

# THE EFFECT OF INFLATION ON UNEMPLOYMENT IN EMERGING COUNTRIES' ECONOMY:

## An Empirical investigation of Phillips Curve in Tanzania

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### Abstract

*The main objective of the study was to investigate the prevalence of Phillip curve in Tanzania. The study was guided by three specific objectives. One was to investigate the short-run relationship between inflation and unemployment in Tanzania, second was to examine the long-run relationship between inflation and unemployment in Tanzania and lastly was examine the casual relationship between inflation and unemployment in Tanzania. The data for the study variables were collected from World Bank Development Indicators (WDI), National Bureau of Statistics (NBS) and United Nations Organization (UN) database for the sample period of 32 years from 1990 to 2021. The researcher employed several econometric techniques for the aim of achieving the objectives enumerated in the study. The coefficient of long-run dynamics was estimated and the findings indicated that, there is a long-run negative and significant relationship between public investment and unemployment rate in Tanzania, in such a way that, any unit increase in public investment would result to 0.863979 decline in unemployment rate, holding other factors constant. On the other hand, real GDP has a negative and significant long-run relationship with unemployment rate in way that any unit increase real GDP would leads to 2.295303 decrease in unemployment rate holding other factors constant. Correspondingly to that, the researcher has found the positive and significant long-run relationship between inflation and unemployment in Tanzania, in a way that, any unit increase in inflation rate would result to 0.310900 increase in unemployment rate in the long-run, holding other factors constant. The coefficient is statistically significant at 5% level. The researcher did not find the existence of short-run relationship between the variables and the result of ranger causality indicated that, inflation does not granger causes unemployment in Tanzania. The researcher concluded that, the government of Tanzania through BOT should make appropriate control of the level of inflation rate in the country since it may result to increase in unemployment rate.*

**Keywords: Inflation, Unemployment, Real GDP and Public investment.**

## Introduction

Over the years, Inflation and unemployment have been some of the most related and discussed concepts in economics, catching the attention as well as affecting the welfare of the majority of individuals, organizations, and governments in the world. Inflation is considered to be a persistent increase in the general price levels of goods and services in an economy. Inflation tends to lower the value of currency of the country and hence the purchasing power of money, in such a way that, an increase in the rate of a country's inflation causes its currency to lose its ability to purchase more goods and services respectively (Jones, 2009). On the other hand, Unemployment is considered to be a condition whereby people who are able and willing to work lack jobs to do, and for several years the proportion of a country's labour force employed has been seen as an indicator on how well a country's human resources are used.

Unemployment is normally measured using 'unemployment rate' which is basically a ratio of the total number of people who are unemployed to the total labor force of the country at a particular time period, expressed in percentage (Focus Economics, 2020). Inflation rate is an important determinant of unemployment rate in most of the world economies nowadays. For instance, according to (Endearment of Economic and Social Affairs, 2020) there has been a remarkable existence of steep disinflation, that is to say, a slowdown in price rise since the onset of COVID-19. However, due to the fact that, inflation rates are diverging among countries, it has also been noted that, in the majority of countries, the price level has been increasing dramatically since the onset of COVID-19, the crisis which has led to a rapid deterioration in the global quality and quantity of employment, mainly as a result of disruptions in the production, initially in Asian countries, and as observed currently the problem has spread rapidly to the rest of the world (ILO, 2020).

Despite the fact, in the last quarter of 2020, there has been a promising gradual decline in the global unemployment rate, but the fact is that, such decline has been mainly contributed by developed countries but in most of world economies still unemployment is a huge problem. Due to the fact that, an increase in the supply of currency or credit relative to the availability of goods and services, leads to higher prices of such goods and services and decrease in purchasing power of such currencies, the governments of various African countries have been trying so hard to formulate different policies and strategies to control money supply in their economies and hence inflation rates respectively, even though in most cases such efforts have been observed to be in vain or unsuccessful due to various factors or challenges.

Currently' the African countries with the highest rates of inflation (3-digit inflation rates) are Zimbabwe and Sudan while an African country with the least inflation rate being Eritrea (negative rate of inflation). For example, "due to the devaluation of the currency in Nigeria in 1973, inflation rose to 15.4% and the prices of imported goods increased and the unemployment rate was 4.3% in 1977. The inflation figure in 1983 was about 23.2% but rose to 39% in 1984 and to 40.9% in 1989. It became worse in 1993, 1994 and 1995 when inflation rate rose to 57.2%, 57.0%, and 72.8% respectively" (Adebowale, 2015). Numerous studies have been conducted by scholars from different parts of the world to study the relationship between inflation and unemployment rates among East African countries. Most of these studies have been in line with the theory behind

Phillips Curve by Williams Phillips whom observed an existence of an inverse and stable relationship between Inflation and unemployment. For instance, according to (Adebowale, 2015) who studied the Effect of Inflation on Unemployment In Kenya, as one of the East African countries recommended that, the governments of East African countries should come up with policies to ensure minimum inflation rates as possible in their economies so as to achieve the lowest possible levels of unemployment as possible.

For a period of five years starting in 2015 the inflation rate in Tanzania has been declining dramatically, which is a good indicator of economic growth of the country. Such fall in the inflation rate in the country has been going alongside a promising decline in unemployment rate in the economy. Such results have contributed much to the advancement and transformation of Tanzanian economy from low to lower-middle income status this year. But such promising results haven't started this year, instead it traces back to early 1990s whereby the inflation rate of the country was about 30% but later on it dropped back to 13% by the late 1990s. During such period of time the unemployment rate in the country was also being observed to decline from the rate of 3.6% in 1991 to about 1.981% in 2021 and that justifies an existence of a positive relationship between inflation rate and unemployment rate in Tanzania, which on the other hand is against the concept behind Phillips Curve as elaborated by William Phillips in the late 1950s. Launching of the national five year development plan 2016/17 – 2020/21 in the beginning of President Magufuli reign in 2015 was among the effective indicators of the determination and initiative of his government in dealing effectively with these two variables under consideration i.e. inflation and unemployment.

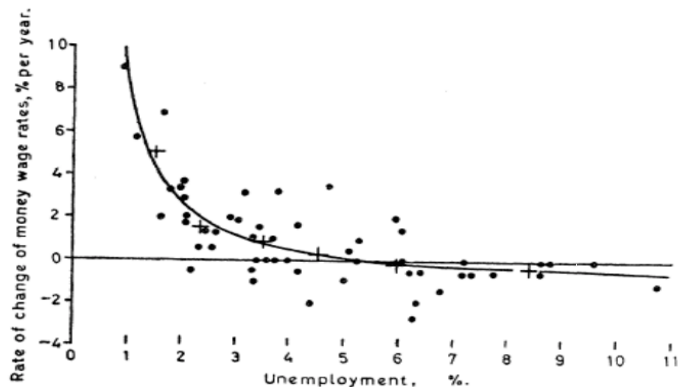
Among the key targets of the national five-year development plan 2016/17 – 2020/21 has been to contain the inflation rate of the country at 5% (single digit). To implement this plan specified to adopt various key interventions, one of them being, “Pursuing and sustaining non-inflationary/prudent fiscal and monetary policies such as restricting budget deficit and bank borrowing” (Ministry of Finance, 2016).

To lower the unemployment rate of country (which is currently at 1.98% according to Macrotrends), the government of Tanzania under President Magufuli has decided to undertake several flagship projects including; construction of a new Central Railway line to Standard Gauge, expansion of the Dar es salaam Port, and the Julius Nyerere Hydropower Station, also called Rufiji Hydroelectric Power Station, is a 2,115 megawatts hydroelectric dam, and the Stiegler's Hydroelectric Power Project, in which, according to (Africa Energy Portal, 2019) at least 12000 Tanzanians are set to get employment during the implementation of Stiegler's Gorge Hydroelectric Power Station (SGHPS), which will be able to generate over 2,100MW within 3-years period, starting in 2019. This study attempts to examine the relationship between inflation and unemployment in Tanzania for the period planning from 1990 to 2019 as inflation plays an important role in determination of a country's unemployment rate. Also the study will examine how Gross Domestic Product (GDP) as an indicator of economic growth of the country can affect the unemployment rate in the economy of Tanzania however this was included as control variable.

## 2.0 Literature Review the Phillips Curve Theory

The concept and theory behind Phillips curve was introduced in 1958 by an English economist and engineer A. W. Phillips (Nüß, 2013). The theory suggests that there is a stable and inverse relationship between inflation and unemployment. Phillips conducted his study in United Kingdom (UK) and also data from UK from 1861 to 1913 and later on, he generalized his findings for the rest of the world economies. Many economists very impressed with the work of Phillips on how an inverse and stable relationship between inflation and unemployment could be identified for such a long period of time i.e. 1861 to 1913 as shown in figure 2.1 below.

**Figure 2.1: Inflation and Unemployment**



**Source:** Phelps (2022)

Although the theory seemed to hold in the United States for a certain period of time in 1960s, the stated relationship later on disappeared especially considering data from 1970 onwards to 2002 respectively as shown in figure 2.2. below (Phelps, 2013) and as a result, a lot of economists from various parts of the world disputed on whether such inverse relationship between inflation and unemployment as stated by Phillips really exists.

### **Inflation-Augmented Phillips Curve Theory**

Failure of the traditional Phillips Curve theory led to the modification of the theory and later led to a rise of Inflation-Augmented Phillips Curve also known as "short-term Phillips curve" or the "expectations augmented Phillips curve." Unlike the traditional Phillips curve, the theory behind this new curve holds that, the curve tends to shift as the rate of inflation changes. The concept of Inflation-Augmented Phillips Curve was introduced by another economist, Milton Friedman and it tries to elaborate that, as the government tries to solve the unemployment in its economy it causes another problem of inflation to appear, that is to say, unemployment in an economy is solved at the expense of rising inflation. For example, as shown in figure 2.3 below, if the government wishes to lower the unemployment rate in an economy, assuming the inflation rate being at 0% rate.

To achieve such goal, the government may wish to increase aggregate demand by, say, building some new roads. In order to attract the required workers, the money wage is increased to a certain level. Previously unemployed workers take the bait (frictionally, or structurally unemployed),

unemployment falls to  $U_1$  at a cost of increasing inflation (3%). The economy moves from point A to point B along the short run Phillips curve SRPC1. As observed in figure 2.3 below, the curve has been labelled 'exp. inf. = 0%'. This means that workers expect future inflation to be 0%. They took the job with increased money wages expecting inflation to stay at 0% so that the real wage is higher. Workers only increase their supply of labour in response to an increase in real wages.

But, the increase in money wages forced the inflation rate up to 3%. The new workers did not realise this straight away at the time they were accepting the jobs. They initially suffer from money illusion. Before long the workers realise that they have, in a sense, been tricked. Real wages have not increased at all. The new workers were not prepared to work at this lower real wage rate, so they withdraw their labour services and become unemployed again. The economy moves from point B to point C. Unemployment is back up to  $U^*$ , but inflation stays where it is because money wages have not fallen back to their original level. The economy is now on a different short run Phillips curve (SRPC2) with expected inflation equal to 3%. The act repeat again and again whenever the government tries to reduce unemployment rate again (S-cool Limited, 2020).

### **Okun's Law**

Okun's Law tends to show and explain the relationship between the rate of unemployment in an economy and its rate of economic growth respectively. The theory was proposed by Yale professor and economist Arthur Okun in 1962 by using data from United States, in which he revealed an existence of a negative relationship between cyclical unemployment and output level or Gross Domestic Product (An, Ghazi and Prieto, 2011).

According to Okun's law, there is an inverse relationship between a country's Gross Domestic Product (GDP) and the unemployment rate in the economy, in such a way that, GDP must grow at about 4% rate per annum in order to achieve 1% reduction in the country's unemployment rate. Just like most of economic theories, Okun's law has also evolved over time, giving birth to several versions of the theory over time. For instance, one version of Okun theory elaborates about the relationship between a country's unemployment rate and Gross National Product (GNP), in such a way that, as unemployment falls by 1%, the GNP rises by 3%. The other version of Okun's law elaborates that, as unemployment rate in an economy rises by 1%, then the GDP falls by 2% respectively.

For years, Okun's law has gained popularity in the fields of economics and academics in general simply due to the fact that, up to now there is no economic theory elaborating about the relationship between unemployment rate in an economy and economic growth and therefore for decades, the Okun's hypothesis has been used as a yardstick to measuring the association between these two variables under consideration i.e. economic growth and unemployment (Javeid, 2012).

However, some studies have shown that the Okun's law is not a panacea for solving the problem of unemployment in all of the world economies. For instance, studies conducted so far have proved on how the Okun's law is unfit for low and lower middle income countries such as Morocco (An, Ghazi and Prieto, 2011). Therefore, despite the fact that, "Okun's relationship between changes in the unemployment rate and output growth has varied considerably over time and over the business

cycle. Nevertheless, Okun's relationship can still be useful as a forecasting tool—provided that one takes its instability into account” (Knotek, 2006).

### **Empirical Literature Review**

For decades, the relationship between inflation and unemployment has been grabbing the attention of various governments, enterprises, and academicians all over the world. This is due to the fact that, inflation and unemployment play very important roles in promotion and improvements of the welfare of the global society.

Chu, Fan and Furukawa (2020) test the long-run causality between inflation and unemployment in a monetary Schumpeterian growth model with matching frictions in the labour market and cash-in-advance (CIA) constraints on consumption and R&D investment. Under the CIA constraint on R&D, higher inflation that raises the opportunity cost of cash holdings leads to a decrease in innovation and economic growth, which in turn decreases labour-market tightness and increases unemployment. Under the CIA constraint on consumption, higher inflation instead decreases unemployment in addition to stifling innovation and economic growth. Therefore, the two CIA constraints have drastically different implications on the long-run relationship between inflation and unemployment.

Lisani, Masbar and Silvia (2020) on the basis of secondary data in 1989-2018 period empirically explored the nature of inflation-unemployment dynamic causal relationships both in the short and long-run in the ASEAN-10, which is a regional intergovernmental organization comprising ten countries in Southeast Asia, which promotes intergovernmental cooperation and facilitates economic, political, security, military, educational, and sociocultural integration among its members and other countries in Asia. Using the Vector Error Correction Model (VECM) analysis, the study found an insignificant inflation-unemployment relationship in the short-run. However, in the long-run, inflation is found to affect the unemployment rate positively. These findings only supported the relevance of the Phillips curve theory in the long-run. Overall, these findings imply that although inflation targeting policy is not relevant to the short-run, it becomes crucial and effective to reduce the unemployment rate in ASEAN-10 in the long-run.

Wulandari *et al.* (2019) examined the persistence of the connection between inflation and unemployment rate in Indonesia during 1987 to 2018 period. The data were collected from various main sources including the World Bank, Central Bank of Indonesia, and Central Bureau of Statistics (BPS). The findings showed that inflation has a one-way relationship toward unemployment in Indonesia and it occurs at the third lag. Impulse Response Function (IRF), shows that the inflation rate are fluctuating in response to the shock of unemployment. The unemployment rate responses to shocks from inflation initially increased until it is eventually diminished. It shows that the shocks caused by the impact of inflation were only in the short term. Further, inflation in the three previous lags will have consequences for the unemployment rate in the year. Lastly, both in the long run and short run, unemployment did not affect inflation rates. These findings suggest that high inflation in Indonesia is determined the rising price of basic commodities and fuel. In addition, most companies in Indonesia applying capital intensive so that employment growth in Indonesia is small.

## **Methodology**

Researcher employed (causal research design)- non-experimental research design as a strategic plan of the procedures followed during a study on the way to attain valid conclusions, with unique consideration given to sample selection and venture to situations, data collection, and data analysis. The causal research design (non-experimental research design) seeks to find the cause-and-effect relationships between the variables, whereby the researcher will seek to determine the cause-and-effect relationship between real Unemployment, Inflation, real GDP and Foreign direct investment (Adam, 2016). Causal research design has a capacity to determine one variable affects another variable in which it is discovering which variables constitute the cause and which the effect. A casual research design is usually allowed researcher to explain the existence of variables quickly and quite at a given factor. As a consequence, on this observe the casual research design could be used to look at the variables in large pool. Furthermore, the design can be beneficial on this examine as it helped to in reflecting the current aspect.

According to Adam, (2016) the research approach refers to the plan and procedure that consists of the selection of an approach which can be used in the study, that depend on the nature of question under consideration and objectives of researcher. There are two types of research approach, which are, quantitative approach (consist of generating data in a quantitative or numerical form) and qualitative approach (involving the subjective assessment of attitude, opinions and behavior). This study will use quantitative approach in analyzing data since it is objective in nature compared to qualitative approach which is subjective in nature, and the foremost, quantitative research approach will enable to establish a cause-and-effect relationship about the population.

## **Findings**

Furthermore, researcher found that the variables are non-stationary in their levels, and stationary at first difference  $I(1)$ , in order to determine whether or not the variables have a long run equilibrium relationship the Johansen's co-integration tests was applied by the researcher. That procedure allowed testing for the number of co-integrating relationships ( $r$ ) on the Vector Autoregressive Model (VAR). However, the long-run relationship to be captured by the model depends significantly on the optimum lag length to be selected. Failure to select the lag-length from the VAR model, would hide the pattern of the long-run dynamics.

## **Long-Run Relationship Coefficients**

The existence of a long-term relationship among the variables under consideration was suggested by the co-integration among the variable, the researcher employed the Dynamic OLS (DOLS) model in order to establish the long-term coefficients among the variable. The aim of applying DOLS was due to the existence of long run relationship among the variables, and to take care of indigeneity bias in the model. However, in short-run there may be some deviations from this equilibrium, to be verified as to whether such disequilibrium converges on the long-run equilibrium or not. Therefore, DOLS was used to observe the relationship among the variables.

**Table 4.8 Long-Run Relationship Coefficients**

UNEMP	INFL	GDP	PUBLIC INV
	0.310900	- 2.295303	-0.863979
Stand Errors	(0.10769)	(0.51521)	(0.12221)
t -ratios	[-2.88694	[ 4.45505]	[-7.06941]

**Source:** Researcher Computation, 2022

The regression model has indicated that, the independent variables (inflation, real GDP and public investment) are statistically significant predictor of unemployment in Tanzania. This was given by the significance of absolute t-ratios of 2.88694 for inflation, 4.45505 for real GDP and 7.06941 for public investment which are greater than 2. This indicate that, the overall model is statistically significance. Furthermore, the LM test for serial correlation as provided by the model indicate that, the model does not suffer from any problem of serial correlation.

## 5.0 Discussion

The main objective of the study was to investigate the prevalence of Phillip curve in Tanzania. The study was guided by three specific objectives. One was to investigate the short-run relationship between inflation and unemployment in Tanzania, second was to examine the long-run relationship between inflation and unemployment in Tanzania and lastly was examine the casual relationship between inflation and unemployment in Tanzania. The data for the study variables were collected from World Bank Development Indicators (WDI), National Bureau of Statistics (NBS) and United Nations Organization (UN) database for the sample period of 32 years from 1990 to 2021. The researcher employed several econometric techniques for the aim of achieving the objectives enumerated in the study. In order to know whether the data is stationary or not, the unit root test were employed, after validating that time series data are I(1) the researcher employed Johansen Multivariate co-integration to test for any existence of long-run relationship among the variables. The research findings has indicated that, there is long-run relationship among the variables.

The coefficient of long-run dynamics were estimated and the findings indicated that, there is a long-run negative and significant relationship between public investment and unemployment rate in Tanzania, in such a way that, any unit increase in public investment would result to 0.863979 decline in unemployment rate, holding other factors constant. On the other hand, real GDP has a negative and significant long-run relationship with unemployment rate in way that any unit increase real GDP would lead to 2.295303 decrease in unemployment rate holding other factors constant.

Correspondingly to that, the researcher has found the positive and significant long-run relationship between inflation and unemployment in Tanzania, in a way that, any unit increase in inflation rate would result to 0.310900 increase in unemployment rate in the long-run, holding other factors constant. The coefficient is statistically significant at 5% level, as it has the t-ratios which are higher than 2. The researcher further investigated the existence of short-run relationship in the model and found that the short-run relationship does not exist in the model. The result of the Granger causality has also depicted that, there is no granger causality between inflation and unemployment.



## **Conclusions**

The study investigated the prevalence of Phillips curve in Tanzania, and concluded that, Phillip theory does not hold in the country. Whereby, the effect of inflation on unemployment in Tanzania were analysed which is widely used as an indicator for country economic. The outcome results indicated that, inflation has a positive long-run relationship between inflation and unemployment. The research findings have indicated that, there is long-run relationship among the variables. The coefficient of long-run dynamics were estimated and the findings indicated that, there is a long-run negative and significant relationship between public investment and unemployment rate in Tanzania, in such a way that, any unit increase in public investment would result to 0.863979 decline in unemployment rate, holding other factors constant. On the other hand, real GDP has a negative and significant long-run relationship with unemployment rate in way that any unit increase real GDP would lead to 2.295303 decrease in unemployment rate holding other factors constant

## **Recommendations**

The study findings have indicated the existence of long-run significant relationship between inflation and unemployment rate in country economy of Tanzania. For this case, the researcher recommended that; The government of Tanzania through BoT should make appropriate control of the level of inflation rate in the country since it may result to increase in unemployment rate. High inflation rate is associated with high purchasing power which increase cost of living among individual consumers, discouraging investment and causes unemployment to increase. Also, the government should be added to public investment, as in the long run-may foster the in order to reduce unemployment rate, this due to the negative relationship between public investment and unemployment rate. Policy formulators should also make a clear investigation as to what measure may be used to control inflation and unemployment corresponding to their effect on country's economy.

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