THE INTERNATIONAL JOURNAL OF BUSINESS & MANAGEMENT

Nexus between Selected Macroeconomic Variables and Economic Growth in Kenya (1980-2019)

Kitum Toroitich Edward
Ph.D. Student, Department of   Economics, Moi University, Kenya

Abstract:
Economic growth challenges dominate government policy and research agendas in today's globalized world. The Kenya Vision 2030 is the country's development roadmap, with the overarching goal of becoming a middle-income nation that is not only globally competitive and successful but also provides a good quality of life for its residents and a middle-income earning economy. In Kenya, the relationship between macroeconomics and economic growth has received little attention. The specific objectives of this study were:

- *To establish the influence of external debt,*
- *To examine the influence of domestic debt,*
- *To determine the influence of inflation rate, and*
- *To assess the influence of foreign exchange rate on economic growth in Kenya*

Keynesian and classical theories guided this study. The study used an explanatory research design and adopted positivism philosophy, which is based on ontological principles and doctrines, implying that reality and truths are not only free but also independent of the observer. Annual data from 1980 to 2019 giving 40 observations were used. Vector Error Correction (VEC) Model was customized to analyze the long-run and short-run contribution of macroeconomic variables and gross domestic product in Kenya. From the VECM model, R-square value was 58.62, and Chi-square value was 26.913 (p > Chi2 = 0.0494), which showed that VECM was fit for parameter estimation. The coefficient of the exchange rate was 0.828, with a p-value of 0.001. Domestic debt reported a coefficient of -0.266, with a p-value of 0.019. The coefficient of inflation was $0.055, p-value = 0.020$, while external debt reported a coefficient of 0.0003 with a $p-value$ of 0.001, which had a positive significant influence on economic growth. Based on the findings, the country may need to manage inflation since when inflation exceeds a particular threshold, economic growth is projected to halt. The study finds that domestic debt expansion in Kenya has a negative and significant influence on economic growth during the study period. As a result, this analysis suggests that the Kenyan government limits domestic borrowing. The government should favor macroeconomic policies that increase the stability of Kenya's exchange rate against the major international trade currencies if the foreign exchange rate has a beneficial effect on economic growth in Kenya.

Keywords: *Domestic debt, economic growth, exchange rate, external debt and inflation rate*

1. Introduction

1.1. Background of the Study

According to Fioramonti (2017), Any country's macroeconomic strategy should prioritize economic growth, and the Gross Domestic Product (GDP) is seen as a vital indication of that growth. If a country's GDP grows faster than its population, it indicates that the country's GDP per capita is increasing and the people's standard of living is improving (Chowdhury, Hamid & Akhi, 2019). A country's GDP is influenced by various factors, including inflation, interest rates, exchange rates, domestic debt, foreign debt, foreign direct investment, household consumption, etc.

Macroeconomic factors are variables that exist in the external environment, and so have an indirect effect on GDP (Nurlaily *et al.*, 2013). Interest rates, foreign exchange rates, money supply, inflation, foreign debt, domestic debt, and unemployment are all macroeconomic variables. Economic growth is defined as an increase in a country's overall production (Wambui, 2012). It reflects the increase or decline of the value of a country's overall products and services and the annual income earned (Bednarczyk, 2014). Over time, the country's Gross Domestic Product analysis has been used as a gauge of economic performance and growth. When a country's economic factors are inadequate, economic progress is constrained and at risk (Nyamu, 2016).

The United States was predicted to grow at a standard rate of 2.7% between 2014 and 2018, which is near to how the country has done in the past at 3%. The Eurozone, on the other hand, was expected to develop at a pace lower than its historical standard. The current output is already significantly lower than the earlier prediction made prior to the financial crisis. It was noted that monetary policy is highly vitalizing, and interest rates are almost zero, the eurozone was unable to

produce its past average rate of growth, and this is rarely done in the United States. As a result of these obstacles, a debate concerning 'secular stagnation' has erupted: what appears to be the new normal(Wepukhulu & Otieno, 2019).

African economies have shown tremendous momentum and durability. This may be observed in the real output rise from 2017 to 2019. Whereas output growth was 3.6 percent in 2017, it increased to 4.1 percent in 2018 and 2019. In general, growth recovery has been faster than expected, particularly among non-resource-intensive countries (African Economic Outlook, 2018). This recovery in economic development could be a turning point for net product-exporting countries, where a protracted drop in export costs reduced export earnings and increased macroeconomic imbalances. Although revenues declined as expenditures climbed in these nations, the current account balance and inflation increased in 2017 due to the improved exchange rate policy (African Economic Outlook, 2018).

1.2. Economic Growth and Public Debt in Kenya

Under the Internal Loans Act, the Cabinet Secretary to the National Treasury has the legal authority to borrow money from the internal market on behalf of the government by issuing Treasury bills and Treasury bonds (Cap, 420). The government overdraft at the Central Bank of Kenya appears to be the only portion of domestic debt borrowing that appears to be governed by law. Domestic borrowing appears to be unregulated by legislation. This differs from borrowing from abroad, where the External Loans and Credit Act, CAP. 422 of Kenyan laws limits the total amount of debt in relation to the principal amount to Ksh 500 billion or any higher amount approved by the resolution of the National Assembly (Vajs, 2014).

1.3. Inflation and Economic Growth in Kenya

The World Bank (2007) defines inflation as the annual increase in the cost of an economy's consumer goods and services. As a result, the country's inflation rate defines how consumer prices for goods and services produced in the country have changed over time. The cost of living in Kenya is calculated as a percentage using the consumer price index. The inflation rate is commonly used to assess the price stability of the economy. The minimum inflation rate scenario will result in an increased currency rate as the currency's value relative to other currencies rises. A scenario with significant inflation, on the other hand, will result in currency depreciation, which is the process through which the value of money diminishes (Kiruri, 2018).

1.4. Exchange Rate and Economic Growth in Kenya

According to Onyango (2014), Kenya's economy is open and small, making it vulnerable to both internal and foreign shocks that could cause it to collapse. Kenya, as a developing country, must find measures to encourage economic growth while resolving challenges caused by the execution of both microeconomic and macroeconomic policies. Exchange rate, monetary, and fiscal policies are all part of these schemes. Exchange rate policy is important because it effects international transactions. Inflation rates and comparable price levels, according to Stockman (1978), have undergone less fluctuation over time than exchange rates. As a result of exchange rate volatility, Kenya has seen a number of distinct exchange rate regimes.

1.5. Statement of the Problem

Economic growth, as measured by annual increases in GDP, is the sum of a country's economic activities. According to Kenya's Vision 2030, GDP growth should be 10% in 2012. However, the GDP growth rate now is merely 5.6% (Republic of Kenya, 2015).

At the time of its independence, Kenya's economy was comparable in scale to that of modern Asian economic powerhouses like South Korea, Hong Kong, Taiwan, and other rapidly industrializing nations. Particularly, in 1965, Kenya's GDP, at 2859.4 US dollars, was equivalent to that of South Korea (World Bank, 2015). When Kenya's economy collapsed due to macroeconomic instability in the 1990s, the GDP per capita for the two countries began to vary significantly. Years later, the GDP per capita of East Asian nations is three times that of Kenya, and the economy of Kenya is still characterized by significant inequality, unemployment, and poverty. While Kenya's GDP per capita was $1,909.30 in 2019, East Asia's was $11,494.

For the purpose of stabilizing the economy and guiding it toward economic growth, successive government regimes have adopted policies and developed a number of papers. Despite these initiatives, cyclical highs and lows in the country's real GDP growth remain a feature of the process.

The long-term significance of macroeconomic stability in driving growth has not been fully examined in a number of Kenyan research on economic growth. For instance, the majority of interest rate research focuses on how loan interest rates affect certain economic sectors.

1.5.1. Specific Objectives

The study was guided by the following specific objectives:

- To establish the influence of external debt on economic growth in Kenya
- To examine the influence of domestic debt on economic growth in Kenya
- To determine the influence of inflation rate on economic growth in Kenya
- To assess the influence of foreign exchange rate on economic growth in Kenya

1.6. Significance of the Study

Establishing the relationship between macroeconomic factors and economic growth in Kenya lays a solid framework for policymaking, especially with regard to developing more effective macroeconomic policies for the nation. These results are particularly helpful to the Treasury in developing stronger macroeconomic policy measures to promote economic growth in the nation. This helps the treasury or ministry of finance, in particular, to create policies that are appropriate to influence the amount of economic activity.

This work will be helpful to other researchers because it serves as the foundation for further research in the same field. The study specifically broadens researchers' understanding of macroeconomic factors and how they affect the economic expansion of particular industries in Kenya.

2. Literature Review

2.1. Classical Theory

Economic shifts influenced economic ideas more than ever between the end of the 18th and the beginning of the 19th century. The rate of economic expansion skyrocketed, and some thinkers of the period later became the first economists. They created the classical economic growth theory, which describes how markets and economies function (Reid, 1989). The Adam Smith, David Ricardo, and Robert Malthus economic theories from the eighteenth and nineteenth centuries make up the classical theory of economic growth (Button, 2006).

Although Adam Smith's theory of self-interest and Jean-Baptiste Say's (1767–1832) law of the equality of market demand and supply served as the economic foundation for classical economics, John Locke's (1632–1704) vision of the natural order provided the philosophy. The 'Father of Economics,' Adam Smith (1723–1790), created a significant portion of the market theory that is now accepted as a mainstream theory. According to Adam Smith, market forces ensured that the proper commodities and services were produced (Adam Smith, 1723-1790). Producing them would result in this since producers would seek to profit from doing so. Public welfare would improve the rivalry of organized production to suit the public if there was no government interference, creating a laissez-faire atmosphere. Through fiscal and monetary policies that use public borrowing, inflation control, and optimal exchange rates, this served as the foundation for the free market economy without government intervention (Reid, 1989; Blanchard & Johnson, 2014). According to the classical theory of economic growth, increases in real GDP rates are only momentary, and once real GDP per person exceeds the subsistence level, a population boom lowers real GDP per person down to the subsistence level (Park, 2006).

2.2. Keynesian Theory

John Maynard Keynes (1883-1946) proposed a theory in which government spending and taxation are utilized to promote the economy. According to his thesis, the government should aggressively participate in the economy to moderate demand (Keynes, 1936). This approach is also known as fiscal policies or demand-side economics since it promotes public borrowing and lowers taxation during economic downturns. It is said that the key to Keynesian economics is the concept that economic growth may be boosted by pursuing policies that promote growth in the face of existing impediments rather than merely removing these obstacles in the hope that development will follow (Keynes, 1936). These policies are frequently referred to as demand management policies.

Keynesian economists support government involvement by promoting public policies that aim to achieve full employment and price stability. To generate the appropriate amount of economic activity, the government uses fiscal and monetary policy. Therefore, the government uses an expansionary fiscal strategy during a recession. It can borrow both internally and abroad. Keynesians do believe that there is a nexus between the money supply and real GDP. They claim that a monetary policy that is more expansive lowers interest rates by expanding the pool of resources that banks may lend to customers. Price, currency rates, and interest rates all typically fluctuate in the same manner. Keynes claimed that since resources are being underutilized in less developed nations, inflation won't rise when the money supply is expanded. Investment boosts output (economic growth) and lowers the unemployment rate.

2.3. Empirical Review

This section reviews the empirical literature related to analyzing the relationship between macroeconomic variables and economic growth in Kenya. Specifically, the study examines external debt, domestic debt, inflation rate, and foreign exchange rate, and they relate to economic growth.

2.3.1. External Debts and Economic Growth

The impact of external indebtedness on the gross domestic product of particular sectors in industrialized and developing countries has been the subject of numerous studies. Mweni et al. (2016), in their investigation, discovered that the issue of debt overhang is caused by the accumulation of external debts. This, in turn, discourages investment in many economic areas, which ultimately leads to poor performance. According to a related study by Akram (2011), the capacities and performance of the majority of developing countries are hampered by their high levels of external debt.

According to a study by Reinhart and Rogoff (2010), there is no correlation between the stock of external debt and the performance of the agriculture and education sectors in both emerging and developed nations. According to this study, public debt of up to 90% of GDP has little impact, but once it crosses this threshold, sectoral performance and, consequently, GDP are lowered by 1%. Panizza and Presbitero (2012) found a negative correlation between economic performance and debt burden. However, their findings were contradictory. In this study, the Organization for Economic Cooperation and Development (OECD) was the subject of an instrumental variable (IV) model (OECD).

2.3.2. Domestic Debt and Economic Growth

Matiti (2013) and Charan (2013) used the co-integration and Granger causality tests for India from 1959 to 2010 to examine the connection between domestic debt and economic growth. The Granger causality test and co-integration tests back up the Ricardian equivalence theory of domestic debt and economic growth. According to Ricardian equivalence, the impact on the overall level of demand in an economy is the same whether a government pays its spending with debt or a tax increase.

Musibau *et al.* (2018) used a cross-country study of the function of domestic debt markets in sub-Saharan Africa based on a new data set of 27 sub-Saharan African countries during the 20-year period (1980-2010) and discovered that domestic markets in these countries are typically smaller, highly illiquid, and frequently have a narrower investor base. Additionally, he discovered that domestic interest rate payments place a heavy strain on the budget and have a considerable crowding-out impact.

In another study, Abbas *et al.* (2020) and Abbas and Christensen (2010) examined the optimal levels of domestic debt in low-income nations (including 40 sub-Saharan African nations) and emerging markets between 1975 and 2004 and discovered that moderate levels of marketable domestic debt as a percentage of GDP have notable favorable effects on economic growth. The study proved that debt levels higher than 35% of total bank deposits have a detrimental effect on economic expansion. Gurley and Shaw (1956) noted that every government should plan for some sort of secular increase in public debt since it is a vital component of a stable and healthy financial structure of an economy.

2.3.3. Inflation Rate and Economic Growth

A strong association between inflation and economic growth has been noticed by Mallik and Chowdhury (2001). The problem today is not only that there is a connection between the two phenomena but (Mamo, 2012) that inflation can have a positive or negative effect on economic development. Barro (1995) emphasized that high inflation lowers the amount of spending, and this decline has a negative effect on the economy. The value of predicting inflation for economic growth is highlighted by Mamo (2012). Bidirectional causality, unidirectional causality, and no causality between inflation and economic growth are suggested in observational studies undertaken to explore the existence of the relationship between inflation and growth. Umaru I Zubariu (2011) has stated that inflation is caused by GDP. Empirical analysis has also found that this causality differs in the short and long term. While studying growth and inflation in Malaysia, Datta (2011) found that there is causality between inflation and economic growth in the short term; hence inflation affects economic growth, but inflation affects inflation in the long term.

2.3.4. Foreign Exchange Rate and Economic Growth

The price of one currency in relation to another is known as the exchange rate, ER. It conveys the national currency's exchange rate in relation to foreign currencies (Aslam *et al.*, 2020). Real Exchange Rate (RER), as opposed to nominal, is frequently recognized as a crucial macroeconomic policy indicator since it reflects a nation's level of global competitiveness. The Nominal Exchange Rate (NER) is adjusted for domestic price fluctuations (inflation) in comparison to those of trading partners to arrive at the Real Exchange Rate (RER). The RER is influenced, among other things, by NER, and the NER management depends on the RER (Montiel, 2017; Thapa, 2012). Since NER frequently determines the RER, there is a strong link between real and nominal exchange rates. Additionally, RER alterations typically have a high degree of persistence or permanence.

Fetai (2013) found that if a different exchange rate regulation mechanism was implemented as a means of fostering rapid economic growth, the macroeconomic stability might be readily upset with no discernible benefits to the economy. According to the long-term exchange rate coefficient, a change of 1% in the exchange rate results in an increase in prices of 0.52%, showing that 52% of differences in the rate of exchange supply into the price levels. The investigation came to the conclusion that implementing a new exchange rate strategy would probably result in higher expenses than revenues.

According to Eichengreen's (2018) study, which used panel data regression analysis and descriptive analysis to analyze data from 1985 to 2003, real exchange volatility appears to have a considerably negative influence on job growth. Jinzhao (2012) corroborated the same outcome in China using a similar study and methodology. Rosoiu (2014) investigated unemployment hysteresis in the USA using the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) tests to support Okun's Law.
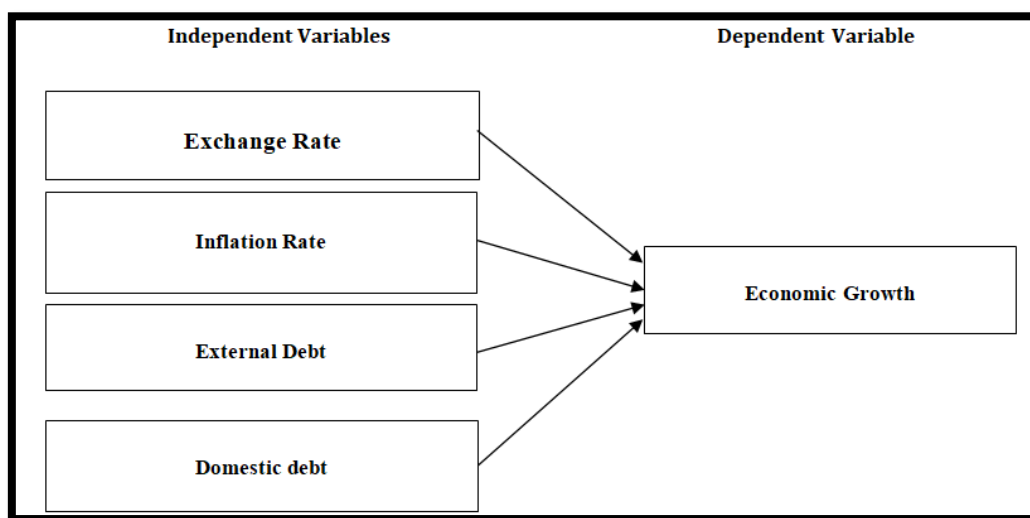
Figure 1: Conceptual Framework

3. Research Methodology

3.1. Research Design

A framework for conducting research is known as research design. The layout makes it easier for researchers to concentrate on successful study setups and procedures that are appropriate for the subject (Gliner *et al.*, 2016). This study used a time series-based explanatory research design. It is a time series because it includes repeated measurements of a particular entity (in this case, Kenya) done at regular intervals over time, in this case, once a year.

A causal research design, also known as an explanatory research design, is typically used to determine the scope and kind of cause-and-effect interactions (Adrian, 2010). In order to understand the patterns of interactions between variables, explanatory studies concentrate on an investigation of a situation or a particular problem. According to Creswell (2014), exploratory studies are a useful tool for learning more about what is happening, looking for fresh perspectives, posing questions, and evaluating phenomena in a different way.

3.2. Model Specification

Vector Error Correction (VEC) Model was customized to analyze the relationship between macroeconomic variables and economic growth in Kenya. The VEC Model's main distinguishing factor requires the series to be co-integrated, whereas the VAR model requires non-cointegration. The presence or absence of co-integration dictates which of the two models between VAR and VECM should be fitted for the study's data set. Vector autoregressive (VAR) is a model in econometrics that captures values and interdependencies between multiple time series and generalizes univariate (ARs) models. It is a system of equations equal to the number of variables within the model (Brooks, 2008). Also, each variable is taken as endogenous, and in the VAR system, each variable is a function of its own lagged values (past values) and lagged values of other variables in the model.

If the series is non-stationary and not co-integrated, the researcher differenced the data to induce stationarity before estimating the VAR model. If the series are co-integrated, then the following model from Brooks (2008) is adopted.

$$Y_t = \alpha_0 + \beta_1 Y_{t-1} + \beta_2 Y_{t-2} + \beta_3 Y_{t-3} + \cdots \beta_p Y_{t-p} + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots\dots 3.16$$

Where:
- Y_t = the model variables, four by a 1-dimensional vector of the model's endogenous variables.
- α_0 = is the model intercept, i.e., four by a 1-dimensional vector of constant.

$\beta_1, \beta_2, \beta_2,$ and β_p are four-by 4-dimensional autoregressive coefficient matrices of the established parameter that relate to lagged values of the variables to their current values. ε_t = is a four-by-a 1-dimensional vector of stochastic error term normally distributed with noise properties $N(0, \sigma^2)$, $t-1, t-2, \dots, t-p$ is the number of lags.

VAR model is not used to capture the dynamics within if the series are not co-integrated. In such cases, the VEC model is employed to describe the relationships. Therefore, VECM is described as a restricted VAR model used for stationary and co-integrated series. In the long-run, co-integrated series share equilibrium, while in the short term, the series may deviate from the equilibrium as they respond to their own shocks, where the VEC model is used to correct the short-term deviations. The VECM model takes the following form:

$$\Delta X_t = \alpha\beta X_{t-1} + \Gamma_1 \Delta X_{t-1} + \Gamma_2 \Delta X_{t-2} + \Gamma_3 \Delta X_{t-3} + \cdots \Gamma_p \Delta X_{t-p} + \varepsilon_t \dots\dots\dots\dots\dots 3.17$$

Where:
- α = is the coefficient of the adjustment's matrix,
- β = is a co-integrating equation of matrix coefficients
- Γ = is a short-run coefficient
- X_t = model endogenous variables

3.3. Unit Root Tests

Time series data exhibit trending or non-stationarity at its mean, and using such kind of data without removing unit roots leads to spurious regression. In this context, stationarity implies a time series data that has constant mean, variance, and covariance. Non-stationarity behavior in time series data implies that its variance, covariance, and mean is not constant, implying that the results can only be studied for the period under consideration and, therefore, cannot be generalized for the other time periods.

3.3.1. Augmented Dickey-Fuller Test

The ADF test statistic is based on the *t*-statistic of the coefficient φ from OLS estimation as per Dickey & Fuller (1979). It does not have an asymptotic standard normal distribution, but it has a non-standard limiting distribution. ADF test estimates equation 3.2 on the time series model to accommodate serial autocorrelation, auto covariance, and covariance (Pfaff, 2008).

$$\Delta y_t = \alpha + \beta_t + \gamma_{t-1} + \delta \Delta y_{t-1} + \delta_{p-1} \Delta y_{t-p+1} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.2$$

Where:
- y_t is the first difference between each variable,
- α is a constant,
- β is the coefficient of time trend,
- p represents the lag order of the autoregressive process, which allows for the formulation of higher-order autoregressive processes,
- ε is the error term

ADF tests two hypotheses $H_0 : \phi = 0$, that is, the series contains unit root versus alternative hypothesis.

$H_1 : \phi < 0$ H1: $\varphi < 0$ that the series is stationary or trend stationary. Augmented Dickey-Fuller tests are based on *t*-statistic of the coefficient φ from OLS estimation as per Dickey & Fuller (1979).

3.3.2. Diagnostic Tests

In an effort to guarantee the validity of estimated results, the study undertook several multivariate linear regression assumption tests such as normality, serial correlation/autocorrelation, multicollinearity, and heteroskedasticity.

3.3.3. Model Stability Tests

When a model is estimated, it is presumed that its parameters will remain constant throughout the whole research time. The parameter stability or constancy assumption is this. A model could become unstable as a result of structural changes. The following techniques were used in the study:
- Roots of the companion matrix, and
- CUSUM test

4. Empirical Results and Discussion

4.1. Descriptive Statistics

Variable	Observations	Mean	Std. deviation	Minimum	Maximum
EGR	40	3.970454	2.284124	-0.799494	8.405699
DDT	40	5812027	8073803	12250.54	3.36e+07
EXD	40	9.37e+09	7.30e+09	3.23e+09	3.42e+10
INF	40	11.80326	8.526401	1.554328	45.97888
EXR	40	58.0077	31.43399	7.420187	103.4109

Table 1: Descriptive Statistics
Source: Author (2021)

Measures of central tendency, such as mean and median, were the main descriptive statistics that were carried out. Maximum and minimum values of study variables were also computed. Descriptive statistics is important in time series analysis because it allows the presentation of raw data in a meaningful manner and the easy interpretation of data (Cohen, 2014). Economic growth over the study period had a mean annual growth of 3.97 percent.

Domestic debt (DDT) showed a standard deviation of 8073803 US dollar, a minimum of 12250.54 US dollar, and a maximum of 3.36e+07 US dollar. External debt (EXD), on the other hand, showed a mean of 9.37e+09 percent. Inflation (INF) recorded a minimum of 1.55, a standard deviation of 8.53, and a maximum of 45.98 percent. Kenya's exchange rate against the US dollar had a mean of 58.01.

4.2. Unit Root Tests

The table shows regression analysis of level and first difference results.

First Difference						
DDT	-7.813	0.0000	-3.62	-2.94	-2.614	I (1)
INF	-7.546	0.0000	-3.62	-2.94	-2.614	I (1)
EXD	-6.438	0.0000	-3.62	-2.94	-2.614	I (1)
EXR	-5.789	0.0000	-3.62	-2.94	-2.614	I (1)
EGR	-7.378	0.0000	-3.62	-2.94	-2.614	I (1)

Table 2: Augmented Dickey-Fuller Unit Root Test

Upon first difference, all the variables (DDT, INF, EXD, EXR, and EGR) achieved stationarity. This is indicated by its critical values, which were less than 5 percent. This rejected the null hypothesis of unit root, and hence, *I (1)* and hence VECM model was applicable.

4.3. Optimal Lag Length Selection

Too many lags may inflate standard errors with respect to the estimated coefficients. Overfitting, that is, selecting a higher order lag increases the mean square variance of residuals (Lutkepohl, 2005). On the other hand, a few lags tend to be highly correlated; hence, the problem of multicollinearity may arise. Ford *et al.* (2014) stated that the number of lags to be used in annual data is 1, 2, or 3, and 4 in order not to lose the degrees of freedom. For quarterly data, the number of lags should be between 1 and 8, while for monthly data, the number of lags should be 6, 12, or 24.

Sample: 1980–2019 Number of Observations = 40 Selection Order Criteria							
Lag	LL	LR	Df	P	FPE	AIC	HQIC	SBIC
0	-1159.46				8.6e+21	64.692	64.7687	64.9119
1	-977.111	364.69	25	0.000	1.4e+18e*	55.9506	56.4112*	57.2702*
2	-968.974	16.274	25	0.906	3.96e+18	56.8875	57.7319	59.3067
3	-938.123	61.704	25	0.000	3.5e+18	56.5624	57.7906	60.0813
4	-898.054	80.137	25	0.000	2.5e+18	55.7252*	57.3372	60.3438

Table 3: Lag Length Selection
Source: Author (2021)

For this study, an optimal lag length of 4 was chosen as suggested by AIC criterion.

Sample: 1980–2019 Number of Observations = 40 Selection Order Criteria							
Lag	LL	LR	Df	P	FPE	AIC	HQIC	SBIC
0	-1159.46				8.6e+21	64.692	64.7687	64.9119
1	-977.111	364.69	25	0.000	1.4e+18e*	55.9506	56.4112*	57.2702*
2	-968.974	16.274	25	0.906	3.96e+18	56.8875	57.7319	59.3067
3	-938.123	61.704	25	0.000	3.5e+18	56.5624	57.7906	60.0813
4	-898.054	80.137	25	0.000	2.5e+18	55.7252*	57.3372	60.3438

Table 4: Co-integrating Relationships among the Variables
Source: Author (2021)

It was deduced from table 4 that there are three co-integrating relationships among the variables.

4.4. Jarque-Bera Test for Normality

Normality test regression results are hereby shown in table 5.

Equation	Chi^2	Df	$prob > Chi^2$
D-EGR	1.37	2	0.51493
D_LEXR	2.151	2	0.34107
D_INF	1.783	2	0.41002
D_LEXD	9.887	2	0.71340
D_LLDT	16.107	2	0.26990
ALL	31.256	10	0.44537

Table 5: Normality Test Regression Results
Source: Author (2021)

It is shown that the Jarque Bera in the table above rejects the null hypothesis, and it was concluded that the sample was obtained from a normal distribution.

4.5. Lagrangian Multiplier (LM) Test for Autocorrelation

Results in the table below showed that the probability of Chi2 is insignificant or the P value>0.05 at 5% level of significance, implying the null hypothesis of no serial correlation failed to be rejected but rather accepted. This implies that there was no serial correlation present.

Lags(p)	Chi²	Df	Prob> Chi²
1	0.074	1	0.7863
H0: no serial correlation			

Table 6: Lagrangian Multiplier (LM) Test for Autocorrelation
Source: Author (2021)

4.6. Long-Term Co-integrating Equations and Hypothesis Testing

The table reports long-run effects of the study variables on economic growth

Co-integrating Equations					
Equation	Parms	Chi2	p>chi2		
_ce1	4	95.7686	0.0000		
Identification: Beta is exactly identified					
Johansen Normalization Restriction Imposed					
	Beta	**Coef.**	**Std. Err**	**Z**	**p>|z|**
_ce1					
	Egr	1	.	.	.
	Exr	-0.8280	0.2569	-3.22	0.001
	Inf	0.0551	0.0237	2.33	0.020
	Exd	0.0003	0.0001	3.24	0.001
	Ddt	-0.2664	0.1140	-2.34	0.019
	Constant	-5.9603	.	.	.

Table 7: Reports Long Run Effects of the Study Variables on Economic Growth
Source: Author (2021)

4.6.1. Effect of External Debt on Economic Growth

The results indicated that the coefficient of external debt was positive (0.0003) and significant. This is in line with Keynesian theory, which promotes deficit spending to spur economic growth during downturns.

This implies that one unit increase in external debt would increase economic growth in Kenya by 0.0003 units in the long run. In support of this sentiment of positive effect, economists have concluded that the principal contributor to economic development in developed countries is foreign borrowing, and this only happens when the debt is properly utilized.

This claim has been supported by multiple studies undertaken by Pattillo *et al.* (2002). Kenya needs to be cautious concerning external debt because even though debt is good, the government is advised to borrow and invest wisely (Wray, 2009). This is because accumulating more debts brings negative impacts to economic growth in the long run and because there are weak debt policies and systems in most developed countries exacerbated by poorly designed international financial architecture. This has caused them to borrow heavily, leading to their economy being eroded (UN, 2009). There is yet to be a definitive finding on the effect of foreign debt on economic development.

4.6.2. Effect of Domestic Debt on Economic Growth

The results showed that the coefficient of domestic debt was negative,-0.2664, and significant. In support of this sentiment of negative impact, economists have concluded that the principal contributor to economic development in developed countries is domestic borrowing, and this only happens when the debt is properly utilized. In developing economies, domestic debt is not properly utilized and hence the negative impact. In developing economies, this implied that domestic debt was not utilized properly, leading to a reduction in economic growth.

This claim has been supported by multiple studies undertaken by Pattillo *et al.* (2002). It has been demonstrated by Panizza (2007) and Christensen (2005) that domestic public debt is more costly than external debt. This is when policymakers turn to raising interest rates to continue enticing buyers as the public domestic debt begins to rise, which increases the expense of managing public debt. Kenya has been carrying out net loan repayments for over a decade, while domestic debt has accumulated steadily over the years (Tskhadadze, 2019).

4.6.3. Effect of Inflation on Economic Growth

Regression analysis in the table above shows that the coefficient of inflation rate was positive (0.0551) and significant. A sound macroeconomic policy that relies on both private and government investment to generate wealth, raise production, national income, and wages, minimize inflation, and fund the provision of public services is the most powerful instrument for economic development (Saungweme & Mufandaedza, 2013).

The study is consistent with structural economists, who believe inflation is beneficial to economic growth, whereas monetarists believe inflation is destructive to economic progress. Both points of view explain why inflation has a

good or negative impact on economic growth. Inflation, for example, enhances economic growth by altering the income distribution in favor of greater saving capitalists, according to neoclassical ideas. This boosts savings and, as a result, economic growth. Furthermore, Keynesians claimed that inflation might boost GDP by increasing the rate of profit, hence stimulating private investment (Švigir & Miloš, 2017).

4.6.4. Exchange Rate on Economic Growth
The results showed that the coefficient of foreign exchange rate was negative (-0.8280) and significant.
This study deviates from the conventional wisdom that claims there is a correlation between economic growth and the foreign exchange rate. So much so that a rise in exchange rates boosts net export volume and, as a result of rising overall demand, has a positive impact on economic growth. However, this study supports the claim made by structural economists that the exchange rate and economic growth are inversely related. An increase in exchange rates makes import production inputs more expensive and hence has a negative impact on economic growth, particularly in emerging nations where the input structure of production depends on imported capital and intermediate goods (Karahan, 2020).

The study differs from Sibanda *et al.* (2015)'s study on the impact of real exchange rates on economic development in South Africa over the long run. According to the regression results, currency undervaluation greatly inhibits growth in the long run while significantly enhancing economic growth in the short run. As a result, weakening the currency to obtain greater growth rates is only successful in the short run and is unsustainable in the long run. Based on the study's findings, the researcher advised that currency misalignment (overvaluation and undervaluation) should be avoided at all costs.

5. Conclusion and Policy Implications

5.1. Conclusions
From the results, it can be concluded that external debt would have a favorable effect on the borrowing country's economy if the marginal output of an available external debt is greater than or equal to the principal and interest payment.
Domestic debt had a negative and significant effect on economic growth in Kenya. This implied that domestic borrowing would result in crowding out effects such that private investors would be negatively affected, hence not able to invest in the country.
Inflation had a statistically significant positive impact on GDP growth, but when inflation is high, this positive relationship can start declining. When inflation rises above a certain level, economic growth is expected to decrease.

6. Recommendations
The study shows that domestic debt expansion in Kenya, for the period of study, has a negative and significant effect on economic growth. Therefore, this study recommends that the Kenyan government should consider minimizing domestic borrowing provided since it affects economic growth negatively in the long run and would eventually cause crowding out in the economy where private sectors tend to reduce their investment in the economy.
Results depicted that external debt had a positive and significant effect which, in essence, could imply that where external borrowing was used as intended as laid down in the borrowing schedules; this could lead to increased economic growth in Kenya.
Results showed that inflation had a positive and significant effect on economic growth. However, as revealed by impulse function, any shock will have a negative implication on economic growth. A key goal of Kenyan economic policy should be to control the volatility of inflation. The government needs to think of ways to increase supply.
The study found out that the foreign exchange rate has a negative effect on economic growth in Kenya. Therefore, macroeconomic policies that strengthen the stability of Kenya's exchange rate against the major world trading currencies should be encouraged. In order to promote economic growth, policymakers in CBK may adopt measures that preserve and sustain stability in the exchange rate to prevent volatility, by introducing high tariffs to deter product imports and diversifying exports.

7. References
i. Abbas, S., Wizarat, S., & Mansoor, S. (2020). External debt distress in South Asia: Evidence from Panel data analysis. South Asian Journal of Macroeconomics and Public Finance, 9(2), 221–236.
ii. Akram, N. (2011). Impact of Public Debt on the economic growth of Pakistan. The Pakistan Development Review, 599–615.
iii. Aslam, F., Aziz, S., Nguyen, D. K., Mughal, K. S., & Khan, M. (2020). On the efficiency of foreign exchange markets in times of the COVID-19 pandemic. Technological forecasting and social change, 161, 120261.
iv. Button, K. (2006). The political economy of parking charges in "first" and "second-best" worlds. Transport Policy, 13(6), 470–478.
v. Christensen, J. (2005). Domestic debt markets in sub-Saharan Africa. IMF Staff Papers, 52(3), 518–538.
vi. Fetai, B. (2013). Exchange rate pass-through in transition economies: The case of Republic of Macedonia. Transition Studies Review, 20(3), 309–324.
vii. Fioramonti, L. (2017). Gross domestic problem: how the politics of GDP shaped society and the world History of the Future of Economic Growth (pp. 91–109): Routledge.

viii.   Ford, M. T., Matthews, R. A., Wooldridge, J. D., Mishra, V., Kakar, U. M., & Strahan, S. R. (2014). How do occupational stressor-strain effects vary with time? A review and meta-analysis of the relevance of time lag in longitudinal studies. Work & Stress, 28(1), 9–30.

ix.   Gliner, J. A., Morgan, G. A., & Leech, N. L. (2016). Research methods in applied settings: An integrated approach to design and analysis: Routledge.

x.   Karahan, Ö. (2020). Influence of Exchange Rate on the Economic Growth in the Turkish Economy. Financial Assets and Investing, 11(1), 21–34.

xi.   Keynes, J. M. (1936). The general theory of interest, employment, and money: London: MacMillan.

xii.   Kiruri, D. (2018). Effect of Inflation Targeting on the Inflation Rate in Kenya. University of Nairobi.

xiii.   Matiti, C. (2013). The relationship between public debt and economic growth in Kenya.

xiv.   Musibau, H. O., Mahmood, S., Ismail, S., Shamsuddin, Z., & Rashid, N. (2018). Does external debt cause economic growth? An experience from ECOWAS Member Countries. International Journal of Academic Research in Business and Social Sciences, 8(11), 1256–1264.

xv.   Mweni, F. T., Njuguna, A. G., & Okech, T. C. (2016). Time series analysis of the relationship between GDP growth rate and external debt in Kenya.

xvi.   Nurlaily, F., Suhadak, S., Rahardjo, K., & Hsu, W.-H. L. (2013). The Influence of Macroeconomic and Microeconomic Variables on Capital Structure and Financial Performance. PROFIT: JURNAL ADMINISTRASI BISNIS, 7(1).

xvii.   Nyamu, F. (2016). The Effect of Macroeconomic Factors on Financial Performance of Insurance Organizations, Theory and Practice: London: Oxford University Press. participacão de mercado. Porto Alegre: Bookman.

xviii.   Onyango, D. W. (2014). The impact of real exchange rate volatility on economic growth in Kenya. University of Nairobi.

xix.   Panizza, U. (2007). Is domestic debt the answer to debt crises?

xx.   Pattillo, C. A., Poirson, H., & Ricci, L. A. (2002). External debt and growth.

xxi.   Reinhart, C. M., & Rogoff, K. S. (2010). Growth in a Time of Debt. American economic review, 100(2), 573–578.

xxii.   Saungweme, T., & Mufandaedza, S. (2013). An empirical analysis of the effects of external debt on poverty in Zimbabwe: 1980–2011. International Journal of Economics and Research, 4(6), 20–27.

xxiii.   Sibanda, K., Hove, P., & Murwirapachena, G. (2015). Oil prices, exchange rates, and inflation expectations in South Africa. International Business & Economics Research Journal (IBER), 14(4), 587–602.

xxiv.   Švigir, M., & Miloš, J. (2017). Relationship between inflation and economic growth; comparative experience of Italy and Austria. FIP-Financije i pravo, 5(2), 91–101.

xxv.   Tskhadadze, K. (2019). The impact of external debt on inflation rate in Georgia. Ecoforum, 8(2), 0–0.

xxvi.   Vajs, S. (2014). Government debt issuance: issues for central banks. BIS Paper (76d).

xxvii.   Wepukhulu, J. M., & Otieno, O. G. (2019). EFFECT OF MACROECONOMIC FACTORS ON ECONOMIC GROWTH IN KENYA. International Journal of Economics, 4(1), 43–67.