of the Family Planning (KB) program, which began on the road in 1970. In terms of improving the quality of the workforce can be supported by various things, such as educational investment to improve the competence and expertise of the population, thereby increasing the competitiveness of the economy. Investment in health is also very essential, aspects of food sufficiency, nutrition, and nutrition intake, as well as population access to health services, must be the focus of government attention.

Furthermore, the positive relationship of the dependency to unemployment ratio should be a warning to the government to make fiscal policy and monetary policy more urgent and drastic to deal with this problem.

6. Conclusion

Unemployment is an important issue for a country because it involves employment and welfare opportunities. The supply chain can improve the economy and in the next stage the employment. This research discusses the effect of inflation, economic growth, and the ratio of dependencies on the unemployment rate, and the model used is ECM. ECM regression results indicate that inflation has a positive effect on the unemployment rate, the dependency ratio brings a negative effect on unemployment, and economic growth does not affect unemployment. It proves that the Okun's Law and Phillips' Curve do not apply in Indonesia.

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