INFLATION DYNAMICS AND ECONOMIC GROWTH IN RWANDA (2006Q1-2019Q4)

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN DATA SCIENCE IN ECONOMETRICS IN THE AFRICAN CENTRE OF EXCELLENCE IN DATA SCIENCE, COLLEGE OF BUSINESS AND ECONOMICS (CBE), UNIVERSITY OF RWANDA

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December 2020

DECLARATION

I declare that this dissertation entitled "**Inflation Dynamics and Economic Growth in Rwanda (2006Q1-2019Q4) ‘’** is the result of my own work and has not been submitted for any other degree at the University of Rwanda or any other institution.

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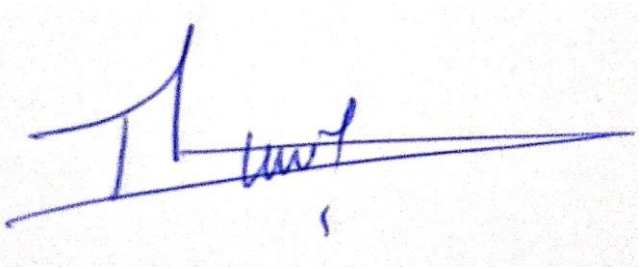
Signature: 

APPROVAL

This dissertation entitled "**Inflation Dynamics and Economic Growth in Rwanda (2006Q1-2019Q4) ''** written and submitted by **Theogene NIYIZURUGERO** in partial fulfilment of the requirements for the degree of Master of Science in Data Science majoring in Econometrics is hereby accepted and approved. The rate of plagiarism tested using Turnitin is 18 % which is less than 20% accepted by the African Centre of Excellence in Data Science (ACE-DS).

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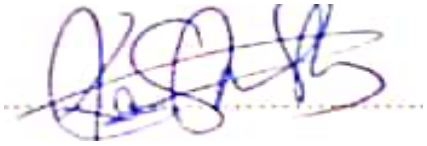

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17.8.2021

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Head of Training

DEDICATION

To my

To my brothers and sisters;

To my relatives and friends;

To my colleagues.

ACKNOWLEDGEMENTS

The realization of this study was made possible by the support and assistance of many people whom I am duly grateful.This laborious work would not have been a success without moral and financial support and guidance from various persons.

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God bless you all

Abstract

It is now widely agreed among economists, policy makers and central bankers that the main objective of macroeconomic policies is to achieve a high economic growth rate while maintaining a low inflation rate; it is also believed that a high inflation has an adverse effect on economic growth. But how low should be the inflation rate not to impact negatively on economic growth? Monetary authorities in Rwanda have been targeting an inflation level of around 5% for economic policy purposes. Was this inflation target the most appropriate for economic growth?In the current work, it is intended to assess the dynamism of inflation and economic growth over the period 2006Q1-2019Q4using econometric approach .general objective of the work was to assess the dynamism of inflation on economic growth with specific objective to identify existence of a long run or short run relationship between inflation and economic growth in Rwanda economy, to measure the degree of responsiveness of change in GDP growth rate due to change in general price level. The estimated results of 1% change to inflation increased economic growth by 0.03%,1% change to investment increased economic growth by 0.04%.1% depreciated on exchange rate increased economic growth by -0.21%, the degree of responsiveness , the results of responsiveness showed that the price is elastic as the elasticity value(1.33) is greater than 1, and it implies that one unit change in inflation increased economic growth by 1.33 Per cent, where its R^2 is equal to 0.944477 , the results also indicated that economic growth and inflation affect each other positive In long-run during the period of the study. The researcher founded that the short-run variable that can help policymakers to predict economic growth were exchange rate (endogenous variable). I am inviting ministry of finance and economic planning and other economic agents to apply exchange rate policy for better economic growth.

Keywords: Economic growth, Inflation, Investment, exchange rate

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LIST OF SYMBOLS AND ABBREVIATIONS

AD = Augmented dickfuller

AIC = Akaik information criteria

AS = Aggregate supply

BNR = Bank National du Rwanda

CPI = Consumer Price Index

DF-GLS = Dickey-Fuller General Least Square method

EAC = Easter African Community

ECM =Error Correction Model

EMDEs = Emerging Market and Developing Economies

EXR = Exchange rate

GDP = Gross Domestic Product

INVT = Investment

IV = Instrumental Variable

K = Capital,

L = labor,

l**n(.)** = Natural logarithm

MINECOFIN =Ministry of Finance and Economic Planning

NAIRU = Non-Accelerating Inflation Rate of Unemployment

NBR =National Bank of Rwanda

NISR =National Institute of Statistics of Rwanda

OLS = Ordinary Least Square method

Q1 = Quarterly one

Q3: = Quarterly three

Q4 =Quarterly four

SBIC = Schwartz Bayesian Criterion

Ꞇ = Land

TAR =shocksAuto Regressive

VAR = Vector Autoregressive method

VECM = Vector-Error correction method

Γ = output

CHAPTER 1:

GENERAL INTRODUCTION

1.0.Introduction

The relationship between economic growth and inflation dynamics remains controversial or somewhat indecisive in the world, the debates on the type of existing relationship between these variables continue to be a no consensus among scholars. Rising in price level of a given countries is recognized by most economist to be inflation. In economic growth, increase in price level in considered being either advantageous or harmful as both empirical and theory evidence remain controversy. The monetarist believes that inflation is harmful to economic growth while the view of monetarist is that inflation is necessary for economic growth. Most countries, according to the macroeconomic policy, the main objective is to enhance sustainability of economic growth with price stability. For that reason, in monetary policy; price stability and productivity growth in fiscal policy should be evaluated, monitored, coordinated and evaluated accurately. Maintaining stabilization of price and sustainability of economic growth at the same time can sometime be hard to achieve for policy makers.

Around the world, all central banks are committed for achieving at low rate level of inflation due to the fact that it contributes to economic growth or economic development particularly by raising the welfare level. But, There are some economic concepts obviously state that moderate inflation is a one that stimulate economic growth (Mubarik, 2005). Also, according to (Feldstein, 1982; Khan and Senhadji, 2001; Ocran, 2007), inflation spiral and rational expectation, gradually rising the level of price can transform into high level of price and macroeconomic uncertainty that is harmful to economic growth.

The search on existing relationship has made been since 1980s, when after the main monetarism provisions in the central banks activity has been implemented. Practitioners and scientists faced an unexpected increase in inflation due to monetary factors. Nowadays, due to the introduction of inflation targeting mechanisms in most countries, inflation remains at a low and controlled level

for governments and central banks, but in developing countries, the challenge of anti-inflation policy is relevant.

Not surprisingly, the existence and nature of the relationship between inflation and economic growth has become the subject of an extensive body of theoretical and empirical studies (Temple, 2000)

1.1. Background of the study

Sustaining strong economic growth along with very low inflation is a key and fundamental goal of the country's macroeconomic policies in both developed and developing countries (Chimobi.2010). In essence, the rate of economic growth is mainly dependent on the rate of capital accumulation, and the rate of capital formation is dependent on the rate of savings and investment. The main problem is whether economic growth is influenced by inflation.

High inflation rate is and could hardly be favorable to economic growth (Niyimbanira, 2013). Aftereffect of inflation can easily be inferred. Given a constant set of prices today, a situation of relatively much more chasing the same amount of bundle of service and goods tomorrow or in the following day with a constant real wage income simply indicate the adjustment in patterns of consumption. Today, the same amount of bundle of good and service consumed cannot be consumed tomorrow. Henceforth, according to (Maku and Adelowokan, 2013); a decrease in consumption capacity and standard of living is imminent. Inflation may also decrease the global competitiveness of a nation by making its exports comparatively more expansive, impacting the balance of payments (Atkinson and Milward, 1998).

In the short term, Luppu (2009) found that inflation and GDP growth in Romania have a positive relationship. This assumes that GDP must also grow in the short run as inflation rises. GDP, however, may also decrease as inflation declines. Drukkeret al. (2005) identified that inflation increases do not have a statistically significant impact on growth if the inflation rate is below 19.6 percent, but further inflation increases would reduce long-term growth when inflation is above 19.6 percent. This statement is in line with Luppu (2009), but it only sets a threshold above which

Luppu's (2009) statement will not hold. Mallik and Chowdury (2001) have identified a long-term positive relationship between South Asian countries between the growth rate of GDP and inflation.

Cross-country studies have found that inflation negatively impact economic growth, including Fisher (1993), Barro (1996) and Bruno and Easterly (1998). Fisher (1993) and Bruno (1996) have discovered that inflation has a very small adverse impact on the conduct of economic growth behavior. But Fisher (1993) concluded that one clear conclusion can be drawn, although the evidence is weak: inflation is not good for long-term growth.Khan (2002) also argued that inflation decreases the foreign competitiveness of a country by making its exports comparatively more costly, impacting the balance of payments negatively. Second, there is a positive relationship between inflation and economic growth, according to Tobin (1965), Shi (1999), Mallik and Chowhury (2001) and Gokal and Hanif (2004). Again, Feldstein (1996) states that "shifting the inflation equilibrium rate from 2 percent to 0 percent would result in welfare gains equivalent to about one percent of GDP per year."

Globally, economy grew by 3.6 % in 2018, lower than 3.8 % in 2017, in 2016 and 2015 there was a constant growth of 3.4 percent which is lower compared to 3.6 percent in 2014; in 2013 and 2012 also growth rate was the same at 3.5 percent lower compared to 4.3 % in 2011. EAC Economy represent a growth rate higher that general global economy, in 2011 rate was 6.9 % but fall to 4.5 percent in 2012, this rate increased to 6.1 percent in 2013 and fall to 5.9 percent in 2014, and rise to 6.1 in 2014 but decrease to 5.4 percent in 2016 and increased to 5.6 in 2017, this increase go on to 6.3% in 2018. Also, globally annual average inflation behavior in 2010 was 3.74 and increase to 5.05 in 2011, this inflation decrease to 4.07 in 2012, continue to decrease to 3.66 in 2013 to 3.23 in 2014 to 2.77 in 2015 and to 2.76 in 2016, it raised to 3.20 in 2017 and fall to 3.04 in 2018. Nationally, in Rwanda, GDP growth rate in 2015 was 8.9 while its inflation was 2.5 percent, in 2016 and 2017 growth rate was 6 and 6.1 percent respectively and inflation of 5.7 and 4.8 % respectively, in FY11/12 and FY12/13 GDP growth rate was 8.3 and 6.7 with inflation rate of 7.5 and 4.6 percent both respectively, in FY13/14 growth was 4.5 % with inflation of 3.4% while in FY14/15 and FY15/16 experience a constant growth 8.6 percent but different inflation rate of 1.3

and 4.1 respectively while in FY 18/19 this growth and inflation rates was 9.5 and 0.9 percent respectively.(BNR Annual report 2018 and 2019).

There has been considerable controversy about the current form relationship between inflation and economic growth in recent years, with some academics believing differently in inflation action on economic growth, such as those in favor of monetarist views and structural and Keynesian views. Due to these economic controversies among different scholars, the current study will conduct the existing effect of economic stability measures such as inflation, Exchange rate and Investment on economic growth in Rwanda. This study will focus on assessment between inflation dynamics and economic growth rate in Rwanda and highlight the existing relationship between these main macroeconomic variables vice versa for providing support on economic stabilization in Rwanda.

1.2. Problem Statement

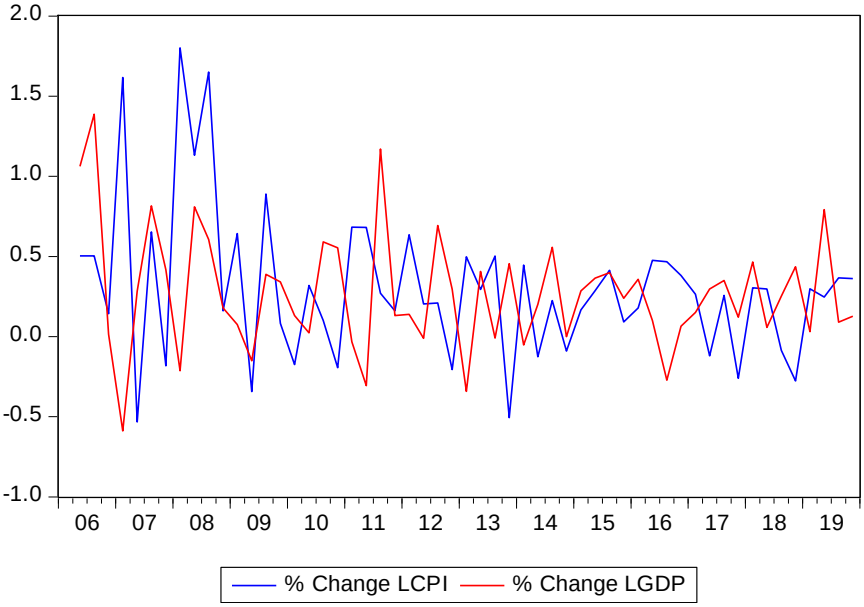
Recently, the question of whether or not inflation dynamics are detrimental to economic growth has been the subject of intense debate among macro-economists and policymakers, and the search for the current association between inflation and economic growth remains important for governments and central banks in several countries around the world. Whether inflation is really necessary for economic growth to be successful or detrimental to growth is a key question.

Farajikasidi and Kenani Mwakanemela (Journal, A. (2015),research has been carried out on the current relationship between inflation and economic growth in Rwanda , they use Consumer Price Index and GDP from 1990 to 2011, the result showed that, as a result of the general price levels, the degree of responsiveness of the shift in GDP was inelastic to the tune of -0.8, only short term relationship between these two variables was found, and they found that inflation impact negatively economic growth indicating that inflation is harmful to economic growth in Rwanda . In this study, they use only two variables; they forget to insert other variables which influence economic growth such as exchange rate, money supply and small sample size data was used as data arranged annually while the period range was short.

Rwanda has been implementing comprehensive economic stabilization programs with the

financial and technical assistance of the International Monetary Fund and other development partners. As it is well known, in such IMF supported programs, low inflation is a key element of the policy package whose objective is to achieve macroeconomic stability and a sustained high economic growth rate.

Figure 1:Trend of Percentage change of LGDP and LCPI in Rwanda.



During the implementation of successive economic programs, an inflation rate of around 5% was used as a policy target; this target was met most of the time, but was missed at times, notably due to external and internal supply shocks.

Estimated Inflation threshold in Rwanda have been changed several times, and the level of inflation has been higher compared with the level of inflation in developed and emerging

economies. Change in inflation threshold present a dynamic inconsistency challenge to policy makers. The implication of dynamic inconsistencies is that macroeconomic policies formulated on the basis of inconsistent inflation forecasts may have a negative impact on economic growth.

The inflation-growth nexus controversy has remained persistent and has drawn significant analytical and theoretical effort. Motivated by this economic controversial, this research will conduct assessment of inflation dynamics on economic growth in Rwanda. Inside, it will also assess long run and short run relationship between inflation and economic growth and finally, the degree of responsiveness of the change growth rate of GDP due to the change in the general price level was calculated.

1.3. Objectives of research

1.3.1. General Objective

The general objective of the study is to examine the inflation dynamics on economic growth in Rwanda.

1.3.2. Specific Objectives of the study

Specifically, the research aimed at achieving the following three objectives as highlighted below;

1) To identify the types of shocks of economic growth and inflation in Rwanda.
2) To identify existence of a long run or short run relationship between inflation and economic growth in Rwanda economy.
3) To measure the degree of responsiveness of change in economic growth rate due to change in general price level.

1.4. Research Hypothesis

1) Economic growth and inflation has positive and negative shocks.
2) Inflation influence significantly economic growth in Rwanda.
3) There exist a significant short run relationship between inflation and economic growth.

1.5. Research questions

1) Is there a significant relationship between economic growth and inflation, vice versa?

2) Is there an existence of short or long run relationship between inflation and economic growth? If so which type of relationship (negative or positive)?
3) Is there a stability of Rwandan economy?

1.6. Justification of the study

This study is very important to policy makers, central bankers, academicians and financial analyst for monetary policy decision making. In order to conduct monetary policy, NBR has been anticipated a shift from monetary regime to price based monetary policy framework. It is for that reason before setting inflation objectives, monetary authorities have to establish optimal level of inflation which is helpful in the coming years for enhancing sustainability of economic growth. Again, it is usually necessary for all policy makers to have a doubt about the existing type of relationship between inflation change and economic growth, this relationship still remain inconclusive as scholars found this relationship to be either negative, positive on neutral .

Motivating by previous studies on these two macroeconomic variables, this study will conduct assessment of inflation dynamics on economic growth in Rwanda, due to price change behavior now day and thus filling the existing knowledge gap.

1.7.Organization of the Research

This research was divided into five chapters: Chapter one is general introduction and it is composed by the background of the study, Statement of the problem, Objectives of the study, Research hypothesis, Research questions, Justification of the study. Chapter two presents the literature in relation to the topic under study, this chapter deals with the definition of key concept, theoretical Reviews, conceptual framework, critical Reviews and partial Conclusion. Chapter three briefly highlights the various research methods; simply this chapter indicates the model specification, Estimation Procedure and data analytics methods .Chapter four will present the data analysis and interpretation of the results. It shows the index of data analysis in a scientific way using various tools such as tables, graphs, charts, etc. Chapter five includes summary of findings, conclusion and recommendations. The researcher analyzes and interprets summarized findings

against known practices as elaborated the research questions. Conclusions were b based on the research findings and analysis done, and then possible implications are also indicated.

Finally, I provided recommendations on what should be done to boost economic growth as well This is where the research will be combined, both qualitative and quantitative, so as to gain an insightful analysis of the relevant facts and figures in explaining the effect of inflation and economic growth.

CHAPTER 2:

Literature Review

2.0. Introduction

Both in developing and developed countries, there have been extensive number of studies carried out to test the existing relationship between two major variables in economics (Inflation dynamic and economic growth rates). The reviews of different studies that tested the type association between inflation and economic growth rates have been reached through various conclusions theoretically and empirically regarding the effect between these two macroeconomic variables. Hence, this section presents brief different reviews of theoretical and empirical studies which clarify the impact of inflation on economic growth.

2.1. Theoretical Review

Economic theories achieve multiplicity conclusions regarding the responsiveness of rate of output growth on inflation behavior. These theories are more useful because its account on observed phenomenon. Based on the historical phenomenon, while there is no 'persistent inflation,' the early inflation-growth hypotheses are also based on cyclical observations. Persistent inflation is considered a phenomenon of post-World War 2. Before, inflation sessions were accompanied by deflation sessions. At the moment of no downward or upward trend, inflation activity resembles 'lazy dog'. Until there is unrest, inflation remains at a specific level in that period, unless. Then, it moves to the extra stage at which it settles. As a result, the hypothesis attempted to account for positive association between inflation and growth rates.

The framework of AS-AD (Aggregate Supply-Aggregate Demand) similarly show a positive association between inflation rate and growth where increase in inflation is accompanied by the increase in economic growth. The level of validity on positive relationship between the two variables has been questioned in 1970s, the period where the concept of stagflation gained reputation. At that time, was widely accepted and the Phillips curve relationship have been appeared to not hold. This has been evidenced by period of negative or low output growth, where

inflation was historically at high rates. In this period, around the world there was an experience of massive unemployment and the price rose sharply.

2.1.1. Money and Monetarism

Monetarism has various important features, which focus particularly on the long-run supply side characteristics of the economy contrary to short-run dynamics. The term "Monetarism" has been coined by Milton Friedman who emphasized a number of key long-run properties of the economy, he include neutrality of money and quantity theory of money. The quantity theory of money associated economic growth and inflation by equating the total amount of money in existence to the total amount of spending in the economy. Friedman M. (1996), "inflation may be produced only by rapid increase in the quantity of money than output and inflation is always and everywhere a monetary phenomenon".

He has also challenged the Phillips Curve concept and his argument was centered on based on the evidence of an economy where there is a doubles of cost everywhere. Peoples have to pay doubles as much for goods and services, nonetheless they don't mind, since their wages are also double as large. People forestall the future inflation rate and incorporate its impacts into their behavior. As such output and employment are not affected. As result, economists call this theory the neutrality of money. When the equilibrium values of real variables including the GDP are independent of the money supply in the long-run, hence the neutrality holds. On other hand when the real variables including the GDP growth are independent of growth rate in the money supply in the long-run, then Super neutrality holds. It would be harmless in case inflation worked in this manner. In actual though, rate of inflation does not have real effects for other macroeconomic variables. Through its effect on investment, capital accumulation and exports, inflation rate can adversely affect a growth rate of a country. Generally, monetarism proposes that prices are mainly affected by the rate of growth in money, whereas there is no real effect on growth rate both in the long-run. If the economic growth rate is less than money supply growth, hence inflation will result.

2.1.2. Neo-classical Theory of economic growth

Swan (1956) and Solow (1956) have postulated the earliest neo-classical. The specified model exhibited diminishing returns to capital and labor separately with constant returns to jointly both factors. Investment (growth of K) has been replaced by technological change as the primary factor that explains the long-term growth.

Its level has been assumed by the Slow and further growth theorists to be definite exogenously and it behaves independently to all other factors which include rate of inflation (Todaro, 2000). The mechanism relating output growth and inflation distinct from the excess demand for commodities was first articulated by Mundell (1963). According to him, a rise in inflation expectation or inflation change lessens the wealth of population immediately. This mechanism take place in case there is a fall of the rate of return on individual's real money balance. People take a decision to increase their price, save more by switching to assets, and therefore driving down the real rate of interest both in order to accumulate the desired wealth. Hence, faster output growth results from greater capital accumulation from grater savings.

2.1.3. Classical Theory

There are number of growth theories that have been put in place by classical theorists with the objective to understand Cleary the cause of economic change. The classical growth model foundation was set by Adam Smith who hypothesized a supply side driven growth model and production function as follows;

$\gamma = f(K, L, \mathcal{T})$; where

γ= output, **K**= Capital, **L**= labor, and $\mathcal{T}$= is a Land

Hence, the output growth is related to the inputs such as capital, Labor and land. Therefore economic growth was driven by investment, growth in population, rise in overall productivity and growth in land.

As argued by Smith, growth was self-reinforcing as it exhibited growing the returns to scale. Furthermore, for him the creator of investment and thus growth is savings as main source, hence, he declare that the most important determinants of how slow (or fast) a nation's economic growth would grow is income distribution. He theorized that a decline in profits is due to capitalists competition for workers, but not because of decreasing in marginal productivity and this will results a proposal of wages up. The linkage between the change in inflation rate (or price level) with its tax effects on output and levels of profit, in classical growth theories were not particularly expressed. Zhattau (2013), economic growth is the basis of increase in prosperity and also comes from accumulation of more capital with innovations that lead to technical progress. According to Classical economist, Growth means the increase in the rate of investment, signifying that the growth is a function of share of profit in national income. There is existence of relationship positively between higher rate of growth and higher rate of profit in the long run.

The quantity theory of money is also another aspect of classical theory, it state that in the long run the money does not impact real variables, however price level in an economy can be determined. Even though the association between inflation and economic growth has not been stated in a clear manner in growth of classical theory, but it is implicitly declared that there exists negative relationship between these two macroeconomics variables. With theoretical insight, Boyd and Champ's (2006) analysis states that inflation decreases real return on assets, hence there is a raise in nominal interest rate due to the discourages savings which encourages borrowings. Consequently, an increase in the nominal interest rate discourages investments which discourage economic growth.

Though, the existing relationship between these two macroeconomic variables has implicitly proposed to be negative and this has been showed by decrease in levels of profit of firms' from end to end higher wages costs.

2.1.4. Neo-Keynesian

The term Neo-Keynesians originally has been developed from philosophies of the Keynesians. The concept of "potential output" referred to as natural output has developed under Neo-

Keynesianism. Given the natural and given institutional constraints, this output level produced where the economy is at its optimal level of production. The rate of natural unemployment corresponded to this output level, or what is termed as non-accelerating inflation rate of unemployment (NAIRU). In this specific framework, endogenously, "the built-in inflation rate" is determined and consequently It is a normal working of the country's economy. From this theory rate of inflation depends on actual output level or GDP level and rate of natural employment.

Initially, when the unemployment is above the rate of natural employment and Gross Domestic Product (GDP) falls below its potential level, and holding all other factors constant, then inflation would slow down as suppliers endeavor to fill excess capacity, undermining built-in inflation and decreasing prices which lead to disinflation. Hence, this causes the Phillips curve to shift in the desired direction, toward less unemployment and less inflation. Secondly, if the unemployment is below the rate of natural employment and Gross Domestic Product (GDP) exceeds its potential, holding all else equal, henceforth inflation will hastens as suppliers increase their prices and built-in inflation get worse. As results, the Philips curve will shift to the stagflationary direction; towards greater unemployment and greater inflation. Lastly, on other side when the rate of unemployment is equal to NAIRU and Gross Domestic Product (GDP) is equivalent to its potential, consequently, rate of inflation will not change given that there are no supply shocks. The Neo-Keynesians accept as true that the Phillips curve is vertical in case of long-run. Specifically, the rate of unemployment is given and equal to the rate of natural unemployment, whereas there are a large number of possible rates of inflation that could win out at that unemployment rate.

Nevertheless, one challenge with this theory is that, the exact output potential level and rate of natural unemployment is normally unknown and hence tends to change over time. Again, inflation seems to act in an asymmetric manner, going up faster than it falls, mostly due to the downward rigidity in the prices.

2.1.5. Keynesian Theory

To properly demonstrate inflation versus economic growth relationship, the traditional Keynesian model includes Aggregate Demand (AD) and Aggregate Supply (AS) curves. In this model, in

case of short-run, there is a critical feature where AS curve is upward sloping rather than vertical. Only price is affected only when there is a change on the demand side of the economy and AS curve is vertical. Conversely, both prices and output are affected if there is a change in AS and It is upward slopping (Dornbusch, et al, 1996). This embraces with the detail that many factors drive inflation and output rates in the case of short-run. These involve variability in labor force, expectations, other factors of production prices, and monetary or fiscal policy.

The mentioned factors and shock on the steady state of economy are presumed to balance out when there is a moving from the short-run to hypothetical long-run. As the name put forward, nothing is changing in situation of steady state. There is an adjustment path from dynamic adjustment of short run Aggregate demand and Aggregate Supply and this path exhibits an initial positive association between inflation and growth, but, turns negative towards the latter part of adjustment path.

The positive relationship between the economic growth and inflation rate generally occurs due to the problem of time-inconsistency. Sometime producers feel that only price level of their products have augmented whereas other producers are operating at the same level of price. But in reality overall prices have risen. Hence, the producer goes on to produce more and economic output continues to increase. There are two important features of adjustment process to note , firstly; economy does not move in a straight line to a higher rate of inflation, nevertheless follows a traditional path where inflation rate increases and falls. Secondly, there are times when output lessening and rate of inflation rises. In general, the negative relationship between these two macroeconomic variables is very important, as it quite often happens in practice as find out by most empirical literature. The kind of this phenomenon is called stagflation, once inflation rate increases as output decreases or remains stable.

So, there is no permanent trade-off between the two variables (output and inflation), but there exist short-run trade-off between output and the change in inflation rate. Output growth need be equal to natural rate of growth so that inflation held steady at any level. Inflation rate is sustainable at

any given level of inflation; though, the fall in inflation must be due to period where the natural rate is above output.

2.1.6. Endogenous Growth Theory

The theory growth of endogenous defines economic growth that is created by factors within the process of production. There is only one dependent variable (capital return rate) on growth rate in endogenous growth theory. Inflation reduce return rate which in turn decrease capital accumulation and further lessen growth rate. There are Primary features difference between neo-classical economies and endogenous growth model: - In the version of the endogenous growth models, when return on capital does not decrease below a positive lower bound, hence per capita output continues to upsurge, on other hand, in the neo-classical theory economies, then the return on capital decrease as more capital is accumulated. People will go on to be induced by accumulation of capital only if return rate of capital is sufficiently high. The endogenous growth models focus on the role of externalities in determining the return rate on capital and also permit increasing the return to scale in aggregate productions.

The models of endogenous which explain growth additional with human capital develop theory growth by implying that the rate of growth also depends on return rate to human capital, as well as physical capital. The balanced equilibrium growth hastobe equal to the rate of return on all forms of capital and tax on whichever form of capital induces a lower return. Tax on human capital would cause labor to leisure substitution which lowers the return rate on human capital which also can subordinate the rate of growth, while tax on capital income straightly decreases the rate of growth. Endogenous growth economies versions find that the rate of inflation effects on economic growth are small. Inflation rate rise cause a decline in employment rate, this has been stated by Gomme (1993) who studied an economy comparable to the one specified by Hansen and Cooley. According to his research, efficient allocations content the condition that the marginal cost of the last unit of work is equal to the marginal value of the last unit of today's consumption. People are induced to work less when there is an increase in inflation which decreases the marginal value of

today's last unit for consumption. Marginal product of capital is enduringly decreased due to less labor and this cause the slower rate of capital accumulation.

There is conventional view based on inflation which hold that rate of inflation should not be too high, however should be moderate and stable in order to enhance economic growth. Lucas (1973) in paper of inflation-output tradeoff has been used GDP growth (nominal) as the right hand side variable in regression estimated and ordinary least squares, the assumption implied was that the supply shocks in the error or residuals can influence both real GDP and level of price in opposite direction but do not influence not influence nominal GDP. He posits that inflation should be low in order to boost economic growth by creating "wages and prices more flexible". Tobin (1965), capital and money are perfectly substitutes; therefore, inflation will have a long-run effect positively on growth. Sidrauski (1967) suggests that due to neutrality of money inflation has no impact on economic growth. The money has introduced in utility function during his paper.

Contrary, Stockman (1981) in the "cash in advance model" maintains that capital and money are complementary. In his paper investigated the effect of anticipated inflation on the steady – stated capital stock in an economy, money has introduced through a cash in advance constraint somewhat than through utility functions of the individuals. The finding from this research was that there exists a long-term relationship between economic growth and inflation rate. Conversely, (Dornbusch and Frenkel 1973: 141), if money serves as transitionary through a given "shopping time technology", hence the real effect of money will be behave differentially. "Tax on real balances is represented by Inflation and the real effects for altering that tax depends on what we shoulder about the role and nature of money". However, the association between inflation and tax system might affect lending decisions of consumers and finally dampen investment and affect cost of capital, leading to a decrease in the economic growth, Feldstein (1982).

2.2. **Empirical literatures: Inflation versus economic growth**.

Due to the inconclusiveness of whether high or low inflation is harmful to economic growth, there has been several empirical studies conducted by different researchers on the precise inflation-

growth relationship in or across countries. There empirical studies on existing non-linear relationship between inflation and economic growth starting from early 1990s where mostly nonlinear models has been used. Hence this section presents empirical reviews on relationship between the two macro-economic variables.

The study of Mallik and Chowdhury (2001) investigates the existing long and short-run dynamics of linkage between inflation rate and economic growth. For each country there are different period that had covered in their study, such as 1961 to 1997 for India; 1974 to 1997 for Bangladesh; 1966 to 1997 for Sri Lanka and 1957 to 1997 for Pakistan. In this study, there are two interesting result found: firstly, there is significant and positive linkage between economic growth and inflation for all countries of analysis; secondly, It has been found that there no more sensitivity to change in inflation due growth, as compared to sensitivity of inflation rate, to change in economic growth rate. Similarly, Behera and Mishara (2016) conducted a study on the inflation growth nexus in the context of BRICS countries. The result found in their study shows that there exists long-run positive relationship between inflation and economic growth only in China and South Africa.

ARDL model econometric technique has also been employed, and study found the presence of unidirectional causality from inflation to economic growth in the context of India and bidirectional causality in the case of China. Galbis (1979) had tested the effect of inflation and change in rate of real interest on investment and income behavior for 19 Latin American countries for the period spanning from 1961-73. The result from this study showed the absence of any significant relationship between capital formation or income growth and inflation in most of the countries.

Barro (1995) conducted a study on more than 100 countries. The frequently cited paper by this scholar takes five years average for (quarterly data for the period spanning from 1960 to 1990 and in estimation technique uses Instrumental Variable (IV). Barro tests different specifications by including three sub-samples with respect to inflation regimes where first was low inflation up to 15 percent, the second is moderate inflation ranging between 15-40 percent and high inflation which is above 40 percent and other three sub-groups or samples with respect to time first from

1960-70, second 1970-80 and last 1980-90. The findings from this study show that an increase in inflation rate inhibits growth by 0.2-0.3 percent annually. It control for institutional factors effects and initial conditions to get these results. As scholar, Barro contends that the appeared small effects annually have huge impact on the existing long-run welfare in a society. For example, the results show that a monetary policy modify that increases the long-term inflation rate by 10 percent point impacts GDP after 30 years by 4-7 percent. The above results are supported by Fischer (1993), in the first paper for testing inflation-growth association; he used both cross country and panel data sets. He argues that primarily effects of inflation on economic growth appear through investment uncertainty, in this case the investment might be lower in high uncertainty environments and it can be observed in time series data. The author use a spline regression function to estimate the nonlinear relationship between inflation and growth, and the breaks found to be at 15 and 40 percent inflation rates. Estimated results have confirmed a negative relationship between inflation and economic growth which decrease at higher inflation rate.

Munir and Mansur (2009), conducted non-linearity between Inflation rate and GDP Growth in Malaysia using a dataset from 1970 to 2005 with endogenous shocks autoregressive (TAR) model , they found a negative impact of inflation on economic growth when inflation rate is above 3.89 percent, while there is a positive effect on growth when inflation rate is below this threshold.

Shamin and Mortaza (2005) have applied Co-integration and Error Correction Model (ECM) for examining inflation-growth nexus in Bangladesh, (quartely dataset on real GDP and CPI for spanning 1980 to 2005 have used. The result from this empirical search highlight that there exists a statistical significant long-run negative relationship between economic growth and inflation for the country. Again, the estimated threshold model have suggested 6 % as level of threshold (or structural break point) of inflation above which inflation adversely impact economic growth. In the same Gylfason and Herbertsson (2001) conducted analyses for 17 industrialized and developing countries for period of 1960 to 1992 using technics of panel regression. In their study, they found a negative relationship between inflation rate and economic growth when the rate of inflation ranges between 10 and 20 percent.

Erbaykal and Okuyan (2008) examined the existing type of relationship between inflation and economic growth rate for Turkey by using quarterly data from 1981Q1 to 2006Q2. The methods used during analysis are Co-integration and causality test, WALD test and Bound test. They found that there is a negative relationship between inflation and growth in the short term, but no significant relationship exists between these two variables in the long-term. Result from this study show also that there is unidirectional relationship flowing from inflation to economic growth. Durevall (1998) examined the inflationary process in Brazil, 1968-1985. This study show that the degree of inertia, as specified by coefficient (0.41%) value of lagged inflation. Likewise, Scholar found that an increase in money growth or oil-price inflation, increase also overall inflation. Similarly, inflation increases when devaluation rate of exchange rate increase, but decrease when output growth rises.

Sweidan (2004) examined the existing nature relationship between economic growth and inflation in Jordan for 1970 to 2003. He found that there is a significant positive association between economic growth and inflation.

Conversely, the break point of 2 % found to be threshold level of inflation at a point beyond which there is a negative relationship between the two variables. Mohanty, Chakraborty, Das and John (2011) examined the issue of the existence of threshold effects and the nature of relationship between inflation rate and real GDP growth in India. This empirical analysis used data spanning from period of Q1: 1996-97 to Q3: 2010-11 to capture more recent existing picture of growth inflation nexus. Empirically, the findings from this study clearly suggest that there is a non-linear relationship between these two variables in India. In addition, the threshold inflation level range between 4.0 and 5.5 percent that is statistically significant. Above this range, inflation retards growth rate of GDP in India while below this level of threshold, relationship between inflation rate and growth is statistically positive.

Sarel (1996) investigates the possibility of non-linear effect of inflation on economic growth. The findings from this study show the significant structural break in function which relates economic

growth with inflation. The break was 8 % of inflation rate below which inflation does not cause an impact on economic growth or slightly cause positive effect. On other side when the rate of inflation is above the break of 8 percent, resulted estimated effect of inflation on growth is extremely powerful and significant. Frimpong and Oteng-Abayie, (2010), conducted a study by finding whether Inflation is harmful and if so, at which level particularly in Ghana. Their study estimated the threshold effect of inflation in Ghana from 1960 to 2008, using threshold regression models; the gotten threshold level is 11 percent at which inflation starts to significantly hurt economic growth while below which inflation is likely to have mild impact on economic activities. Other hand, the failure of this study is to check for sensitivity of the estimated coefficients within sub-samples from full sample period in order to establish a new evidence of threshold effect. The study finally takes a conclusion that threshold level below 11% is in right direction and thus highlighting the need to extend the context of analysis to deal with lower levels threshold in search of that evidence.

Inflation, Exchange Rate and Economic growth: monetary policy authorities in Emerging market and developing economies (EMDEs) have long been bothered about existing significant exchange rate fluctuations that can jeopardize price stability and force troublesome policy adjustments. Consequently, some EMDEs have assumed managed currency arrangements or employs forceful policy responses to reduce undesirable currency movements; this practice has been motivated by what has been labeled the “fear of floating” (Calvo and Reinhart 2002). Though, as result the lack of exchange rate flexibility can amplify the effect of external shocks and make it more difficult for a central bank to commentator inflation expectations credibility.

There are empirical studies on nominal exchange rates and present a wide range of estimates of its effect on inflation change. In 1990s Goujoun (2006) argues, basing on his empirical analysis, that inflation in country of Vietnam was induced by exchange rate variations and by an excess of broad money. Practically, change in inflation lead to change in economic growth in global economy. Abbot and De Vita (2011) assessed the impact of inflation on growth under different exchange rate regimes for 125 countries for period spanning from 1980 to 2004. Panel analysis technics

employed, they found that developing countries which adopted flexible exchange rate regimes have experienced lower growth rate compared to those countries adopted fixed or intermediate exchange rates. Semuel and Nurina (2015) investigated the impact of rate of inflation, interest and exchange rates on Gross Domestic Product (GDP) in Indonesia using monthly time series data for period June-2005 to December-2013 by using statistical technics. Demonstrated results from this study was that there is noteworthy negative relationship between GDP and interest rate as well as important positive relationship between GDP and Exchange rates, while inflation rate was not significantly influence GDP.

In summary, the prescribed literature review and as Li (2006) stated, the most recent studies conclude that there is a nonlinear relationship between the two macroeconomic variables. These different studies results confirm that there is strong debate on inflation dynamics (or change) behavior and its effect on economic growth. Hence, this study entails to attempt or conduct an insight assessment of inflation dynamics on economic growth in Rwanda.

2.3. Empirical Review

Musoni J. Rutayisire, 2015 conducted a research on threshold effects in the Relationship between inflation and Economic growth in Rwanda. The estimated threshold level was 12.7% and the result from quadratic regression model provided evidence supporting hypothesis of a non-linear relationship in the inflation-growth nexus in Rwanda, and he concluded that threshold level of inflation above 12.7 % is detrimental to economic growth in Rwanda, this research suggest that the upper limit of the inflation target for policy purposes in this country should be 12.7 percent instead of 5%. Some important issues were not addressed in this study such the impact of inflation variability on output growth. There was a need to investigate deeply the existence relationship between these two variables. In study carried by F.Nkikabahizi et al., 2017, they investigate exiting relationship between Inflation and Real economic Growth in Rwanda. The definitive findings of this study show that there is a negative and important long-term association between inflation, unemployment and real economic grow. In his research, he forget to determine the threshold level of inflation, there was also no others significant indicators which contribute the impact on

economic growth or inflation as they may be one of the most factors which contribute to change in real economic growth and inflation. Due to different characteristic for each country separately, the existence association between inflation dynamics and economic growth has to be determined for each country specific.

For example (Musoni.2015) estimated threshold level of inflation of 12.7% which was above inflation target of 5/+or 3 using (quarterly data spanning from 1968 till 2010, the data used was recent. so, there is a need to update research using current data. F.Nkikabahizi et al., 2017, conduct a study on the macroeconomic variables; they conclude that inflation and unemployment have long-run negative and significant relationship on real GDP. During BNR Economic review vol_13, they shows threshold level of inflation in Rwanda was 5.9 % which was below the EAC inflation ceiling of 8.0% and fall within BNR inflation target. For fiscal year of 2018/2019, inflation falls to 0.9% which was very low and very far from inflation target boundary. After looking on all previous study took place using different type of data and different range period, there was a need to conduct new research on existing relationship between inflation dynamics and economic growth in Rwanda by integrating new variables such as exchange rate and Investment. Officially it will help in understanding how change in inflation respond to change in economic growth, they will come up with ideas for relevant policies implementation in order to keep price rate reasonably that motivate production, the authorities will use this study in examining the degree of responsiveness of change in GDP growth rate due to change in general price level.

CHAPTER3:

RESEARCH METHODOLOGY

3.0. Introduction

This chapter discussed all the relevant concepts and techniques for statistical estimation, as well as the specification of models to be estimated in chap 4. This includes all the econometrics approaches used to estimate the model, analyze the model, and model interpretation. The analysis (quarterly data over the span [2006Q1-2019Q4]) was used.

The data were also obtained from an electronic database, such as from National institute of Statistics of Rwanda, World Bank and National Bank of Rwanda. However, some of the International Financial Statistics Supplement Series Publications were complementary to the data. As normal, the sequence is transformed initially to induce stationary. In order to determine the long-run and short-run effects of the dependent variable on independent variable in a model; the investigator would like to apply the maximum probability estimate to a vector error correction model at the same time.

3.1. Research Design

The overall strategy of interpreting the different components of the study in a coherent and logical manner is a research design to address the research problem effectively (Labaree, 2009). Quantitative research design was used in the study because it requires systematic analytical analysis of measurable phenomena through statistical or numerical data. The goal of this study is to evaluate the assessment of inflation dynamics on economic growth in Rwanda since 2006q1 to 2019q4. In this study, meaning different variables of economic growth worldwide is crucial because it shows the correlation between empirical observation and quantitative mathematical relationship.

Basically, there are three dimensions of quantitative research design, descriptive research that seeks to explain the current state of a variable or phenomenon, correlation design that examines

the relationship between variables using statistical analyses and experimental design that requires the use of scientific method to determine relationship between cause and effect. In the number of variables working, descriptive study is special. Descriptive research can involve several variables for interpretation, like other research styles, but it needs only one variable, unlike other method example (Borg & Gall, 1989) where in cases of seeking to test the relationship between variables, descriptive studies are aimed at finding out "what is", so observational and survey methods are frequently used to collect descriptive data.

For example, by using tests such as Pearson's Product Moment Correlation, regression, or multiple regression analysis that matched this research, a descriptive study might use methods of evaluating correlations between multiple variables because the study used data from multiple variety time series. To study the relationship between the variables under analyses, the study employed an econometric model. The VAR model was used to test the economic growth effects of inflation dynamics. Other researchers such as Albala (2001) in Chile, Fasoranti (2012) in Nigeria, Maingi (2010) in Kenya, (Sharabati et al., 2010) in Jordan have used a similar approach.

3.2. Techniques and Instruments for Data Collection.

The research used secondary data from time series. This was improved by the simple accessibility of secondary data from the database of the government and also by being consistent with previous researchers who also used secondary data such as Fasoranti (2012) Kosimbei (2013). The data was collected from the NBR database and from the National Institute of Statistics and Ministry of Economics and Finance (MINECOFIN) of Rwanda. Several prior inflation and economic growth studies used secondary time series data, although, as seen in the empirical analyses, the time frame and geographical location varied from one study to another. Therefore, this analysis was consistent with previous studies.

3.3. Estimation Techniques

The estimation technics used Econometrics approach by using E-views software and in order to estimate the parameters of models found by the investigator, the Ordinary Least Square (OLS) has

been used. The hypothesis test used these parameter values to determine the level of significance in the model, because of the existence of the dependent variable, this technique was selected. As this analysis is a time series in nature, the time series characteristics of the variables to be modeled, stationary monitoring, and co-integration of the variables were also examined.

3.4. Model specification

In this study McCallum (1980)'s model will be used, because most of the literatures in this study employed this model to test the relationship between the government expenditure and economic growth. So, this study also consumed McCallum (1980)'s model to test the Analysis of the dynamism of inflation economic growth in Rwanda 2006q1-2019q1 using further adding variables.

The relationships between explained and explanatory variables were derived into the following function:

GDP = f (EXR, INVT, CPI,)……

This function was converted into the econometric model; it was derived as:

$$GDP = \alpha_0 + \alpha_1 CPI + \alpha_2 INVT + \alpha_3 EXR + \mu t \text{ ……..……}$$

Where:

GDP=Gross domestic product, EXR= exchange rate, CPI= Consumer price index and INVT =Investment, μ = error tem and α = coefficients or parameters

$$\ln GDP = \alpha_0 + \alpha_1 \ln(CPI) + \alpha_2 \ln(INVT) + \alpha_3 \ln(EXR) + \mu t \text{ ……..……..}$$

3.5. Tests of unit root and Stationarity

Several time series display a pattern or non-stationary behaviour. If a series is non-stationary, and if a stationary co-integration relationship is not coupled with other non-stationary series, then the spurious regression can be induced by the regressions involving the series. Due to its capacity to represent false relationships between variables, spurious regression is misleading. It is important to perform pre unit root tests in order to understand the underlying data generation process for the application of appropriate methodology before any empirical estimation is carried out. Schmidt, and Shin (1992 KPSS). Before their pros and cons are illustrated, various parametric and non-parametric pre-testing approaches are discussed in this subsection. In order to analyse the stationarity of time series results, several approaches can be carried out. But the Augmented Dickey-Fuller (ADF) test, Phillips- Perron test (PP) Kwiatkowski, Phillips, Schmidt, and Shin (KPSS, 1992) test are the most common approaches. In this study we only performed the ADF test.

Stationary unit Root test the choice of the most suitable unit root test is difficult in practice. Ender (1995) proposed that the Augmented Dickey Fuller (ADF) (1981) test uses the unit root test as a safe alternative. For unit root analyses, the Augmented Dickey Fuller (ADF) test is commonly applied. We will therefore perform the commonly used method of unit root test, the ADF test, on the variables CPI, INVT, EXR, and GDP for Rwanda, to test stationarity. The unit root tests were carried out at the level of the pattern and the intercept term and at the first difference. By using the Akaike knowledge Criterion (AIC), the optimum lag was chosen.

3.6. Johansen Approach

Engle and Granger are evolving the idea of co-integration. If two or more series are non-stationary themselves, but a linear combination of them is stationary, then it is stated that the series is co-integrated. In general, to test cointegration, two approaches are widely applied. One is the Engle Granger test that is used for a single series only. The Johansen that is acceptable for a multivariate case is an alternative. The setup of Johansen makes the test of hypotheses about the long run balance between the variables. This research uses the Johansen co-integration technique to

examine the relationship between CPI, INVT, EXR, and GDP for Rwanda. The Johansen test is enhanced by the order k Vector Auto regression (VAR) provided by (Hjalmarsson and Osterholm 2007).

$$y_t = \mu + \beta_1 y_{t-1} + \beta_2 y_{t-2} + ... + \beta_k y_{t-k} + \mu_t \quad (12)$$

Where $\boldsymbol{Y_t}$ is $N \times 1$ column vectors of dependent variables which are integrated of order one. $\boldsymbol{ut}$ denotes a $N \times 1$ column vector of innovations.

The most used technique is called "Johansen co-integration" to evaluate if two or more series are in a long-run relationship, which means that two time series are co-integrated. Before using Johansen co-integration, it should be tested whether the time series are at the level and incorporated in the same order that they become stationary. With Johansen co-integration, it is tested the following null.

Hypotheses:

Null hypotheses	Decisions
H_{01}: There is none cointegration	Reject H_{01} if $p<0.05$
H_{02}: There is at least one cointegration	Reject H_{02} if $p<0.05$
H_{03}: There is at least two cointegrations	Reject H_{02} if $p<0.05$

3.7. Optimum lag selection criteria

Further, optimum lag selection criteria are employed to choose the appropriate lag, as it is essential for using any advanced econometric techniques such as Cointegration test, and Granger-Causality test. For this study, five lag order selection criterion such as Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC) and Hannan–Quinn Information Criterion (HQ) have been used to select the optimum lag, the lowest value of each criterion will be selected as the optimum lag.

3.8. Granger causality test

Granger's Causality Test (Granger, 1969/1981) is used to examine for the forecasting relationship between two variables. The co-integration test ignores the effect of the past values of one variable on the current value of the other variable. The Granger causality test was hence used to examine such possible instances. In this paper we set hypotheses to find out the causal relationship between variables.

3.9. Vector Autoregression (VAR)

It is important to note that the right-hand–side variables may be endogenous and could also be on the left-hand side as dependent variables. In this case, vector autoregression (VAR) estimation may be used to study the dynamics of the relationships among the variables. The VAR technique is a non-structural approach to modelling time series; it imposes little a prioristructure. Indeed, by treating each endogenous variable in the model as a function of its lagged values and the lagged values of all other endogenous variables, the VAR technique allows us to estimate the relationships without using a structural model. The base equation is as follows:

$$\ln GDP_t = \alpha_1 + \sum_{i=1}^{k} a1i \ln GDP_{t-1} + \sum_{i=1}^{k} b1i \ln CPI_{t-1} + \sum_{i=1}^{k} c1i \ln INVT_{t-1} + \sum_{i=1}^{k} d1i \ln EXR_{t-1} + e_{1t}$$

$$\ln CPI_t = \alpha_2 + \sum_{i=1}^{k} a2i \ln GDP_{t-1} + \sum_{i=1}^{k} b2i \ln CPI_{t-1} + \sum_{i=1}^{k} c2i \ln INVT_{t-1} + \sum_{i=1}^{k} d2i \ln EXR_{t-1} + e_{1t}$$

$$\ln INVT_t = \alpha_3 + \sum_{i=1}^{k} a3i \ln GDP_{t-1} + \sum_{i=1}^{k} b3i \ln CPI_{t-1} + \sum_{i=1}^{k} c3i \ln INVT_{t-1} + \sum_{i=1}^{k} d3i \ln EXR_{t-1} + e_{1t}$$

$$\ln EXR_t = \alpha_4 + \sum_{i=1}^{k} a4i \ln GDP_{t-1} + \sum_{i=1}^{k} b4i \ln CPI_{t-1} + \sum_{i=1}^{k} c4i \ln INVT_{t-1} + \sum_{i=1}^{k} d4i \ln EXR_{t-1} + e_{1t}$$

3.9. Stability Analysis

The stability test can also be used to determine the impact of structural changes over the study period.

- Engle-Granger causality and VAR models
- Model specifications
- Model Testing [a good model should have the residuals without serial correlation, no spurious, no heteroskedacity and normally distributed]
- Lag specifications

CHAPTER4:

DISCUSSIONS AND RESULTS INTERPRETATIONS

4.0. Introduction

In this chapter, the sampled data used in this work are described in terms of summary statistic and the correlation among the various economic variables. This sampled data is then processed and the outputs are subject to analysis. It then explains the reason behind the use of co-integration techniques and the diagnostic test for error autocorrelation, heteroskedasticity, and stability of the model for economic growth , inflation, consumer price index , investment and exchange rate to Reach on objectives,the researcher has established different points like: intr oduction to econometrics, specification of the model , data processing, model estimation, and dia gnostic tests by using the data of Rwandan economy on the period of thirty even years from 2006Q1 to 2019Q4.

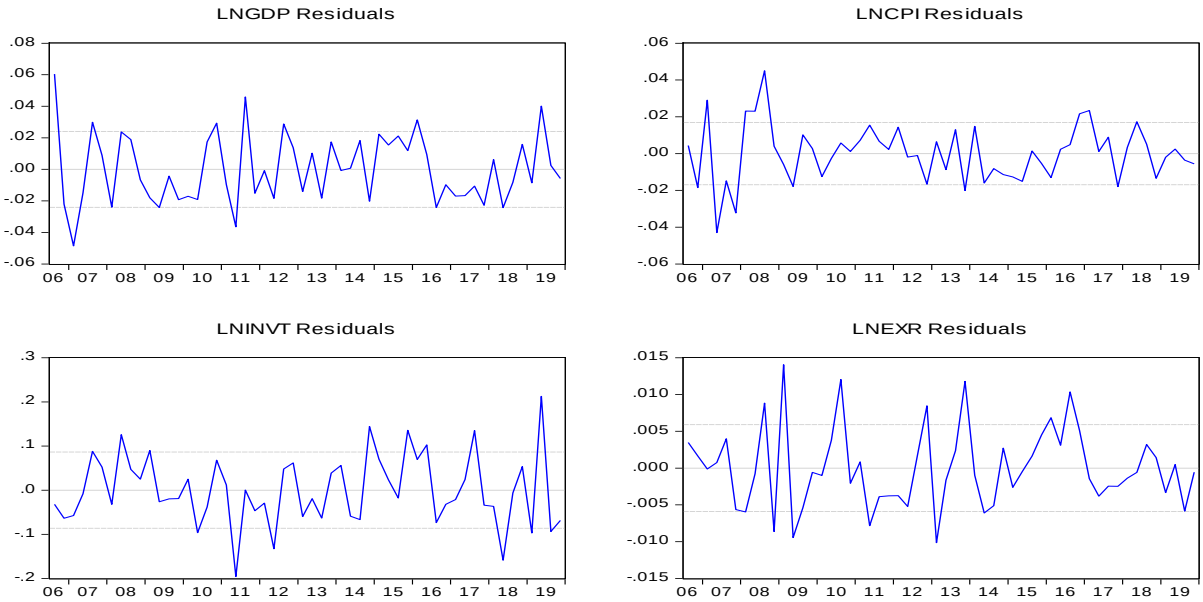
The chapter would like to present the Johansen (1988) included procedures. As the preferred parameter estimation technique for using VAR as an econometric model used to calculate long-term relationships between variables, the co-integration technique has been selected. This is due to its many benefits over alternative approaches. The vector error correction model and the Wald test, which provides information on both the long term and short term relationships between variables, are calculated based on the co-integration approach.

Some of the diagnostic tests involving serial correlation, involving correlation LM test, heteroskedasticity test, residual normality, and stability tests, etc must be passed by the projected model. I now apply these methods to Rwandan data, having become familiar with the estimation techniques, to achieve the objectives of this study as set out in chapter one.

4.1 .Data description

The time series that are subject of investigation in this work have been described in section three above. A quick display of each time series follows bellow. The top five sub-graphs include

Figure 2:Time series of variables description



Source: Eviews 7, September 2020

Figure (4.1) Time series corresponding to GDP, CPI, INVT and EXR variables. The time series for GDP, CPI, while the bottom two sub-graphs depict the time series corresponding to INVT and Exchange Rate variables. In the last 14 years all of them exhibit an increase or a trend signaling economic growth. Are these economic time series stationary? The next lines attempt to provide an answer to this question. But on the observation the years of 2006-2019 present higher level of error as shown by the figure above this is due to Rwanda economic instability as we now

4.2 .Testing for stationarity

First of all, the stationary test is performed because it reveals the stationary series and the non-stationary series. The software program Eviews 7.0 allows the researcher to use the tests of

stationarity. In this section, in their logarithmic transformation values, the Dickey-Fuller augmented test, as described in equation (4) is used for each time sequence. In addition, the DFGLS tests is also performed to validate that a unit root exists in the sequence. In this case, the test's null hypothesis means that the time series Yt is simply a random walk, having a drift possible. This time series could then be stationary with respect to the linear trend, which is equation (5), or stationary with zero mean, but no linear time trend, which is equation (6).

The ADF and PP tests and the findings allow the investigator to decide if the regression is spurious or not. And the, the data obtained from that test helps to understand the technique to be used; when the series is stationary, the researcher uses the Least Square (OLS) as a technique, while the researcher uses the co-integration test after differentiating the data when the series is not stationary.

ADF test show that LGDP, LCPI, LINVT and LEXR are transformed to its first difference, the null hypothesis is rejected and series became stationary. Therefore, they are said to maintain stationarity at an integration of order one, I (1). All the results from ADF test are shown here below in the table:

Table 1:Stationarity tests – Augmented Dickey – Fuller (ADF) unit root tests

Variable	Crit. Val. (5%)	ADF Stat.	p-value	Results interpretation(Decision)
LGDP	-2.91	-9.80	0.0000	Stationarity at First difference. I(1)
LCPI	-2.91	-7.92	0.0000	Stationarity at First difference. I(1)
LINVT	-2.91	-7.38	0.0000	Stationarity at First difference. I(1)
LEXR	-2.91	-3.77	0.0000	Stationarity at First difference. I(1)

Source: computed by researcher with Eviews 7, September 2020

4.3. Diagnostic testing

After the error correction model the other tests are necessary to see whether the assumption of tradition regression is confirmed. These tests are related to residual series:

1. Normal distribution test

2. Heteroscedasticity test
3. Autocorrelation test
4. Stability test

4.3.1. Normality test

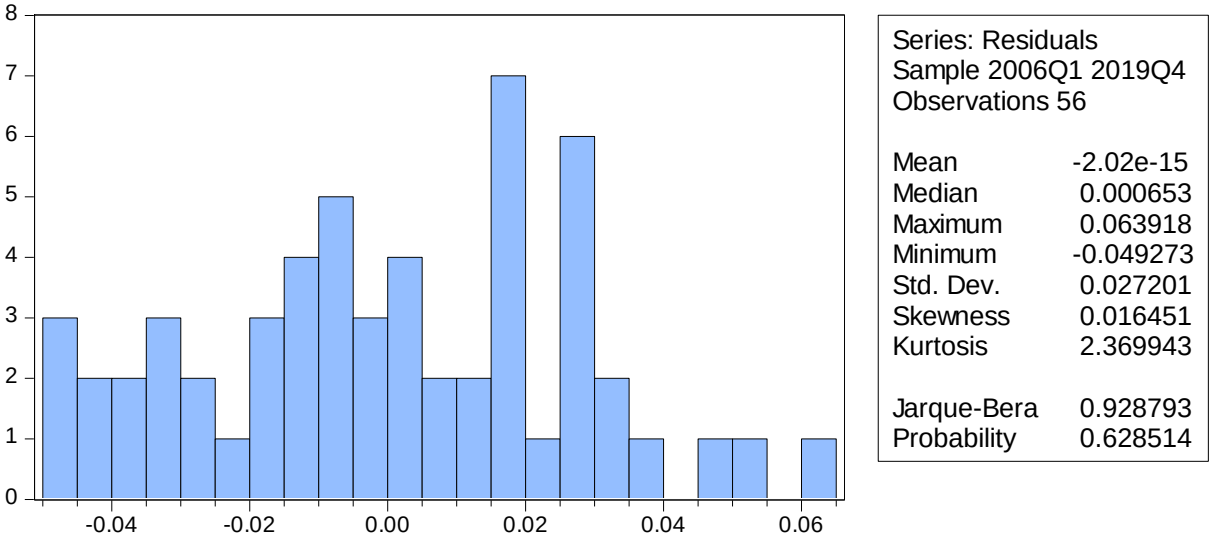
The assumption of this test is as follow

H_o(null hypothesis) : The residuals are normal distributed

H_1(alternative hypothesis) : The residuals are not normal distributed

The null hypothesis is rejected at 10% level of significant

Figure 3:Normality Test



Source: Eviews 7, Septembe 2020

Since the likelihood of JarqueBera is 0.62 higher than 10 percent of the significance level reference, we interpret it as our residuals are typically distributed, and this represents our model's good quality.

4.3.2. Heteroscedasticity test

The assumptions of this test are as:

H_0= the model is homoskedastic

H_1= the model is heteroskedastic

The null hypothesis is rejected when the probability is less than 10%

Table 2: Heteroskedasticity Test: ARCH

Heteroskedasticity Test: ARCH			
F-statistic	3.391245	Prob. F(1,53)	0.0711
Obs*R-squared	3.307578	Prob. Chi-Square(1)	0.0690

ARCH heteroskedasticity proves that there is no heteroskedasticity as the probability of obs*R-square 3.3 is greater than 10% level of significance. this means that our model is homoscedastic. The Null hypothesis is not rejected.

4.3.3. Autocorrelation test

Table 3: Breusch-Godfrey Serial Correlation LM Test:

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	9.518036	Prob. F(2,50)	0.0003
Obs*R-squared	15.44149	Prob. Chi-Square(2)	0.0004

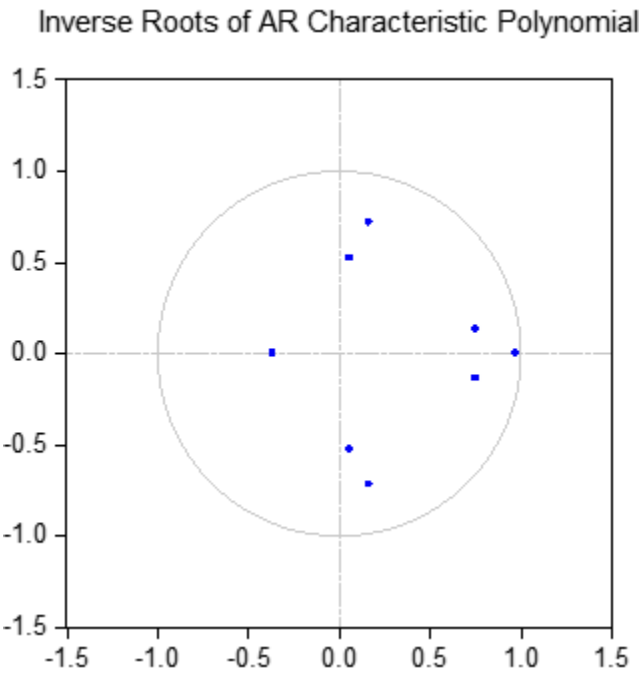
Source: Eviews 7, November 2020

Breusch–Godfrey serial correlation LM test was adopted in conducting the serial correlation test. An observation of the tables shows that the corresponding probability values of the F statistics and $\chi 2$ are greater than 5 percent. Hence, we accept the null hypothesis that there is no serial correlation in the models which entails that the model is free from the problem of autocorrelation.

4.3.4.VAR Stability Test

The AR Roots graph helps to test if the inverse roots of the AR characteristic polynomial are inside the unit circle. As shown in the figure below, the AR roots graph confirms that the estimated VAR model is stable over the period of the study.

Figure 4:VAR stability Test



4.4. Lag Length Selection

The lag length selection criterion consists of an essential step. There are numerous measures that would imply the optimum number of lags. Determination of the lag period of the VAR is a crucial element in the specification of VAR models. Different lag length selection criteria are specified by various authors, such as Akaike's (1969) final prediction error (FPE), Akaike Information Criteria (AIC) proposed by Akaike (1974), Schwarz Criterion (SC) (1978) and Hannan-Quin Information Criterion (HQIC) (1979).

Table 4:The result of the lag order selection criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	252.6057	NA	3.73e-10	-10.35857	-10.20264	-10.29964
1	503.1892	448.9620*	2.13e-14*	**-20.13288**	-19.35321*	-19.83824*
2	518.9834	25.66558	2.18e-14	-20.12431	-18.72091	-19.59396

3	535.0610	23.44648	2.25e-14	-20.12754	-18.10041	-19.36148
4	549.9990	19.29503	2.53e-14	-20.08329	-17.43243	-19.08153
5	561.7989	13.27484	3.42e-14	-19.90829	-16.63369	-18.67081
6	580.8131	18.22195	3.68e-14	-20.03388	-16.13554	-18.56069
7	602.8066	17.41153	3.92e-14	-20.28361	-15.76154	-18.57471
8	638.6604	22.40863	2.77e-14	-21.11085*	-15.96505	-19.16625
* 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						

As shown from the table; the minimum lag at Akaike information criterion. Thus, with this study, we use 1 as lag length criterion.

4.5.Co-integration test of Equations

Co-integration is the method of bringing together long term variables that stray away from each other in the short term. Thus, from each variable, the order of integration that interferes with the given economic growth model is already defined. The next step is to estimate the long run relationship between Rwanda's export and economic growth using Johansson's maximum likelihood methods and the two stages of Engel and Granger process. Both variables are combined from order one I (1). The lag order and the deterministic trend assumption for the VAR should be defined in order to continue with the Johansen co-integration technique. The sequential modified likelihood ratio (LR), Akaike information criteria (AIC), final prediction error (FPE), Schwarz information Criterion (SC) and Hannan Quinn Information criterion (HQIC) are different forms of lag selection criteria for the selection of the lag order.

The following is testing the possible number of the co-integrating vectors (r) using Johansen's maximum likelihood approach. The H_0 and $H_1$are hypothesized as follow:

H0 = There is no number of co-integration vector (r = 0) versus H_1= there is existence of number of co-integration vectors (r=1)

From the table 4.4 above the number of co-integrating vector are three, we can compute three none vectors of no intercept no trend, two linear vectors with intercept and trend and two quadratic vectors of intercept and trend all vectors are given by Trace and Max-Eig values

Table 5:Trace Co integrating Equations

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.561402	105.1965	63.87610	0.0000
At most 1 *	0.491884	60.69118	42.91525	0.0004
At most 2	0.252602	24.13071	25.87211	0.0811
At most 3	0.144191	8.408237	12.51798	0.2201
Trace test indicates 2 cointegrating eqn(s) at the 0.05 level				
*** denotes rejection of the hypothesis at the 0.05 level**				
****MacKinnon-Haug-Michelis (1999) p-values**				

Source: Source: Eviews 7, September 2020

Notes: The findings indicate the optimal lag length of 1 for the Johansen Co-integration test trace indicated two co-integrated vectors this result refer to the trace value compare to t-statistics or the p-value.

Table 6:Trace Co integrating Equations

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.561402	44.50532	32.11832	0.0010
At most 1 *	0.491884	36.56047	25.82321	0.0013
At most 2	0.252602	15.72247	19.38704	0.1575
At most 3	0.144191	8.408237	12.51798	0.2201
Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level				
*** denotes rejection of the hypothesis at the 0.05 level**				
****MacKinnon-Haug-Michelis (1999) p-values**				

Source: Source: Eviews 7, September 2020

Notes: The results indicate the optimal lag length of 1 for the Johansen Co-integration test max-Eig suggested that two co-integrated vectors apply to the trace value as opposed to the statistic or p-value. These findings provide an indicator of the long term relationship between economic growth and inflation in Rwanda between 2006Q1 and 2019Q4. The statistical max and trace values strongly reject the null hypothesis for "no" co-integration vector in favor of at least one co-integrating vector at the significance level of 1 percent. Therefore, the specified co-integrating vector is given below.

It's table 4.4 and 4.5 table. Trace and max-Eigen value statistics and stated to calculate the number of co-integrating vectors(r) using Johansen's maximum probability strategy. The null hypothesis is being evaluated in trace and max-Eigen values statistics. According to test results, the null hypothesis of r=0 is rejected in favor of r=1, which implies that there are 2 co-integrating relationships between the variables, since the likelihood found, 0.0000, 0.0004 of trace and 0.0010, 0.0013 of max-Eigen values both are less than 0.05 significance level, respectively. After finding that, the following test is the correction of the vector error to check the long and short term relationship between variables.

4.6 ECM Results: Estimation of the short-run relationship

Existence of a long run equilibrium model means that there is also a short-run relationship (ECM), which explains the short run disequilibrium and that shows how this disequilibrium is corrected for in order to converge to the long run equilibrium. The ECM is also estimated by using the OLS

method as shown in equation (11). The error correction term (e_{t-1}) has an expected negative sign and is statistically significant at 5%. Other variables are also significant at 5%.

$$\Delta \ln RGDP_t = -0.127763\Delta \ln RGDP_{t-1} - 0.000719\Delta \ln CPI_{t-1} - 0.045020\Delta \ln INVT_{t-1} - 0.00023\Delta \ln EXR_{t-1} - 0.000483e_{t-1} + \varepsilon_t$$

(0.13183) (0.00266) (0.09882) (0.00347) (0.00259)

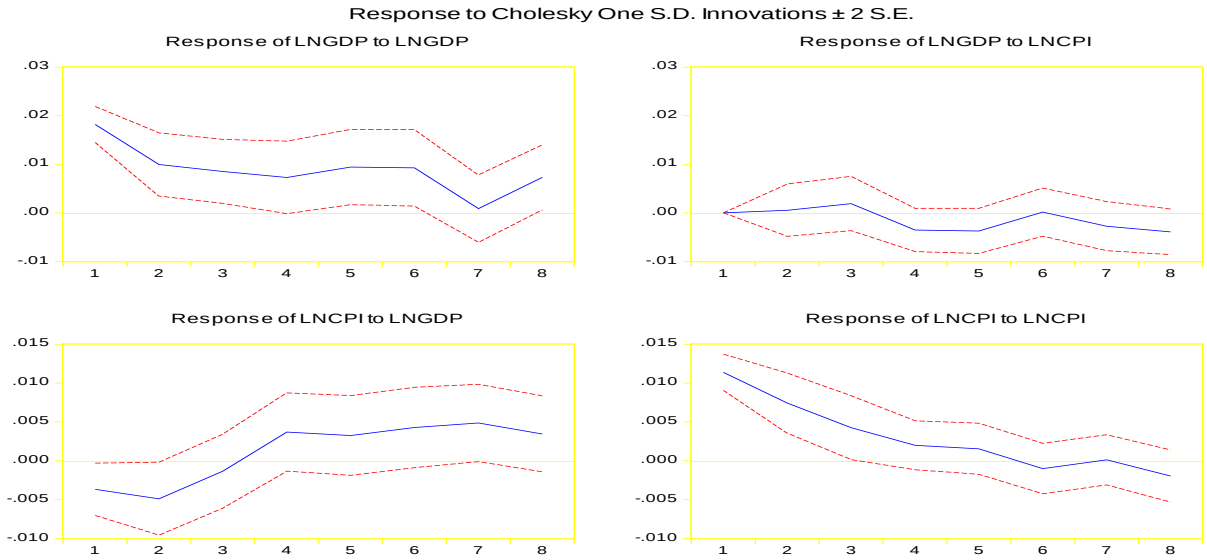
Just like in the long run model, the variables in the ECM have expected signs. The probability of $\Delta \ln CPI_{t-1}$ (0.00266) is less than 5%, meaning that $\Delta \ln CPI_{t-1}$ is significantly negatively related to lnRGDP since the increase of 1% in CPI reduces the LRGDP by 0.000719%, keeping other factors constant, $\Delta \ln EXR_{t-1}$(0.00347) is less than 5%, meaning that $\Delta \ln EXR_{t-1}$ is significantly negatively related to lnRGDP since the increase of 1% in EXR reduces the LRGDP by 0.00023%, keeping other factors constant while $\Delta \ln INVT_{t-1}$ also has a negative sign and is not statistically significant at 10% meaning that the coefficient of $\Delta \ln INVT_{t-1}$ is not significant, its probability (0.09882) is greater than 10%. Thus, a 1% increase in investment leads to a 0.045020% reduction in the real economic activities. The RGDP (-1) has a negative sign and a standar error (0.13183) which means that its coefficient is insignificant at 5% of level of significance. The error correction term has a probability of 0.00259 which is less than 5%. Therefore, its coefficient is significantly different from zero.The coefficient (-0.000483) means that for each quarter, the short run disequilibrium will be reduced by 0.000483 %, meaning that the effect of the shock will reduce by 19.32 % each 4 quarter, meaning that it will end at 20 quarter (Fifth Year). R^2 values are small for all cointegrating equations (0.022675), (0.498962), (0.373759) means that actually none of the variables is significant in the short run. Also, the cointegrating equation explains dynamics in real GDP, in other words it is a growth mode.

4.7. Impulse response of economic growth versus inflation

Impulse response called shock test how a variable react to each other, for this case we are testing how economic growth is affecting inflation and how inflation is affecting economic growth .suppose there is an innovation term for economic growth for this we will give one positive

standard deviation sign (+1) and the estimated period which can an number greater than 1 will define how long the change is assumed to be exist.

Figure 5:Impulse response



Source: Researcher computation, October 2020

Based on the results in figure 4.2: Response of LNGDP to LNGDP explained how economic growth affecting itself and the effect is positive from the starting period up to the end of the period 2(0.010), 6(0.009), 7(0.007) changes were 2, 6, and 7are period respectively. while for the response of LNGDP to LNCPI the response started positive from one to three period but for four period it become negative, this means that one standard deviation positive shock is given to one variable 3(0.002), 4(-0.004). For a response of LNCPI to LNGDP the effect started by negative shock for2 period and end by positive shock where 2(-0.0049), 4(0.0037). By the end response of LNCPI to LNCPI the effect started positive and negative and positive shock where 3(0.0043)6(-0.0010)7(0.0001). The results above agreed that economic growth affect inflation and inflation affect economic growth.

4.8. Johansson Long Run Relationship

The long –run equilibrium of the model indicate relationship between dependent variable with its independent variables and this shows how each variable explain the dependent by comparing the estimated parameters with their standard errors .

Table 7:Long-run output

1 Cointegrating Equation(s):		Log likelihood	541.1624	
Normalized cointegrating coefficients (standard error in parentheses)				
LNGDP	LNCPI	LNINVT	LNEXR	@TREND(06 Q2)
1.000000	-0.031759	-0.047546	0.217931	-0.017831
	(0.00313)	(0.02828)	(0.08395)	(0.00179)

Source: Source: Eviews 7, September 2020

For being able and easy to explain how explanatory variables (EXR, CPI and INVT) determine the dependent variable GDP; the long run equation becomes:

$$\ln GDP = \alpha_0 + \alpha_1 \ln(CPI) + \alpha_2 \ln(INVT) + \alpha_3 \ln(EXR) + \mu t$$

$$\ln GDP = 0.01 + 0.03\ln(CPI) + 0.04\ln(INVT) - 0.21\ln(EXR)$$

$$(0.00179)\quad (0.00313)\qquad (0.02828)\qquad (0.08395)$$

In parenthesis there are standard errors to test the significance of parameters

The estimated values in parenthesis are standard errors that test the significance of parameters, as all parameters greater than their respective standard error this phenomena explain the significance of t-statistic .These explain the all independent variable are statistically significant to explain the dependent.

This equation relating inflation dynamism and economic growth during the period of the study (2006q1 to 2019q4), from the above relations the following is explanation of how each explanatory variable is affecting the dependent variable.

α_1 = 0. 03: This estimated long run output indicated that GDP is negatively related to CPI, the result agreed with the results founded by Mallik and Chowdhury (2001) investigates the existing long and short-run dynamics of linkage between inflation rate and economic growth. For each country there are different period that had covered in their study, such as 1961 to 1997 for India; 1974 to 1997 for Bangladesh; 1966 to 1997 for Sri Lanka and 1957 to 1997 for Pakistan. In this study, there are two interesting result found: firstly, there is significant and positive linkage between economic growth and inflation for all countries of analysis; secondly, It has been found that there no more sensitivity to change in inflation due growth, as compared to sensitivity of inflation rate, to change in economic growth rate. Based on the above results we can now end saying that in Rwanda if CPI increases by 1%, economic growth increased by *0. 0 3*%, and if you analyze this types of inflation you can see that it is moderate, if other factors remain constant (ceteris paribus).

α_2 = *0.04*: This estimated value of long run indicated that investment is positively related to Rwandan economic growth , the estimated value of 0.04% agreed with the above research this means that if ceteris paribus 1% increases on investment motivated economic growth to increase by 0.04%. Other factors remain constant (ceteris paribus)

α_3 = *-0.21*: this estimated output of EXR is negatively related to Rwandan economic growth as we have expected to have appreciation of the currency , the value -0.21explained the depreciation of local currency and this is negative to economic growth, for a country like Rwanda it is said to have a suitable economic growth if it's currency is appreciated compare to foreign one .if exchange rate depreciated by 1% economic growth decline by 0.21% other factors remain constant (ceteris paribus.)

The following is to test the short run relationship between dependent variables economic growth and its determinants proxies (EXR, CPI, and INVT) to test the short run. Vector error correction model have been used

4.9. Granger causality Test

If there is a relationship between two X and Y variables, whether positive or negative, it is not appropriate to denote that X causes Y, or that Y causes X, or that X and Y cause each other. However, if X triggers Y, then X contains some useful Y knowledge that helps us to efficiently predict the value of Y.

The principle behind the technique of causality (Granger, 1969) is not to find the correlation between the variables, but to the causality between them. For instance, if GDP(X) is related to Y (inflation) positively, then we use the Granger causality test to determine the direction of causality between them. This test decides whether causality runs from X to GDP (X to GDP), whether causality runs from GDP to X (GDP to X), whether X and GDP cause each other (X to GDP), or whether there is no causality between X and GDP.

The Granger Causality test was conducted before estimating the linear regression model in order to examine the linear causation between inflation and economic development. The rationale for this test is that inflation in the growth inflation regression may not be an exogenous variable and, thus, the inflation coefficient may be biased. As Khan and Senhadji (2001) have pointed out, the severity of this issue will depend, to a large extent, on whether the causality, however, as indicated by Fisher (1993), is more likely to run primarily from inflation to economic growth, suggesting that the bias will not be large and that the coefficient will not be seriously affected.

The Granger Causality test has specifically checked this claim and the results of the calculation are provided in Table 4.9. It is important to point out that causality does not necessarily imply exogeneity, but the absence of a feedback effect from growth to inflation helps to choose the model specification based and independent variable (Mubarik, 2005); it also provides a clear indication that inflation does indeed have an impact on growth.

Table 8: Causality test

Pairwise Granger Causality Tests
Date: 10/03/20 Time: 20:05

Sample: 2006Q1 2019Q4			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
LNCPI does not Granger Cause LNGDP	54	0.53002	0.5919
LNGDP does not Granger Cause LNCPI		2.74786	0.0739

Source: Source: Eviews 7, September 2020

The test statistic indicates that the null hypothesis that inflation does not cause economic growth is not rejected at the 10 percent significance level as shown by the p-value of 0.5919, this imply that inflation does not causes economic growth. Conversely, the null hypothesis that growth does not cause inflation is rejected at the 10 percent significance level as shown by the p-value of 0.0739; this implies that economic growth causes inflation. It may then be concluded from these results that there is no feedback from output growth to inflation, suggesting that there is a unidirectional causality running from growth to inflation.

4.10.The Degree of Responsiveness of Inflation for GDP

The study applied regression equation to determine the degree of responsiveness of GDP changes in the general level of prices as illustrated below. Results for regression equation are presented in equation below:

$$\ln GDP = 1.254257 + 1.332030\ln(CPI)$$

$R^2 = 0.944477$

The log results forecast provided very interesting results on the issue of GDP responsiveness to general price changes. Due to the fact that the inflation rate is a very critical macroeconomic indicator for changes in GDP, the elasticity coefficient of GDP to the inflation rate is elastic. The result showed that inflation in Rwanda's GDP is elastic since the approximate value of coefficient

B_1(1.332030) is greater than one. At the 5 percent level of significance. From these results the study conducted that the degree of responsiveness of change in GDP due to the changes in general price levels in Rwanda is elastic to the level of 1.33. Also R^2= 0.944477 is also very high, suggesting that shifts in general price levels have explained around 94 percent responsiveness of GDP. As value of elasticity is greater than 1, it implies that the demand for the good or service is affected by the price in Rwanda.

CHAPTER 5:

CONCLUSIONS AND RECOMMENDATION

5.1. Introduction

This chapter refers to the organized, presented and analyzed data in the preceding chapters.

5.2. Summary

The history of the study, the problem statement, the intent of the study, its goals, research questions, the hypothesis, and the scope of the study were defined in the first chapter. The sense of economic growth, inflation, and how some theories state about it were mentioned in the second chapter. Its content can be summarised as follows: as technically initiated by previous researchers, this chapter also highlights inflation and economic development as part of the goals in this report. Evaluating inflation dynamics on economic growth, the related case studies have been updated and some previous research has been concluded and limited. The third chapter covers all applicable principles and techniques for statistical estimation, methodology and the specification of models for estimating research findings. Chapter four on the assessment of inflation dynamics in Rwanda statistics was calculated using the maximum likelihood method developed using the VAR approach. The research, developed by Johansen (1988) and Johansen and Juselius (1990), showed that inflation and economic growth and their intermediate variables have a long term relationship. The description, conclusion, and recommendations associated with this study are discussed in chapter five.

5.3. Policy Implications and Recommendations

This study found that a rise in the general level of prices (inflation) was detrimental to Rwanda's sustainable economic growth. These findings have important policy consequences for both domestic policy makers and development parteners, suggesting that inflation management is a necessary prerequisite for economic growth promotion. Policy makers should also concentrate on keeping inflation at a low (single digit) rate. This may mean that any fluctuation in the overall price level of the country would have a direct effect on growth.

In this regard, the study concluded that all factors that cause general price levels to rise, such as the oil crisis, the instability of exchange rates and the increase in the supply of capital, low agricultural production, etc., should be tackled with appropriate policies to encourage economic growth. Since the double digit inflation rate in Rwanda is mainly due to the energy crisis and low agricultural production, other sources of electricity, such as coal, should be used by the government as an alternative to hydroelectricity. Asian Journal of empirical Research 3(4):363- 378 is of great importance for development because the more the country producers, the lower the prices of products and services, thus higher economic growth.

Similarly, the improvement of infrastructure, the provision of labor, training for farmers and strategies such as the provision of loan schemes with competitive interest rates and the creation of permanent markets for their goods could increase agricultural produce. Due to the fact that the inflation rate is a very critical macroeconomic indicator for changes in GDP, the elasticity coefficient of GDP to the inflation rate is inelastic. For policy makers, this may imply that even though there are other factors affecting economic growth, such as FDI inflows and outflows, human resources, investment, technical progress, financial systems, the country's geographical location, as well as better rule of law maintenance, less non-productive government consumption, and better public investment in high-ranked investment

Policy makers in Rwanda should aim to keep inflation at a possible minimum rate in order to achieve and maintain growth (GDP). This research is the first attempt to address the shock effect of Rwanda's inflation growth nexus; it is therefore important because it provides a benchmark analysis in pursuit of optimal inflation for growth in Rwanda.

Moreover, the findings of this research are consistent with the results of other recent related empirical studies conducted in developing countries (Risso and Carrera, 209, 2010) and, in particular, with the results of panel and country specific studies for African economies (Combey and Nubukpo, 2010; Frimpong and Oteng-Abayie, 2010; Quartey, 2010; Salami and Kelikume, 2010) it follows that, while achieving and sustaining price stability is the primary objective of the monetary policy implemented by the National Bank of Rwanda, the monetary authorities should also be aware of the trade-offs between inflation, development and jobs in developing countries such as Rwanda, where production capacity is not fully exploited and where supply shocks.

Finally, although the aim of this study was to shed light on the relationship between inflation and growth in Rwanda, some important related issues have not been addressed, such as the channels through which inflation has a negative impact on economic growth and the effect on production growth of inflation variability.

REFERENCE

Heshmati, A. (2017). *Introduction to Studies on Economic Development and Growth in Selected African Countries*. https://doi.org/10.1007/978-981-10-4451-9_1

Journal, A. (2015). Impact of Inflation on Economic Growth in Pakistan. *International Journal of Science and Research (IJSR)*, *4*(11), 1091–1096. https://doi.org/10.21275/v4i11.nov151272

Khan, M. S., & Senhadji, A. S. (2001).shockseffects in the relationship between inflation and growth. *IMF Staff Thesis s*, *48*(1), 1–21. https://doi.org/10.5089/9781451853339.001

Ruzima, M., & Veerachamy, P. (2015). A Study on Determinants of Inflation in Rwanda from 1970-2013. *Int. Journal of Management and Development Studies*, *4*(4), 390–401. https://mpra.ub.uni-muenchen.de/73222/

{Formatting Citation}Economics, A. (2018). *Inflation and the Economic Growth :28*(2).

Hasanov, F. (2011). Relationship Between Inflation and Economic Growth in Azerbaijani Economy: Is There AnyshocksEffect? *Asian Journal of Business and Management Sciences*, *1*(1), 1–11. http://www.ajbms.org/articlepdf/ajbms_2011_1103.pdf

(Economics, 2018)Behera, J., & Mishra, A. K. (2017). The Recent Inflation Crisis and Long-run Economic Growth in India: An Empirical Survey ofshocksLevel of Inflation. *South Asian Journal of Macroeconomics and Public Finance*, *6*(1), 105–132. https://doi.org/10.1177/2277978717695154

BNR. (2015). *Banki Nkuru Y ' U Rwa Nda*. *13*(August).

Datta, D., & Kumar Mukhopadhyay Professor, D. (2011). *Relationship between Inflation and Economic Growth in Malaysia-An Econometric Review*. *4*, 415–419.

Economics, A. (2018). *Inflation and the Economic Growth :28*(2).

Heshmati, A. (2017). *Introduction to Studies on Economic Development and Growth in Selected*

African Countries. https://doi.org/10.1007/978-981-10-4451-9_1

Mishchenko, V., Naumenkova, S., Mishchenko, S., & Ivanov, V. (2018). Inflation and economic growth: The search for a compromise for the Central Bank's monetary policy. *Banks and Bank Systems*, *13*(2), 153–163. https://doi.org/10.21511/bbs.13(2).2018.13

Ndorieimpa, A., Osoro, N. E., & Kidane, A. (2016).shockseffects of inflation on economic growth in selected African regional economic communities: Evidence from a dynamic panelshocksmodeling. *Applied Econometrics*, *41*(249), 5–23.

Wp9997.Pdf. (n.d.).

www.econstor.eu. (2018). https://doi.org/10.32327/IJMESS.7.4.2018.18

Zhan, M., & Zhan, Z. (2017). A Kind of Neither Keynesian Nor Neoclassical Model (3): The Decision of Inflation. *OALib*, *04*(01), 1–16. https://doi.org/10.4236/oalib.1103333

Abdulsalam, S. (2016). *www.econstor.eu*.

Agalega, E., & Antwi, S. (2013). The Impact of Macroeconomic Variables on Gross Domestic Product: Empirical Evidence from Ghana. In *International Business Research* (Vol. 6, Issue 5). https://doi.org/10.5539/ibr.v6n5p108

Coban, O. (2019). *Relationships Between Economic Growth , Foreign Direct Investment and Inflation : Ardl Models Approach for*. *369*, 7–23.

Corlett, W. J., & Aigner, D. J. (1972). Basic Econometrics. In *The Economic Journal* (Vol. 82, Issue 326). https://doi.org/10.2307/2230043

Cycles, O. (n.d.). *Inflation and Output Cycles* (pp. 667–688).

Dada, M. A. (2018). *International Journal of Economics Review & Business Research Modelling*

Inflation and Economic Growth in Five ECOWAS Countries ; A Bivariate Analysis. *22*(6).

Dynamics, S., & Xiao, J. (2009). *The Relationship between Inflation and Economic Growth of China : Empirical Study from 1978 to 2007*. *August 2009*.

Edition, G. (1984). Macroeconomics: Theories and policies. In *Journal of Macroeconomics* (Vol. 6, Issue 2). https://doi.org/10.1016/0164-0704(84)90031-4

Enu, P., Attah-obeng, P., & Hagan, E. (2013). The Relationship Between GDP Growth Rate And Inflationary Rate In Ghana : An Elementary Statistical Approach. *Academic Research International*, *4*(5), 310–318.

Erickson, R. W., Maksimovic, D., Mortimer, J. T., & Shanahan, M. J. (2001). *List of E Books*. *1*.

Gujarati, D. N. (2004). Basic Econometrics. In *The McGraw-Hill*. https://doi.org/10.1126/science.1186874

Hasanov, F. (2011). Relationship Between Inflation and Economic Growth in Azerbaijani Economy: Is There AnyshocksEffect? *Asian Journal of Business and Management Sciences*, *1*(1), 1–11. http://www.ajbms.org/articlepdf/ajbms_2011_1103.pdf

Ihugba, O. A., Ebomuche, N. ., & Ezeonye, R. . (2015). Relationship between Economic Growth and Inflation in Nigeria (1970 – 2013). *International Journal of Research in Business Studies and Management*, *2*(7), 14–22.

Khan, M. S., & Senhadji, A. S. (2001).shockseffects in the relationship between inflation and growth. *IMF Staff Thesis s*, *48*(1), 1–21. https://doi.org/10.5089/9781451853339.001

Kilindo, A. A. L. (1997). *FISCAL OPERATIONS , MONEY SUPPLY AND Fiscal operations , money supply and inflation in Rwanda* (Issue November).

Mussardo, G. (2019). 済無No Title No Title. *Statistical Field Theor*, *53*(9), 1689–1699. https://doi.org/10.1017/CBO9781107415324.004

Ndongo, D., & Revelli, P. (n.d.). *The Exchange Rate Pass-Through to Inflation and its Implications for Monetary Policy in Cameroon and Kenya The Exchange Rate Pass-Through to Inflation and its Implications for Monetary Policy in Cameroon and Kenya*.

Nyoni, T., & Mutongi, C. (2019). *Modeling the long-run relationship between inflation and economic growth in Zimbabwe : a bi-variate cointegration (Engle-Granger Two-Step) approach*. *93981*.

Personal, M., & Archive, R. (2010). *Munich Personal RePEc Archive Investment , inflation and economic growth nexus Investment , Inflation and Economic Growth Nexus*. *27163*.

Sani, I. (2012). *Www.Econstor.Eu*.

Sarel, M. (1996). Nonlinear Effects of Inflation on Economic Growth Author (s): Michael Sarel Published by : Palgrave Macmillan Journals on behalf of the International Monetary Fund Stable URL : http://www.jstor.org/stable/3867357 Nonlinear Effects of Inflation on Econom. *Palgrave Macmillan Journals on Behalf of the International Monetary Fund*, *43*(1), 199–215.

Shakhaowat Hossin, M. (2015). The Relationship Between Inflation and Economic Growth of Bangladesh: An Empirical Analysis from 1961 to 2013. *International Journal of Economics, Finance and Management Sciences*, *3*(5), 426. https://doi.org/10.11648/j.ijefm.20150305.13

W. Madurapperuma, M. (2016). Impact of Inflation on Economic Growth in Sri Lanka. *Journal of World Economic Research*, *5*(1), 1. https://doi.org/10.11648/j.jwer.20160501.11

Wold, B. Y. H. (2019). *Causality and Econometrics Author (s): H . Wold Published by : The Econometric Society Stable URL : https://www.jstor.org/stable/1907540 The Econometric Society is collaborating with JSTOR to digitize , preserve and extend access to Econometrica*. *22*(2), 162–177.

Appendices

Appendix 1: The used Quarterly Data

year	GDP	CPI	INVT	EXR
2006Q1	813	58.39	102	553.5
2006Q2	873	59.60	125	552.2
2006Q3	959	60.84	126	551.4
2006Q4	960	61.20	143	549.9
2007Q1	922	65.41	144	548.1
2007Q2	940	63.97	151	546.2
2007Q3	994	65.73	152	548.2
2007Q4	1,023	65.23	177	545.5
2008Q1	1,008	70.33	165	543.9
2008Q2	1,066	73.80	207	543.4
2008Q3	1,112	79.23	214	552.2
2008Q4	1,126	79.79	235	553.0

2009Q1	1,132	82.07	228	566.5
2009Q2	1,120	80.84	215	567.9
2009Q3	1,151	84.06	188	568.7
2009Q4	1,179	84.37	210	570.0
2010Q1	1,190	83.72	225	572.5
2010Q2	1,192	84.91	200	579.0
2010Q3	1,243	85.29	215	588.9
2010Q4	1,293	84.56	262	592.1
2011Q1	1,290	87.16	262	598.8
2011Q2	1,262	89.85	221	600.2
2011Q3	1,372	90.95	244	600.0
2011Q4	1,385	91.61	273	602.2
2012Q1	1,399	94.28	285	605.4
2012Q2	1,398	95.16	269	608.5
2012Q3	1,470	96.07	306	614.9
2012Q4	1,502	95.17	353	628.3
2013Q1	1,465	97.35	324	633.2
2013Q2	1,509	98.67	316	639.7
2013Q3	1,508	100.97	316	649.2
2013Q4	1,559	98.64	355	664.4
2014Q1	1,553	100.68	368	674.7

2014Q2	1,576	100.10	337	680.2
2014Q3	1,642	101.14	317	684.4
2014Q4	1,642	100.72	429	692.3
2015Q1	1,677	101.50	417	701.7
2015Q2	1,723	102.85	404	713.0
2015Q3	1,775	104.84	408	725.0
2015Q4	1,807	105.29	505	738.9
2016Q1	1,856	106.17	493	758.6
2016Q2	1,870	108.55	524	776.1
2016Q3	1,832	110.95	451	799.2
2016Q4	1,841	112.96	434	815.2
2017Q1	1,862	114.38	429	823.5
2017Q2	1,904	113.73	443	828.0
2017Q3	1,955	115.12	499	833.7
2017Q4	1,973	113.71	463	841.7
2018Q1	2,044	115.36	441	849.4
2018Q2	2,053	117.00	431	856.2
2018Q3	2,093	116.52	502	864.4
2018Q4	2,164	115.00	553	874.9
2019Q1	2,169	116.64	500	884.1
2019Q2	2,305	118.02	686	893.1

2019Q3	2,321	120.10	600	904.1
2019Q4	2,344	122.2	590	916.3

Appendix2: Estimation Results

Dependent Variable: LGDP
Method: Least Squares
Date: 12/05/20 Time: 17:19
Sample: 2006Q1 2019Q4
Included observations: 56

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LCPI	0.468117	0.067489	6.936227	0.0000
LINVT	0.209015	0.033756	6.191918	0.0000
LEXR	0.553800	0.053047	10.43987	0.0000
C	0.372134	0.273221	1.362027	0.1791

R-squared	0.990844	Mean dependent var	7.278985
Adjusted R-squared	0.990315	S.D. dependent var	0.284270
S.E. of regression	0.027975	Akaike info criterion	-4.246258
Sum squared resid	0.040695	Schwarz criterion	-4.101590
Log likelihood	122.8952	Hannan-Quinn criter.	-4.190170
F-statistic	1875.714	Durbin-Watson stat	0.990755
Prob(F-statistic)	0.000000		

Appendix3: Cointegration Test

Date: 09/25/20 Time: 08:34

Sample (adjusted): 2006Q3 2019Q4

Included observations: 54 after adjustments

Trend assumption: Linear deterministic trend (restricted)

Series: LNGDP LNCPI LNINVT LNEXR

Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.561402	105.1965	63.87610	0.0000
At most 1 *	0.491884	60.69118	42.91525	0.0004
At most 2	0.252602	24.13071	25.87211	0.0811
At most 3	0.144191	8.408237	12.51798	0.2201

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.561402	44.50532	32.11832	0.0010

At most 1 *	0.491884	36.56047	25.82321	0.0013
At most 2	0.252602	15.72247	19.38704	0.1575
At most 3	0.144191	8.408237	12.51798	0.2201

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LNGDP	LNCPI	LNINVT	LNEXR	@TREND(06Q2)
-69.69598	2.213486	3.313782	-15.18894	1.242765
-24.16760	-1.666012	17.46974	5.363610	-0.069312
-5.989883	-12.14951	0.587040	4.543129	0.120764
-5.741017	-31.72061	-0.102262	-43.66497	0.949294

Unrestricted Adjustment Coefficients (alpha):

D(LNGDP)	0.015965	-0.000753	-0.000384	0.003418
D(LNCPI)	-0.005721	0.007365	0.005066	0.003581
D(LNINVT)	0.005486	-0.051420	-0.011371	0.021360
D(LNEXR)	-0.000121	0.001824	-0.002498	0.001091

1 Cointegrating Equation(s): Log likelihood 541.1624

Normalized cointegrating coefficients (standard error in parentheses)

LNGDP	LNCPI	LNINVT	LNEXR	@TREND(06Q2)

1.000000	-0.031759	-0.047546	0.217931	-0.017831
	(0.00313)	(0.02828)	(0.08395)	(0.00179)

Adjustment coefficients (standard error in parentheses)

D(LNGDP)	-1.112729	
	(0.16891)	
D(LNCPI)	0.398748	
	(0.18174)	
D(LNINVT)	-0.382329	
	(0.95832)	
D(LNEXR)	0.008407	
	(0.06341)	

2 Cointegrating Equation(s): Log likelihood 559.4427

Normalized cointegrating coefficients (standard error in parentheses)

LNGDP	LNCPI	LNINVT	LNEXR	@TREND(06Q2)
1.000000	0.000000	-0.260540	0.079198	-0.011303
		(0.03534)	(0.06935)	(0.00141)
0.000000	1.000000	-6.706513	-4.368297	0.205563
		(0.97242)	(1.90823)	(0.03885)

Adjustment coefficients (standard error in parentheses)

D(LNGDP)	-1.094527	0.036594
	(0.17859)	(0.00671)
D(LNCPI)	0.220753	-0.024934

	(0.17565)	(0.00660)	
D(LNINVT)	0.860371	0.097809	
	(0.85385)	(0.03207)	
D(LNEXR)	-0.035670	-0.003305	
	(0.06425)	(0.00241)	

3 Cointegrating Equation(s): Log likelihood 567.3039

Normalized cointegrating coefficients (standard error in parentheses)

LNGDP	LNCPI	LNINVT	LNEXR	@TREND(06Q2)
1.000000	0.000000	0.000000	0.231043	-0.019362
			(0.05791)	(0.00066)
0.000000	1.000000	0.000000	-0.459682	-0.001889
			(0.55055)	(0.00628)
0.000000	0.000000	1.000000	0.582809	-0.030933
			(0.26848)	(0.00306)

Adjustment coefficients (standard error in parentheses)

D(LNGDP)	-1.092226	0.041260	0.039523
	(0.17913)	(0.03016)	(0.04306)
D(LNCPI)	0.190411	-0.086479	0.112680
	(0.16771)	(0.02824)	(0.04032)
D(LNINVT)	0.928483	0.235963	-0.886793
	(0.84801)	(0.14278)	(0.20385)
D(LNEXR)	-0.020708	0.027043	0.029995
	(0.05867)	(0.00988)	(0.01410)

Appendix4: Vector Auto Regression Estimates

Vector Autoregression Estimates

Date: 10/17/20 Time: 14:12

Sample (adjusted): 2008Q1 2019Q4

Included observations: 48 after adjustments

Standard errors in ( ) & t-statistics in [ ]

	LNGDP	LNCPI
LNGDP(-1)	0.556823	-0.137256
	(0.17799)	(0.11694)
	[3.12837]	[-1.17369]
LNGDP(-2)	0.199027	0.167832
	(0.18787)	(0.12343)
	[1.05940]	[1.35971]
LNGDP(-3)	-0.037893	0.206548
	(0.19310)	(0.12687)
	[-0.19623]	[1.62802]
LNGDP(-4)	0.104901	-0.105985
	(0.18933)	(0.12439)
	[0.55406]	[-0.85201]
LNGDP(-5)	0.130538	0.051022

	(0.18558)	(0.12193)
	[0.70339]	[0.41845]
LNGDP(-6)	-0.353175	0.069413
	(0.16636)	(0.10930)
	[-2.12293]	[0.63505]
LNGDP(-7)	0.331586	-0.161754
	(0.17626)	(0.11580)
	[1.88127]	[-1.39679]
LNGDP(-8)	0.102978	0.179869
	(0.15427)	(0.10136)
	[0.66751]	[1.77457]
LNCPI(-1)	0.047608	0.652088
	(0.23724)	(0.15587)
	[0.20067]	[4.18345]
LNCPI(-2)	0.110358	-0.044842
	(0.28733)	(0.18878)
	[0.38409]	[-0.23753]
LNCPI(-3)	-0.503431	-0.025231
	(0.27480)	(0.18055)
	[-1.83200]	[-0.13974]

LNCPI(-4)	0.093036	-0.026269
	(0.26553)	(0.17446)
	[0.35037]	[-0.15057]
LNCPI(-5)	0.360408	-0.165060
	(0.26077)	(0.17133)
	[1.38211]	[-0.96341]
LNCPI(-6)	-0.413380	0.332171
	(0.24460)	(0.16071)
	[-1.69002]	[2.06694]
LNCPI(-7)	-0.000359	-0.343355
	(0.25042)	(0.16453)
	[-0.00143]	[-2.08688]
LNCPI(-8)	0.219268	0.145474
	(0.17917)	(0.11772)
	[1.22381]	[1.23579]
C	0.195784	0.225063
	(0.12870)	(0.08456)
	[1.52121]	[2.66157]
R-squared	0.996050	0.995317
Adj. R-squared	0.994012	0.992899

Sum sq. resids	0.010262	0.004430
S.E. equation	0.018195	0.011954
F-statistic	488.5925	411.7569
Log likelihood	134.7024	154.8645
Akaike AIC	-4.904269	-5.744356
Schwarz SC	-4.241552	-5.081639
Mean dependent	7.352354	4.587641
S.D. dependent	0.235118	0.141863

Determinant resid covariance (dof adj.)	4.28E-08
Determinant resid covariance	1.79E-08
Log likelihood	291.9443
Akaike information criterion	-10.74768
Schwarz criterion	-9.422245

Appendix5: Degree of Responsiveness Results

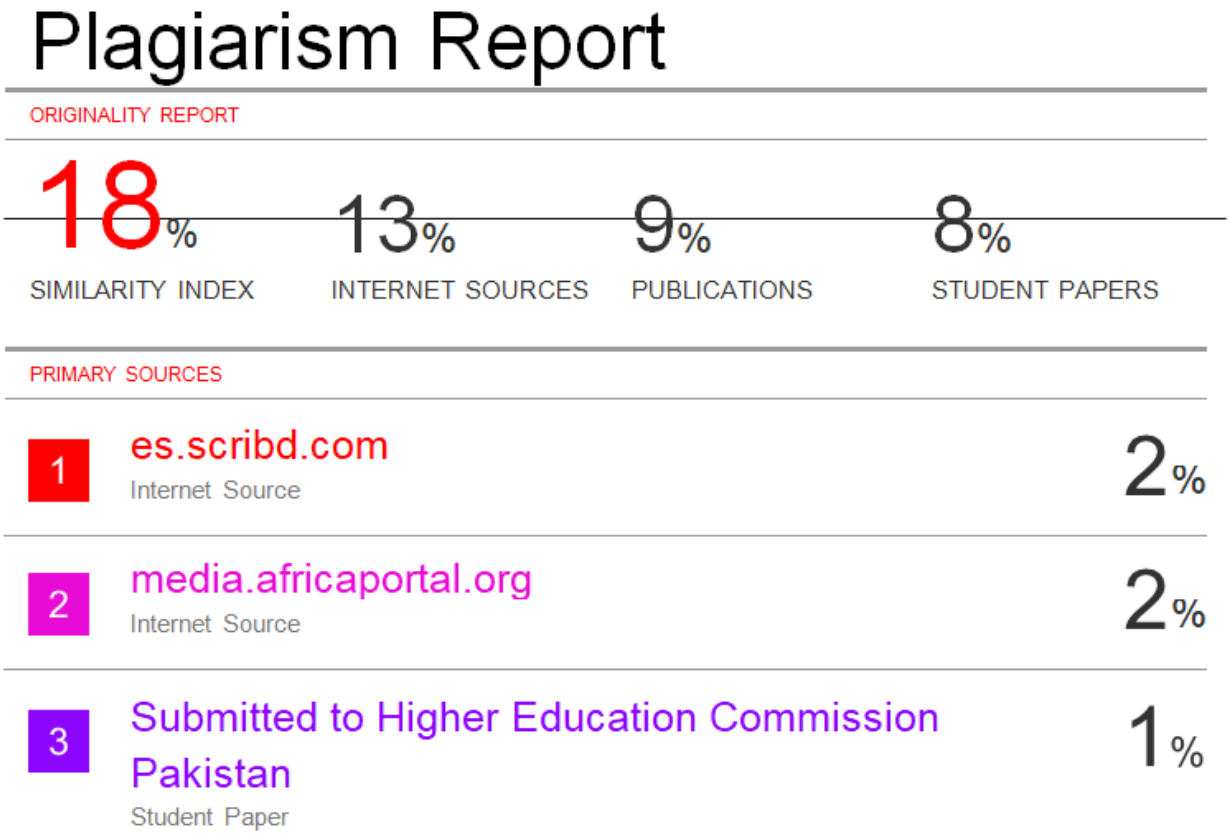
Dependent Variable: LGDP
Method: Least Squares
Date: 12/12/20 Time: 13:26
Sample: 2006Q1 2019Q4
Included observations: 56

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LCPI	1.332030	0.043950	30.30785	0.0000
C	1.254257	0.198990	6.303132	0.0000

R-squared	0.944477	Mean dependent var	7.278985
Adjusted R-squared	0.943449	S.D. dependent var	0.284270
S.E. of regression	0.067601	Akaike info criterion	-2.515329
Sum squared resid	0.246774	Schwarz criterion	-2.442995
Log likelihood	72.42920	Hannan-Quinn criter.	-2.487285

F-statistic	918.5660	Durbin-Watson stat	0.350227
Prob(F-statistic)	0.000000		

Appendix 6: Plagiarism Report



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