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Inflation and Economic Growth in Tanzania from the year 1974 -2019

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Abstract: Achieving sustainable economic growth is a prioritized objective of any country. However the attainment of this priority is faced by obstacles, among which is inflation. The relationship between inflation and growth is a controversial one and it is only through research that this can be properly established. *This study examined the relationship (causal relationship) between inflation and economic growth in Tanzania for the period 1974 -2019. The study has answered major question on the nature of relationship between inflation and Economic growth in Tanzania whereby have identified that there is negative relationship between inflation and Economic growth. The study used secondary data to analyze this phenomena .The study employed correlation analysis, Regression analysis, Granger causality, ECM and Diagnostic and parameter stability as econometric tools. From the findings, it was established that, economic growth is cointegrated with inflation, foreign direct investment and trade openness . The regression results shows that, there is a negative relationship between inflation and economic growth running from inflation to economic growth. Meanwhile, granger causality results shows negative causal relationship between inflation and Economic growth. The study recommends that, the Government should apply proper economic policy such as fiscal and monetary policy measures with an aim to control and restore inflation at acceptable levels in Tanzania.*

Keywords: *Economic growth, Inflation, foreign direct investment prospects*

1.1 Study background

Different countries have been experiencing varying inflation rates and economic growth since their independence to the moment. Within the economic theory framework, several channels are identified through which inflation can affect the economic growth of the host country (Khalid &Noy, 2007). Evidence showing the fluctuation of inflation and economic growth to some of the Asian countries such as India showed that, the growth rate of Gross Domestic Product (GDP) increased from 3.5% in 1970s to 5.5% in 1980s while the inflation rate accelerated steadily from an annual average of 1.7% during 1950s to 6.4% in 1960s and further to 9.0% in 1970s before easing marginally to 8.0% in 1980s (Prasanna and Gopakumar, 2010). Likely, for the case

of China, Xiao (2009) revealed that, from 1961 to 1977, China's real GDP growth and real GDP per capita growth averaged at 4.84% and 2.68% respectively. Since 1978, China's economy grew steadily although growth rate fluctuated among the years. From 1978 to 2007, the growth rate of China's real GDP and real GDP per capita were recorded at 9.992% and 8.69 % respectively.

In Africa, inflation and economic growth have been fluctuating unevenly overtime (Kasidi, 2013). The highest inflation was -315.82 % in 2008 in Zimbabwe while its economic growth was -17.6% % in the same period (Nagarjuna, 2011). High inflation in Zimbabwe was caused by high debt, decline in investment, economic sanction, lack of confidence in government, economy, political life and decline in export earnings (Shitundu & Luvanda, 2000). The lowest inflation was 2.6 % 2013 in Libya, while it's economic growth was 10.5 % (Kasidi,2013).

In East Africa, Evidence from Kenya had 5 years of very positive economic growth with four consecutive years of growth above 4%. But average annual inflation of Kenya increased from 18.5% in June 2008 to 27.2 % in March 2009, before falling marginally to 24.3% in July 2009. Uganda was one of the faster-growing economies in Africa with sustained growth averaging 7.8 % since 2000 with the annual inflation rate decreasing from 5.1% in 2006 to 3.5% in 2009. The average annual real GDP growth rate for Rwanda from 1990-1999 was -0.1 but from 2006 to 2009, Rwanda had an annual average growth rate of 7.3% (Stein, 2010). Empirical evidence on INFL-economic growth relationship, however, are mixed , ambiguous and inconclusive in both theory and empirical findings. A study by Shitundu and Luvanda (2000), Kasidi and Mwakanemela, (2013) Sarel (1996), Khan and Senhadji (2001) shows negative relationship, while according to Kasidi (2013) , there is no relationship. Sidrauski (1967) asserts a positive relationship in Tanzanian context.

Like in other developing countries, Tanzania has been experiencing fluctuating inflation since independence. The inflation recorded at 37.9 % in 1978 was the highest. Meanwhile, the GDP was 1.6% caused by political instability resulted from Idi Amin Dada war 1978/1979 (Shitundu & Luvanda, 2000). Also Tanzania recorded low inflation in 2004 of 5 % while GDP was 7.08 % whereby this resulted from various economic reforms so as to minimize the problem of inflation in Tanzania. The designed package of reforms like the National Economic Survival Programme (NESP I and NESP II) 1980 -1982 (Kilindo ,1997) and (Solomon & Wet, 2004). The other Economic Recovery Programme (ERP I and ERP II) Kilindo of 1986 and 1995 Kilindo (1997), Open general license (OGL) reforms in 1988, Economic and social Action programme (1989-1992) and formulation of economic strategy such millennium development goal in 2000's and monetary and fiscal policy pursued by Central Bank intended to restore economy and minimize the problem of inflation in Tanzania (Shitundu & Luvanda , 2000). Generally, empirical evidence on the prelateship between economic growth in Africa is mixed and inconclusive and call for further empirical studies by (Baro ,1995) from 140 developing and developed countries. Although both inflation and economic growth have been fluctuating over time, their relationship is empirically controversial. Some empirical studies have shown a positive relationship, no relationship and negative relationship (Paul & Kearney, 1997), (Kasidi, 2013) and (Shitundu & Luvanda, 2000) respectively.

1.2 Statement of the Problem

Although there has been deliberate and sustained effort towards price stability intended to keep the level of inflation nearly to acceptable levels, its impact on economic growth in the country is still an practical issue. In some cases, there might be no-relationship, negative relationship, bidirectional relationship and positive relationship between inflation and economic growth. Therefore, there is distinctive disagreement (Shitundu and Luvanda 2000). It is observed that, inflation has been fluctuating much than Economic growth. Thus, despite its importance on macroeconomic policies for price stability, less is known on the actual effect of inflation on economic growth. This study, therefore, intends to find out whether there is a causal relationship between inflation and economic growth in Tanzania in the period 1974-2019. The relationship between INFL and the

rate of economic growth is critically important for policy-making and therefore, calls for further empirical scrutiny. Most of the studies have come with contradicting results about the relationship between inflation and economic growth. The actual relationship between inflation and economic growth is not well understood and there is a need for empirical research to be undertaken (Barro, 1995).

1.4 Study Objectives

The following are the specific objectives for this study;

- i. To determine the causal relationship between inflation rate and economic growth in Tanzania.
- ii. To examine the long run relationship between inflation rate and Economic growth in Tanzania.

Research Hypothesis

- i. The first hypothesis (H₁) that there is a negative significant causal relationship between inflation rate and Economic growth is accepted. There is a negative coefficient, which is a significant relationship existing between the independent variable (inflation rate) and dependent variable (Economic growths).
- ii. The second hypothesis (H₁) that there is a negative significant long run relationship between inflation rate and economic growths is accepted. There is a negative coefficient which means there is significant relationship exists between the dependent variable and independent variable.

1.5 Conceptual Framework Model

The figure below shows a conceptual framework model. This entails as an abstract idea or a theory used to develop new concepts or to reinterpret existing ones (Kothari, 2004). It gives the relationship between the independent and dependent variables. The conceptual framework of this study is presented bellow basing on both independent include unemployment, inflation rate, Direct Foreign Investment, Exchange rate and interest rate and the dependent variable is Economic growth. Theoretically, there exists a relationship among them (i.e. dependent and independent variables). The relationship can be expressed as Economic Growth (Y) is the function of unemployment, inflation rate, Direct Foreign Investment, Exchange rate and unemployment(x₁, x₂.....x_n). This is expressed mathematically as;

$$y = f(\text{inflation rate, Exchange rate, unemployment, Exchange rate, Direct Foreign Investment})$$

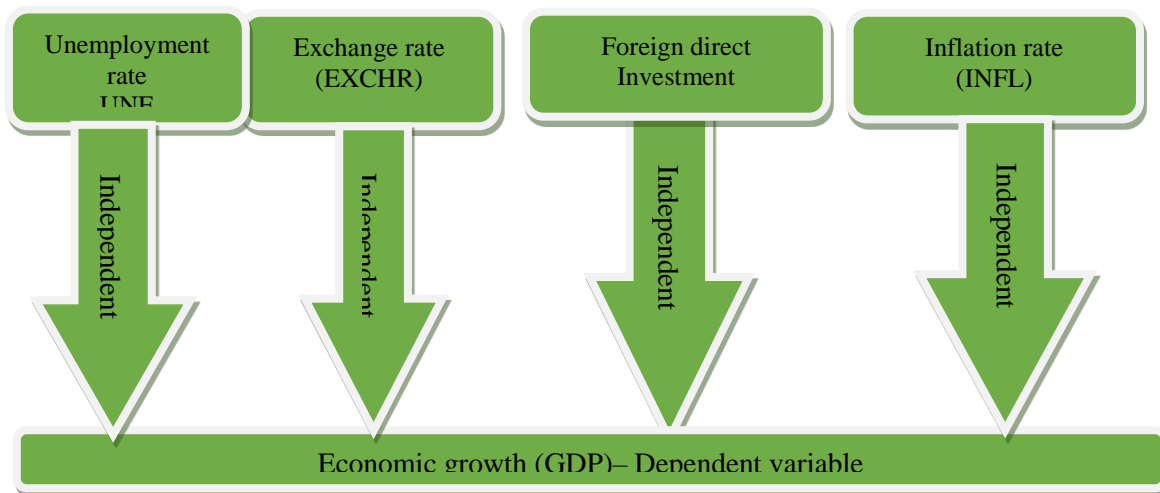


Figure 1: Interaction among Independent Variables to Economic growth

Source: Own Conceptualization, 2020

From the conceptual framework model, Economic growth (GDP) is the dependent variable while Foreign Direct Investment (FDI), Exchange Rate (EXCHR), Unemployment rate (UNE) and Inflation Rate (INFL) are the independent variables.

1.6 Literature review

This section seeks to find out what others have written about this study. This includes theoretical literature review, and empirical literature review.

Conceptual Definitions

Gross Domestic Product

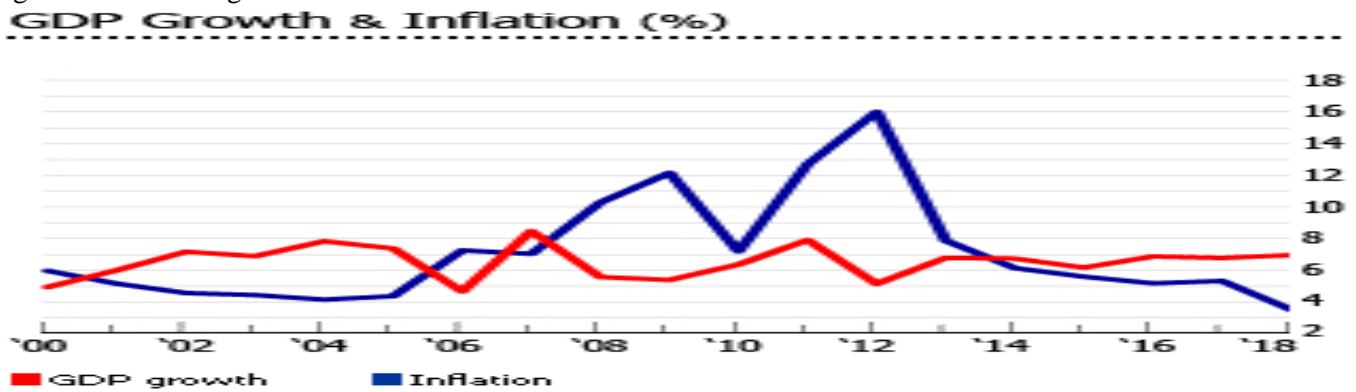
Gross domestic product is defined as the monetary value of all the finished goods and services produced within a country’s borders in a specific period; it is usually calculated on an annual basis. It includes all of the private and public consumptions, government outlays, investments, exports and fewer Imports that occur within a defined territory (George, 2007). It can be expressed in the form of equation hereunder:

$$GDP = C+G+I+NX \dots\dots\dots(1)$$

where C is all private consumption or consumer spending in a Nation’s Economy is the sum of government spending, I is the sum of all the country’s businesses spending on capital, NX is the Nation’s total net export calculated as a total export minus import (NX = Export-Import).

Inflation Rate

Inflation rate is defined as the rate at which the general level of price for goods and services is rising and subsequently purchasing power is falling. Inflation is defined as a rise in the general level of price of goods and services in an economy over some time (Shim J.K. et al., 1995). According to Gultekin (1983), inflation and economic growth have a negative relationship as the growth rate is depended on the rate of return but the rate of return is decreased by inflation and hence economic growth is negatively related to inflation. As foreign companies enter into a long-term contract in the host country, high rate of inflation can be a cost of doing business. Foreign firms may lose out when actual rate of inflation turned to be very different from the anticipated rate of inflation as their purchasing power declines. Hailu (2010) found that high rate of inflation has a negative effects on Economic growth since investors are discouraged to make investment. Twimukye (2006) also found that high rate of inflation has a negative relationship with Economic growth into Africa. Low level of inflation has a positive impact on Economic growth into Sub Saharan Africa. According to the findings by Asiedu (2006), also, Nonnemberg and Mendonca (2004) found that there is a correlation between Economic growth and level of inflation in developing countries as the country with a low level of inflation is likely to have high rate Economic growth.



Source: IMF, Global Property Guide

Figure 1 Inflation rate and Economic growth trend

Most countries including Tanzania measures inflation rate by looking at the consumer price index changes in % from one year to another year. The inflation rate around 2-3 % per year is considered to be very low to cause any problem for household and businesses in general. Therefore, the countries try to keep inflation somewhere around 7%. In 2015 the inflation value was 7% (consumer price annual %) and the high value of inflation of 36.15% in 1994 and it was the maximum value over the past 49 years and in the year 2019 the minimum value was 3.45% .

Foreign Direct Investment

Foreign direct investment is defined as an investment involving a long term relationship and reflecting a lasting interest and control by a resident entity in one economy (Vaidya, 2006). It is also defined as long term participation by a country A into country B. It involves participation in management, joint venture, transfer of technology and expertise (Shim et al, 1995).

Trade Openness

Trade openness defined as the degree to which an economy maintains its outward orientation in trade also trade openness accelerated with more open markets in goods and services can contribute to creating jobs and increase incomes (Ngowi, 2008).

Theoretical Literature Review

Theoretical review the purpose of this form is to concretely examine the corpus of theory that has accumulated concerning an issue, concept, theory, phenomena. The theoretical literature review help establish what theories already exist, the relationships between them, to what degree the existing theories have been investigated, and to develop new hypotheses to be tested. Often this form is used to help establish a lack of appropriate theories or reveal that current theories are inadequate for explaining new or emerging research problems. The unit of analysis can focus on a theoretical concept or a whole theory or framework. Harvey (Andruss Library of the Bloomsburg University of Pennsylvania).The study was guided by classical theory and New Keynesian theory.

Empirical Literature

On the empirical side, a number of studies have examined the relationship between inflation and economic growth; some are country-specific studies see for instance Fischer (1993) examined the presence of nonlinearities in the inflation-growth nexus. Fischer (1993) exogenously determined the inflation threshold by dividing the sample into three threshold levels; inflation rate less than 15%, inflation between 15% and 40% and inflation above 40%. Using spline regression techniques on a panel of 93 developed and developing countries, he concludes that when inflation is low, its impact on economic growth is positive but turns to negative as inflation increases. Following Fisher (1993), Bruno (1995) uses a panel of 127 countries and finds that inflation has a positive impact on growth when it goes up to 15-20 % range but when it goes beyond 20-25 %, its impact becomes negative.

Mubarik (2005) follows the study of Khan and Senhadji (2000) and detects a structural break point of inflation of 9% for Pakistan, above the break point there is a negative inflation - economic growth relationship, but no significant relationship below the break point. He also evidences a one-way direction relationship from inflation to growth by Granger Causality method. According to Marbuah (2010) empirically re-investigated the long-term relationship to determine whether threshold effects and exists if so estimates the optimal inflation level which is conducive for economic growth in Ghana. Also, another linear specification failure of account for a structural break in the model indicates an optimal inflation threshold at 6 % and 10 % respectively. However, adjusting for a structural break in the model indicates an optimal inflation threshold level of 10 % which is quite robust concerning sample size and estimation techniques. The findings of this paper support Banks of Ghana's inflation

targeting a regime which currently targets inflation within the 7 – 11% band in the medium – term Frimpong and Oteng-Abayie (2010) in Ghana monetary and fiscal policies are aimed at sustaining high economic growth rates together with low inflation (price stability).

Choi et al. (1996) shows that low levels of inflation promote growth but high levels of inflation harm economic growth because of credit rationing. On the empirical side, a number of studies have examined nonlinearities in the relationship between inflation and economic growth; some are country-specific studies, (Fabayo and Ajilore, 2006; Ajide and Olukemi, 2012) while others are cross-country panel studies (see for instance, Khan and Senhadji, 2001; Bick, 2010; Kremer et al., 2013; Ibarra and Trupkin, 2016). Among country-specific studies, Lee and Wong (2005) estimate an inflation threshold of 7.25% for Taiwan and 9.66% for Japan. Fabayo and Ajilore (2006) estimate an inflation threshold of 6% for Nigeria. In contrast, for the same country Nigeria, Ajide and Olukemi (2012) finds an inflation threshold of 9%. Munir et al. (2009) estimate a threshold level of inflation at 3.89% for Malaysia. Hasanov (2011) finds an inflation threshold at 13% for Azerbaijan. Phiri (2013) estimates an inflation threshold of 22.5% for Zambia. Tung and Thanh (2015) estimate an inflation threshold at 7% for Vietnam. All these studies conclude that inflation beyond the threshold is detrimental to growth. However, as Espinoza et al. (2010) point out, the relationship between inflation and growth is likely to be strong at low frequencies, and since available data points are usually few, panel data studies are better in capturing the inflation-growth relationship than country-specific studies. In reviewing the empirical literature, we therefore mostly lay focus on panel data studies.

Khan and Senhadji (2001), using non-linear least squares on a panel of 140 countries find the inflation threshold at around 1% for industrial countries and at around 11% for developing countries. In addition, for both industrial and developing countries, when inflation is below the estimated threshold, the findings indicate a positive relationship between inflation and growth, although it is statistically significant only for industrial countries. However, when inflation is above the threshold, a significant and negative relationship is found for both groups of countries. Drukker et al. (2005) use a non-dynamic panel threshold regression of Hansen (1999) on 138 countries and find inflation threshold at 19.16% for developing countries, two thresholds for industrial countries, at 2.57% and 12.61% and one threshold for the full sample at 19.16%. For the full sample, the results suggest that inflation below the threshold does not have a statistically significant effect on growth but above the threshold, inflation is detrimental to growth. But contrary to the conclusion of Faria and Carneiro (2001), Gregorio (1992) also conducts a study based on 12 Latin American Countries which have high inflation history. His results found a negative relationship between inflation and economic growth in the long run. Gregorio (1996) furthers the study in his work of 1996 and stresses the importance of central bank to control the inflation, and same with the result of his work in 1992, he still concludes a robust negative relationship between inflation and economic growth. According to Espinoza (2010), the study examined the nexus between inflation and growth of 2007 – 2008 and it was a concern that high level of inflation could undermine growth, this paper uses a panel of 165 countries and data 1960 -2007. It used a transition model to investigate the speed at which inflation beyond a threshold become harmful to growth, an important consideration in the policy response to rising inflation as the world economy recovers. It was estimated that all the country group inflation above a threshold of about 10 % quickly becomes harmful to the growth. Also, it was suggested that the needs for a prompt policy response to inflation at or above the relevant threshold. Also, it was revealed that for the developed countries threshold is much lower, for oil-exporting countries the estimates are less robust, possibly reflecting heterogeneity among oil producers but the effect of higher inflation for oil producers is found to be stronger.

A few studies in the context of Tanzania have already investigated the existence of a relationship between inflation and economic growth. Kasidi and Mwakanmela (2013) examine the impact of inflation on economic growth in Tanzania using annual time series data for the period of 1990 to 2011. The objectives of the study

were to examine the impact of inflation on economic growth in Tanzania, to measure the degree of responsive of economic growth in Tanzania to change in general price level and to establish relationship between inflation and economic growth in Tanzania. The variables used in the study include GDP which served as a dependent while inflation served as independent variable. The study used reduced form regression equation to investigate the impact of inflation on economic growth. Co-integration was applied to measure whether the two variables moved together in the long run. The result from regression analysis revealed that inflation has negative impact on economic growth in Tanzania. Correlation coefficient and co-integration test using Johansen Co-integrating relationship between inflation and economic growth shows that there is no significant long-run relationship between inflation and economic growth in Tanzania. Only short term negative statistical significant.

The negative relationship between inflation and economic growth reported by Inyama (2013), Moshiri & Sepehri (2004) Nonexistence of long run relationship between inflation and growth , where by revealed non-linearities in the inflation-growth nexus for industrial and developing countries. Indeed, the empirical results of this paper is that, one, the turning points varies widely from as high as 15 percent for lower middle income countries to 11 percent for low-income countries, and 5 percent for upper-middle-income countries. Second, there is no statistically significant long-run relationship between inflation and growth for OECD countries. However, the results point out the possible bias in the estimation of the inflation and growth nexus that may emanate from combining various countries at different levels of development (Rutayisire, 2013). Nonetheless, Jha & Dand (2011) reveal the same results, that there is no significant effect of inflation variability on economic growth when inflation is high in developing country like Tanzania.

The other panel study that estimates threshold level of inflation is undertaken by Kremer *et al.* (2009). Indeed, Kremer *et al.* (2009) expand the scope of Khan & Senhadji (2001) by modelling a large panel-data set of 124 industrialized and non-industrialized countries like Tanzania over the 1950-2004 period. A dynamic panel threshold model is employed in the analysis for the growth equation. The empirical results suggest that the inflation threshold level is about 2.5 percent for industrial countries and 17 percent for non-industrialized economies. The paper also reveals that below the threshold of 2.5 percent, the effect of inflation on long-term growth is significantly positive in developed countries but the impact of inflation on growth remains insignificant in developing economies when inflation is below 17 percent. In fact, the paper fails to support the growth-enhancing effects of inflation on growth in developing economies like Tanzania.

Barro (1995) explores the inflation-growth nexus using a panel data for 100 countries developed and developing country like Tanzania over the 1960-1990 period. He estimates growth regression using Instrumental Variables (IV) technique. The empirical results suggest that there exists a statistically significant negative relationship between the inflation and economic growth, with a coefficient of -0.024. The results also suggest that if a number of the country characteristics are held constant, then the effects from an increase in average inflation by 10 percentage points per year are a reduction of the growth rate of real per capita GDP by 0.2-0.3 percentage points per year, and a decrease in the ratio of investment to GDP by 0.4-0.6 percentage points. Motely (1998), in a cross-country study with a data set covering the same period, also reveals a similar relationship. He suggests that an increase in inflation of 5 percent leads to a 0.1 to 0.5 percent decrease of economic growth. Shitundu and Luvanda (2000) Tanzania showed steady price stability in the 1950s and 1960s. Annual average rates of inflation were low, in a single digit, at about 4.5% and 9.3 % during 1950s and 1960s respectively. But the rates rose to 10.5% in 1973, before it reached 26.5% in 1975. During 1980-1985 the average highest rate of inflation, 27.3% was coupled with the lowest rate of economic growth of 0.9%. Moreover, studies revealed that, as the economy recovered during 1986-1990, the average rate of inflation decreased to 23.9% in turn average growth rate rose to 3.7 % According to Khan and Senhadji (2001) analyzed the price behaviour and gross domestic products association relationship separately for the developed and under-developing nation using descriptive statistics and identified that inflation affects economic growth negatively.

According to Rutasitara (2004) inflation result to low economic growth while low inflation result to high economic growth, thereafter authorities have to keep on track on the different factors that may easily trigger a rise in inflation and erode/affect the value of money holding, trade flows, investors' confidence in Tanzania.

Faraji Kasidi (2013) conducted a research to examine the impact of inflation and economic growth in Tanzania, Cross-sectional research design was used in the methodology, data collected from IMF Database Data collected were analyzed and processed by Stata. The results revealed that inflation tends to affect economic growth negatively. Khan and Senhadji (2000), represented that the is non-linearity in inflation - economic growth relationship is by they adopt economic estimation tool to detect the threshold of inflation instead of fixing them by assumption like Fischer (1993) and Burdekin *et al.* (2000). In the study of Khan and Senhadji (2000), they detect the breakpoints of 1-3% for developed countries; 7-11% for developing countries like Tanzania.

Given the empirical literature review presented above, it is clear that not so much has been done recently concerning of inflation rate -Economic growth nexus in Tanzania. Many studies have investigated the impact of the inflation rate on economic growth, few studies examined the nature of the relationship between inflation and economic growth in Tanzania simultaneously across studies moreover studied conducted remain inconclusive while others brought mixed result about relationship between inflation and Economic growth where by the following result witnessed thus no relationship, positive relationship, negative relation, direct relationship and bidirectional. Again, we expect to extend the period of study from 1974 to 2019 hoping that given a long period, our results might be more robust than previous studies in Tanzania. However, the current study seeks to re-examine the causal relationship between economic growth and inflation rate in Tanzania where by Time series used. Lastly, government macroeconomic policies to improve the performance of the economic growth over time have failed. Thus, the gap justifies the need for the study.

1.7 Research Methodology

Research design is the roadmap and a blueprint of investigation which is concerned with obtaining answers to the research objectives. The research design for this study was a case study where qualitative and quantitative methods were applied. The study was qualitative in a Sense that it was based on a qualitative comparison of phenomena it also involved critical review on inflation regime in Tanzania since 1967 to current and also quantitative since it tried to determine the inflation rate toward the growth of economic development (GDP). It is designed to come up with detailed information about the research problem (Kothari, 2004). The study relied essentially on secondary data which was sourced from various publications. Specifically, data was obtained from various sources. The main sources of data were: International Labour Organization (ILO), International Monetary Fund (IMF).

This study was conducted in Tanzania to analyze the relationship between inflation and economic growth in Tanzania from the year 1990-2017. The time series data was used in this study to represent both independent and dependent variables. The multiple- regression model will be used to analyze the time series data. The study analyses the macroeconomic variables (inflation rate (INFL), foreign direct investment inflows (FDI) , openness to trade (OPEN) and Economic growth(GDP): 1974-2019. The study model demonstrates Economic growth(GDP) as the macroeconomic factors of the inflation rate (INFL), foreign direct investment inflows (FDI) and openness to trade (OPEN). In this model the again the independent variables are inflation rate (INFL), foreign direct investment inflows (FDI) and openness to trade (OPEN) and the dependent variable is Economic growth(GDP) , the model is adapted from Carlos and Bonilla (2012) for the purpose of the present analysis and it is specified as shown below:

Economic growth (GDP) = f (inflation rate (INFL), foreign direct investment inflows (FDI) and openness to trade (OPEN)).In mathematical form, the model is as given by equation (1) to the part of theoretical model. The

conceptual frame is developed by using the multiple regression models estimated to test the mentioned-hypotheses in this study explained by Carlos and Bonilla (2012).The model is presented as follows:

$$GDP = f(INFL, FDII, OPEN)..... (2)$$

Where:

GDP- Gross Domestic Product (Dependent variable) , f = Function of

FDI = Foreign direct investment (Dependent variable)

INFL = Inflation rate (Independent variable)

OPEN = Trade Openess (Independent variable)

$$INFL= f(GDP)..... (3)$$

1.8 The Study findings, analysis and interpretation

The section presents the study findings, data analysis and discussion of the main themes of the study as a reflection of the research objectives. The section presents the analysis plan which gave out the results of the findings. The unit root tests, Augmented Dickey-Fuller (ADF) unit root test which is followed by the choice of the lag length, and the application of Regression analysis, Johansen Co-integration test, Vector Error Correction Model (VECM), VEC Granger causality, Diagnostic tests, Stability tests.

Descriptive Analysis

In the descriptive analysis, the main focus was on the presence of tests employed in the investigation of the research variables. Hence, Normality test were employed to obtain results of the statistics descriptive in terms of Minimum, Maximum, average, Media, and STD deviation. Also, with this aspect variables were then transformed through logarithmic operators which normally eliminate the non-stationary variables. When discussing the relationship between two variables, it is important to know through which channels they relate to each other, as mentioned in the theories and previous studies which have shown the availability of association among inflation, FDII, OPEN and gross domestic product (IMF, 2018).

Table 1: Summary Result for the Descriptive Statistics of the Variables

| Statistics | LGDP | LINFL | LOPEN | LFDII |
|--------------------|-----------|-----------|----------|-----------|
| Mean | 4.831304 | 16.21826 | 26.55243 | 2.175464 |
| Maximum | 8.48 | 37.5 | 55.32292 | 8.03 |
| Minimum | 0.14 | 3.45 | 10.163 | 0 |
| Median | 3.08 | 18.6 | 48.03 | 1.95 |
| Standard deviation | 2.297251 | 11.27127 | 12.55084 | 2.363714 |
| Skewness | -0.519738 | 0.4678068 | 0.829436 | 0.7754154 |
| Kurtosis | 2.205107 | 1.67897 | 2.589178 | 2.458361 |
| N | 46 | 46 | 46 | 46 |

Source: Compiled by the Author, 2020

Where:

FDII=Foreign Direct Investment Inflow, INFL=Inflation Rate, Gross Domestic Product (GDP),

OPEN=Openness trade.

Measures of central tendency are the value that describes the entire set of data as a single measurement. The three primary measures of central tendency are the mean, median, and mode. Measures of dispersion (how data is spread out) are range-difference between the highest and lowest value, variance-how widely observations vary and standard deviation (SD)-a measure how far from observations of the sample average. Measures of normality are kurtosis-measures the peakness on the flatness of the distribution of the series and include the Mesokurtic: a normal distribution with a Kurtosis of 3, Leptokurtic: positive kurtosis (peaked-curve), higher values and Platykurtic: negative kurtosis (flatted-curve), lower values. Skewness-Measures the degree of the asymmetry of

the series or probability distribution of a real-valued random variable about its mean. The skewness value can be Normal skewness: has a 0 skew, distribution is symmetric around its mean, Positive skewness: long right tail, higher values and Negative skewness: long left tail, lower values. Interpretation of the table above note that, the Normal skew: 0, Mesokurtic: Kurtosis of 3. GDP: The results of the variable from the table found that the skewness is -0.519738 means Normal skewness because has a 0 skew and the Kurtosis is 2.205107 means Platykurtic Kurtosis because 2.205017 is less than 3 (2.205017<3).

INFL: The results of the variable from the table found that the skewness is 0.4678068 and is said to be (leptokurtic), which means Positive skewness because has a 0 skew, higher values and the Kurtosis is 2.589178 means Platykurtic Kurtosis because 2.589178 is less than 3 (2.589178 <3).

OPEN: The results of the variable from the table found that the skewness is 0.829436 and is said to be (leptokurtic) meaning positive skewness because has a 0 skew, has higher value and the Kurtosis is 2.589178 means Platykurtic Kurtosis because 2.246339 is less than 3 (2.263565<3).

FDII: The results of the variable from the table found that, the skewness is 0.7764154 and is said to be (leptokurtic) meaning a positive ; Normal skewness because has a 0 skew and the Kurtosis is 2.458361 meaning Platykurtic Kurtosis because 2.458361 is less than 3 (2.458361 <3).

That is to say, major results depicts that, when Skewness is positive, this means that is not normal distributed whereby it is said to be normally distributed when Skewness is great than zero thus this is said to be (leptokurtic) since is less than three (3), positive and Skewness said not to be normal distributed and based on kurtosis since is than positive aid to be (Platykurtic) while, most of the variables were complimentary and less than 3 thus tend to have a normal distribution (Platykurtic). The low standard deviations indicate that, variables are largely in the same range of value. Also, the range of deviation between the maximum and minimum of each series is found to be reasonable in comparison to the mean.

Correlation Analysis

The results are expressed on a -1 to +1 scale as shown inTable 2:

Table 2: Possible Interpretation

| P | Possible Interpretation |
|--------------|---------------------------------|
| -1.0 | Perfectly negative relationship |
| -1.0 to -0.5 | Stronger negative relationship |
| -0.5 to -0.1 | Weaker negative relationship |
| -0.1 to 0.1 | Little to no relationship |
| 0.1 to 0.5 | Weaker positive relationship |
| 0.5 to 1.0 | Stronger positive relationship |
| 1.0 | Perfectly positive relationship |

Sources: Nathan, (2009)

Table 3: Summary of Results for Correlation Test

| VARIABLE | LGDP | LFDII | LOPEN | LINFL |
|----------|---------|---------|--------|-------|
| GDP | 1.0000 | | | |
| FDII | 0.4028 | 1.0000 | | |
| OPEN | -0.5630 | -0.2977 | 1.0000 | |
| INFL | -0.6020 | -0.6030 | 0.4634 | 1.000 |

Source: Compiled by the Author 2020

Where:

FDII=Foreign Direct Investment Inflow, INFL=Inflation Rate, GDP=Gross domestic product, OPEN-Trade Openness.

According to Gathgo and Ragui (2014), correlation matrix is used also to determine the most significant variables among the hypothesized selected independent variables. Therefore the correlation test in the above table shows that the correlation on the diagonal is always 1.0000 because what this calculates is the correlation between INFL and INFL and it's just there for show but giving any information the diagonal is always going to be 1.

Inflation rate (INFL) found to have a -0.6020 the stronger negative correlation with Economic Growth (GDP) , stronger negative correlation with FDII found to be -0.6030 strong positive correlation of 0.4634 with Trade Openness (OPEN) .

Trade Openness (OPEN) also found to have -0.5630 the negative strong correlation with GDP also strong negative correlation of -0.2977 with foreign direct investment inflow (FDII).

FDII found to have 0.4028 the strong positive relationship correlation with Economic growth).

The problem of multi co-linearity arises only when there is the existence of the high correlation between two independent variables and the result of this problem will make the significant variable to be insignificant as it will increase the standard error of the variable. In such case, if the standard error goes up, t- value will go down and hence come up with the high p-value. Therefore that particular variable becomes insignificant but in a real situation, it is not insignificant.

Therefore, targeted variable Inflation (INFL) has almost 60 % strong negative correlation with GDP Growth.

Unit Root Tests

This helps to know whether the variable is stationary or not stationary. The null hypothesis indicates no stationary of the variable which means the variable has a unit root while the alternative hypothesis indicates the variable is stationary. Also, the ADF test statistics will be compared with the critical value. In this case, we will only reject the null hypothesis if the t-statistics is more than the critical value. On the other hand, if the probability value (p-value) is greater than the critical value which usually at level 5% it means we cannot reject the null hypothesis of non-stationary

Table 4: Augmented Dickey Fuller Tests for Stationary at Level

| Variable | Test Statistic | 5% Critical Value | Findings |
|----------|----------------|-------------------|----------------|
| GDP | -2.570 | -3.520 | Non stationary |
| FDII | -2.477 | -3.520 | Non stationary |
| INFL | -2.585 | -3.520 | Non stationary |
| OPEN | -2.292 | -3.520 | Non stationary |

Source: Compiled by the author 2020

The unit root results from the above table indicate that the Test Statistic for all the variables (FDII, INFL, and OPEN) are absolute value of each variable is lower than the all six variables 5% Critical value so we cannot reject the Null Hypothesis and that indeed the series of a log of variables FDII, INFL and OPEN are non-stationary. All the variables are non-stationary which means each variable got a unit root therefore in order to achieve the stationary of the variable we tested for the unit root in first difference.

Table 5: Augmented Dickey Fuller Tests for Stationary at First Difference

| Variable | Test Statistic | 5% Critical Value | Findings |
|----------|----------------|-------------------|------------|
| GDP | -5.083 | --3.524 | Stationary |
| FDIII | -9.351 | -3.524 | Stationary |
| INFL | -8.503 | -3.524 | Stationary |
| OPEN | -7.335 | -3.524 | Stationary |

Source: Compiled by the author2020

Results from the above table indicate that the Augmented Dickey Test statistics for the variables GDP ,INFL, FDII, and OPEN it shows the absolute values is higher than 5% Critical value so we have to rejects the Null

hypothesis and we accept the alternative that now the log of variables GDP ,INFL, FDII, and OPEN are stationary due to the fact that critical value is less than test statistics and the Null hypothesis of Unit root is rejected in these cases that are with the inclusion of the trend term and even look at the trend time is not significant but the constant is significance in these regression.

Regression Analysis

Table 6: Regression Test

```
. reg gdpreal infl open_gdp fdii
```

| Source | SS | df | MS | | | |
|----------|------------|----|------------|-----------------|--|--------|
| Model | 110.884868 | 3 | 36.9616226 | Number of obs = | | 46 |
| Residual | 126.596452 | 42 | 3.01420123 | F(3, 42) = | | 12.26 |
| Total | 237.481319 | 45 | 5.27736265 | Prob > F | | 0.0000 |
| | | | | R-squared | | 0.4669 |
| | | | | Adj R-squared | | 0.4288 |
| | | | | Root MSE | | 1.7361 |

| gdpreal | Coef. | Std. Err. | t | P> t | [95% Conf. Interval] |
|----------|-----------|-----------|-------|-------|----------------------|
| infl | -.0822409 | .03102 | -2.65 | 0.011 | -.1448418 -.01964 |
| open_gdp | -.0659944 | .0232776 | -2.84 | 0.007 | -.1129704 -.0190184 |
| fdii | .0506581 | .1373048 | 0.37 | 0.714 | -.2264342 .3277504 |
| _cons | 7.807216 | .8560631 | 9.12 | 0.000 | 6.079611 9.534822 |

```
. estat dwatson
```

```
Durbin-Watson d-statistic( 4, 46) = .8532663
```

Source: Compiled by the Author 2020

From table above, the coefficients results (R-square) indicates a value of 48.28% revealing that, 46.69 %. This means that (INF) for this model has the power to explain the change of (GDP) concerning test output, with regards to the discussion, there are many macroeconomic variables including , Direct foreign investment Inflow, Trade Openness, Government Expenditure and inflation in which influence GDP since Inflation only has influenced GDP by 46.69 % said to be powerful to influence GDP of the country in regards with dummy variable of reform and recovery 1980s. That is to say, if R-squared is less than Durbin Watson, this implies that, the variable said to represent the negative relationship between the variable and findings tend to be stationary which means can be used for prediction. Since coefficient is negative implying to be significant, increase in inflation decline economic growth rate (GDP) thus null hypothesis accepted, with regards to F and T-tests in the table above implying that there is a significant relationship between inflation and economic growth.

That is to say, since the general Prob. F-Statistics (Prob>F = 0.0000) found to be statistically significant at level 5 %, therefore, this indicates that independent variables can jointly attract dependent variable. The Adjusted R-Squared (Adj R-squared) value of 0.2571 implies the good fitness of the study model. Root MSE value of 1.7361 also indicates the non-existence of autocorrelation in the data but also since R- Squared is less than Durbin-Watson implies that the findings are stationary and can be used for forecasting or prediction.

The choice of the lag length

An important preliminary step in model building, cointegration analysis and impulse response analysis is the selection of the VAR lag order. In this thesis, the research study used some commonly used lag-order selection criteria to choose the lag order, such as LR, FPE AIC, SC and HQ.

Table 7: Lag length selection

```

varsoc gdpreal infl open_gdp fdii

Selection-order criteria
Sample: 1978 - 2019                    Number of obs = 42

lag      LL            LR            df            p            FPE            AIC            HQIC            SBIC
-----
0      -489.996                          193331        23.5236        23.5843        23.6891
1      -408.647        162.7            16            0.000        8645.39        20.4118        20.715        21.2392*
2      -384.805        47.683*         16            0.000        6086.51*       20.0384*       20.5843*       21.5278
3      -379.072        11.466          16            0.780        10506          20.5272        21.3158        22.6786
4      -369.606        18.933          16            0.272        16049.1        20.8384        21.8696        23.6517

Endogenous:  gdpreal infl open_gdp fdii
Exogenous:   _cons
  
```

Source: Compiled by the author 2020.

- * indicates lag order selected by the criterion
- LR: sequential modified LR test statistic (each test at 5% level)
- FPE: Final prediction error
- AIC: Akaike information criterion
- SC: Schwarz information criterion
- HQ: Hannan-Quinn information criterion

The above table shows the results of the length of the lag, where lag length 1 is suggested by all the criteria’s (SC, LR, FPE, AIC, and HQ). To select the optimal lag order for the VAR from the above Table 4 it is important to select high enough lags to ensure that the optimal order is not exceeded. This study has chosen lag length 4 chosen by all criteria’s and because the choice of lag length can drastically affect the results of the cointegration analysis (Brooks, 2008).

Tests for Cointegration

Since the data are proved to be non-stationary at levels, the existence of cointegrating relationship between independent variable and dependent variable in the model is examined. The study applied Johansen Test Cointegration investigates whether there is more than one Cointegration relationship among the variable of interest. The variables must be non-stationary at level but when we convert them into first differenced, they must be stationary. Our variables FDII, INFL, OPEN, and GDP are non-stationary at level but when we convert them into first difference, they will be stationary. The Cointegration test results are shown in Table 8 and 9. The guideline is that, when the Trace statistic is more than 5% Critical value we can reject the Null hypothesis and accept the Alternative hypothesis. Our Null hypothesis here called zero and zero is the Null hypothesis meaning that there is no cointegration. If that, Trace statistic is less than 5% Critical value we can accept the Null hypothesis and reject the Alternative hypothesis meaning that there Cointegration.

Table 8: The Co-integration Variables Results

| Maximum | Eigenvalue | Trace statistics | Critical value at 5% |
|---------|------------|------------------|----------------------|
| 0 | | 61.6491 | 47.21 |
| 1 | 0.62769 | 18.1764 | 29.68 |
| 2 | 0.19909 | 8.4082 | 15.41 |
| 3 | 0.12486 | 2.5396 | 3.76 |
| 4 | 0.05608 | | |

Source: Compiled by the author 2020

According to Johansen Test, Cointegration interprets the table as follows:

Rank 0: We can reject the Null hypothesis because the Trace statistic of 61.6491 is more than 5% Critical value of 47.21 and accept the Alternative hypothesis. Our Null hypothesis here called zero and zero is the Null hypothesis meaning that, there is no cointegration.

Rank 1: We can accept the Null hypothesis because the Trace statistic of 18.1764* is less than 5% Critical value of 29.68 and reject the Alternative hypothesis meaning that there is one cointegration in the Johansen Test Cointegration

Rank 2: We can accept the Null hypothesis because the Trace statistic of 8.4082 is less than 5% Critical value of 15.41 and reject the Alternative hypothesis meaning that there is one cointegration in the Johansen Test Cointegration

Rank 3: We can accept the Null hypothesis because the Trace statistic of 2.5396 is less than 5% Critical value of 3.76 and reject the Alternative hypothesis meaning that there is one cointegration in the Johansen Test Cointegration.

Output from Rank1 to Rank 3 Shows that, there is a long-run relationship or between the dependent and independent variable and associations also from the table above shows that trace statistics is less than the critical value at 5% this means that null hypothesis cannot be rejected, meaning that there is a long-run relationship between the variables.

Table 9: Johansen Tests for Cointegration Result (max statistics)

| Maximum rank | Eiguvalue | Max statistics | Critical value at 5% |
|--------------|-----------|----------------|----------------------|
| 0 | | 43.4727 | 27.07 |
| 1 | 0.62769 | 9.7682 | 20.97 |
| 2 | 0.19909 | 5.8686 | 14.07 |
| 3 | 0.12486 | 2.5396 | 3.76 |
| 4 | 0.05608 | | |

Source: Compiled by the author 2020

According to Johansen Test Cointegration interprets the Table as follows:

Rank 0: We can reject the Null hypothesis because the Trace statistic of 43.4727 is more than 5% Critical value of 27.07 and accept the Alternative hypothesis. Our Null hypothesis here called zero and zero is the Null hypothesis meaning that there is no cointegration.

Rank 1: We can accept the Null hypothesis because the max statistic of 9.7682 is less than 5% Critical value of 20.97 and reject the Alternative hypothesis meaning that there is one cointegration in the Johansen Test Cointegration

Rank 2: We can reject the Null hypothesis because the max statistic of 5.8686 is less than 5% Critical value of 14.07 and reject the Alternative hypothesis meaning that there is one cointegration in the Johansen Test Cointegration.

Rank 3: We can reject the Null hypothesis because the max statistic of 2.5396 is less than 5% Critical value of 3.76 and reject the Alternative hypothesis meaning that there is one cointegration in the Johansen Test Cointegration.

Therefore: Output from Rank1 to Rank 4 Shown that there is a long-run relationship or between the dependent and independent variable and associations also from the table above shows that trace statistics is less than the critical value at 5% that means that null hypothesis cannot be rejected, meaning that there is a long-run relationship between the variables.

The decision of discussion of finding is that: There are two statistics one is Trace statistic and other is Max statistic. The trace and Max statistic we have seen that variables of Rank 1 to Rank 4 are cointegrated and they have one cointegration. Both tests it has been double-checked, double confirmed that our variables are

cointegrated or they have long-run association ship and we can easily run Vector Error Correction Model (VECM).

Error Correction Model for Cointegration Testing

Having checked for cointegration between economic growth and inflation variables, the ECM is tested to capture the short run and long run between the variables in the model. ECM reflects attempts to correct for deviations from the long-run equilibrium path or disequilibrium transmitted in every period to economic growth. Usually, the ECT have (-1). ECM is conducted and the lag of order is determined by using AIC and the results are presented in the table below.

Table 10: Vector Error Correction Model (VECM) Test

| Variable | Coefficient | Std Err | Z | P-Value |
|-------------|-------------|-----------|-------|---------|
| GDP | 1 | | | |
| INFL | 0.1020691 | 0.0265373 | 3.85 | 0.000 |
| OPEN | 0.062592 | 0.0185045 | 3.47 | 0.001 |
| FDII | -0.1055699 | 0.1185226 | -0.89 | 0.373 |

Source: Compiled by the author 2020

To interpret Johansen Normalization the coefficient must be reversed which mean that it shows that the negative coefficient of positive treated as negative same applied to negative treated as positive therefore. Negative Coefficient 0.1020691 imply significant relationship exists between the dependent and independent variable with the P-value of - 0.000 at level 5 % imply the existence long-run causality running from INFL to Economic growth (GDP). This shows that, the negative coefficient of 0.642592 which is significant relationship exists between the dependent and independent variable with the P-value of -0.94 at level 5 % imply the existence long run causality running from OPEN to Economic growth (GDP). This shows that the positive coefficient of 0.1055699 which is significant relationship exists between the dependent and independent variable with the P-value of 0.373 at level 10 % implies the existence of log run causality between a dependent variable and independent variable. Have witnessed that there is long run relationship between inflation rate and Economic growth in Tanzania from 1974 to 2019.

Granger Causality Test Results

The Granger causality Wald test results are reported in Table below. We decide on the causality based on the value of the probabilities. Our null hypothesis is that each variable taken individually does not Granger cause the other (s). If the probability value of any given combination of two variables is less than 5 %, then we reject the null hypothesis and conclude that Granger causality exists between the two in which case the direction of causality runs from the excluded variable to the equation variable (dependent variable).

Table 11: Granger Causality Wald Tests

| Equation | Excluded | Chi 2 | Df | Prob>Ch2 | Remarks |
|----------------|-----------|---------|----|----------|-----------------|
| GROWTH | FDILOG | 3.1582 | 2 | 0.206 | No causality |
| GROWTH | INFLLOG | 16.92 | 2 | 0.000 | INFLLOG→GROWTH |
| GROWTH | OPENLLOG | 19.502 | 2 | 0.000 | OPENLLOG→GROWTH |
| GROWTH | ALL | 58.645 | 6 | 0.000 | ALL→GROWTH |
| LOGFDII | GROWTHLOG | 0.20647 | 2 | 0.902 | No causality |
| LOGFDII | OPENLOG | 1.8041 | 2 | 0.606 | No causality |
| LOGFDII | INFLLOG | 1.2172 | 2 | 0.544 | No causality |
| LOGFDII | ALL | 2.7163 | 6 | 0.844 | No causality |
| LOGINFL | GROWTH | 1.9133 | 2 | 0.384 | No causality |
| LOGINFL | FDILOG | 3.6501 | 2 | 0.161 | FDILOG→INFL |
| LOGINFL | OPENLOG | 2.4133 | 2 | 0.299 | No causality |
| LOGINFL | ALL | 7.6715 | 6 | 0.263 | No causality |
| LOGOPEN | GROWTHLOG | 0.0159 | 2 | 0.992 | No causality |
| LOGOPEN | FDILOG | 2.9683 | 2 | 0.227 | No causality |
| LOGOPEN | INFLLOG | 1.8209 | 2 | 0.402 | No causality |
| LOGOPEN | ALL | 8.1612 | 6 | 0.227 | No causality |

Source: Compiled by the author 2020.

The results in the above Table shows that, LOGINFL and LOGOPEN taken individually Granger cause GROWTH at 5% and 10 % significance level and the direction of causality is indicated by the arrow in the Table. Also, when taken together, the variables LOGOPEN and, LOGINFL jointly Granger causes GROWTH. However, it appears that there is Granger cause between GDP growth and the dependent variable (INFL).

In the first equation, it is only GROWTH that appears that there is Granger cause LOGINFL, LOGOPEN on GDP growth. When taken together, however, that is when they are considered jointly, they appear to Granger cause between these three variables, since the probability is less than 5% or 10 %.

In the second equation, it is only appear that there is no Granger cause LOGOPEN, LOGINFL, LOGFDII. When taken together, however, that is when they are considered jointly, they appear that no Granger cause between two variable, since the probability is greater than 5% or 10 %.

In the third equation, it appears that there is no Granger cause between, LOGFDII, LOGOPEN LOGINFL, and GROWTH. When taken together, however, that is when they are considered jointly, they appear to Granger cause to all dependent variable, since the probability is less than 5% or 10 %..

In the fourth equation, there is no causality relationship of LOGOPEN, LOGINFL and LOGFDII to Economic growth (GDP). When taken together, however, that is when they are considered jointly, they appear to have no Granger cause LOGGEV, since the probability is greater 5%. In the fourth equation, there is a no causality relationship of LOGINFL, LOGOPEN GROWTH since the probability is greater than 5 %. In the first and third equation, there is causality relationship of LOGINFL t to GDP growth therefore, accept the null hypothesis and conclude that there is a direct causality relationship between INFL to GDP growth from 1974 to 2019 in Tanzania.

1.9 Conclusion

The main reasons for conducting this study was after finding out that, Tanzania has been experiencing high levels of economic growth fluctuation in the recent years. Also, the high significance level of Economic growth to other developing countries like neighbours countries such as Kenya, Uganda, Rwanda and Burundi and some emerging economies such as India, China, and Nigeria is among some of the reasons for conducting this study. There are many policies and programs that the government has put in place and implemented since 1990 to promote Economic growth and to maintain price stability but still, much effort is needed to be done by both

policymakers and responsible authorities to ensure economic growth and price stability of goods and services as found in this study that, there is a negative relationship between inflation and Economic growth. From the applied Regression Analysis – Multiple linear regression (MRM) method to analyze the time spanning 28 years data (1990-2017) the results showed that, the Foreign Direct Investment (FDI), Exchange rate and the Unemployment rate were the key determinant of foreign direct investment into the country. Inflation rate (INFL) was found to be significant at level one per cent but with the negative sign which was opposite to our expectation implying that, the Inflation rate (INFL) and Economic growth have a negative relationship in Tanzania.

1.10 Recommendations

The study recommends taking into consideration favorable economic policies to reduce inflation in our economy. Specifically, fiscal policy and monetary policies should be considered because these policies have revealed that, inflation affects economic growth. It is recommended that it is essential to reduce inflation rate by implementing the proper and appropriate economic policies for economic growth consistently. Also the government should promote economic growth by taking action toward controlling inflation rate in the economy in the sense that, monetary policy and fiscal policy should be adapted to control inflation rate to the extent that this should not affect the economy of the country.

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