International Journal of
Economics
(IJECON)

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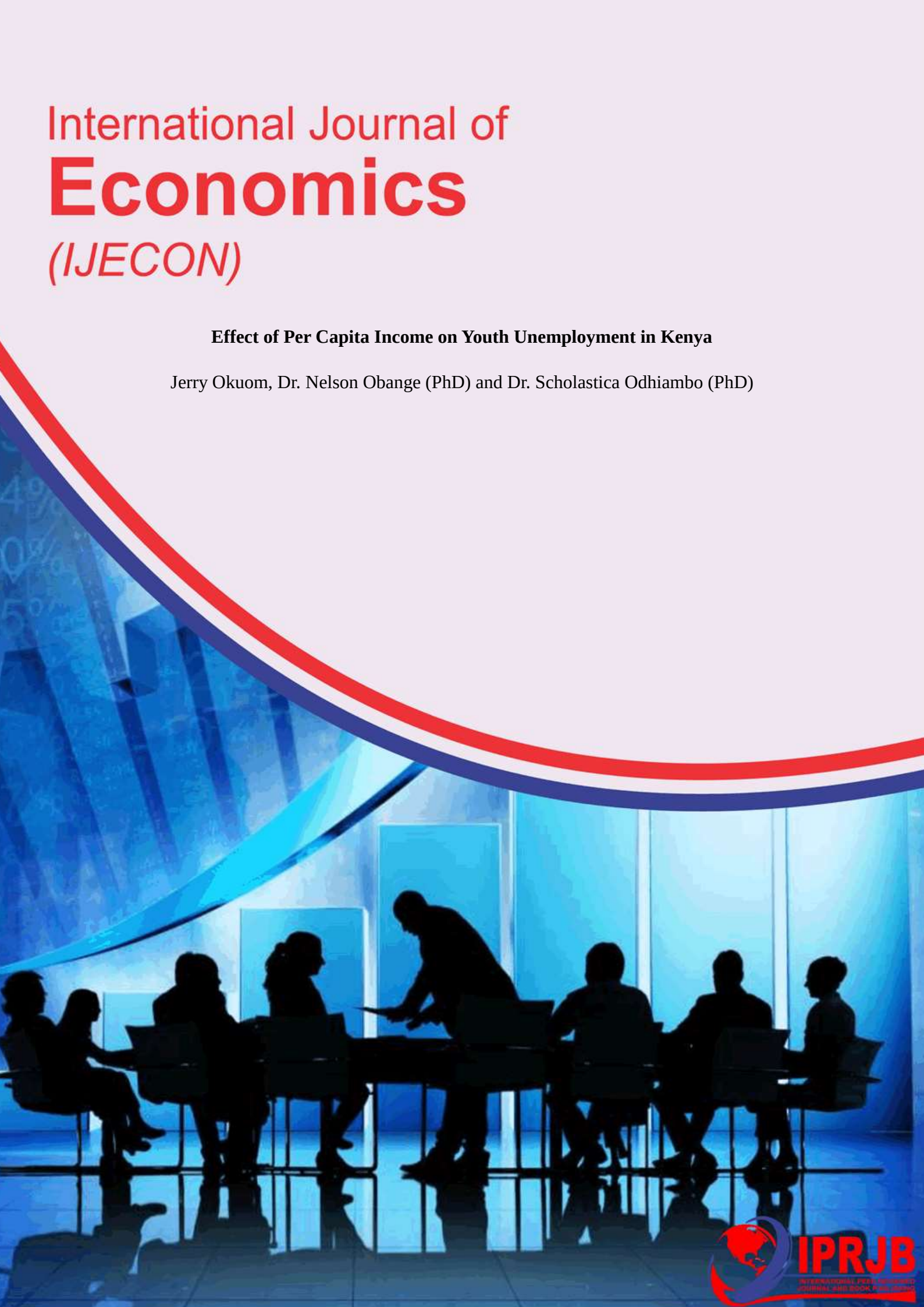

International Journal of Economics
ISSN 2518-8437 (Online)
Vol.8, Issue 2, No.1. pp 1 - 18, 2023

www.iprjb.org

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Article History

Received 1st September 2023

Received in Revised Form 15th September 2023

Accepted 23rd September 2023

How to cite in APA format:

Okuom, J., Obange, N., & Odhiambo, S. (2023). Effect of Per Capita Income on Youth Unemployment in Kenya. *International Journal of Economics*, *8*(2), 1–18. https://doi.org/10.47604/ijecon.2118

Abstract

Purpose: The objective was to determine the effect of per capita income on youth unemployment in Kenya.

Methodology: The study was anchored on Okun's law, which predicts a 1% drop in employment from a 2% drop in GDP. The study used the World Bank Database's quantitative time series data from 1991–2021. The choice of the ARDL was based on the ability of the model to give long-run and short-run analyses of stationary and non-stationary variables. Pre-estimation procedures and diagnostics tests were used to determine the stability of the model.

Findings: Findings revealed a significant negative relationship between per capita income (-0.3666, p = 0.013) and youth unemployment in the long-run. The speed of adjustment (-0.89999, p = 0.0001) from the short-run to the long-run is evident.

Unique Contribution to Theory, Practice and Policy: This study may help academicians develop their knowledge of youth unemployment. It may increase understanding of per capita income as an indicator of growth and its application in Okun's law. The Salaries and Remuneration Commission (SRC) may benefit from this study by creating better packages of salaries, allowances, and mortgages that may attract and improve the standard of living of Kenyan youth. The Public Service Board (PSB) may establish youth-friendly offices to motivate youth to stay in the labour force. Moreover, this study may guide the State Department for Youth Affairs to promote youth employment and increase labour productivity in Kenya. The State Department of Gender may use the study in gender mainstreaming and gender policy management. Policymakers will assess the effectiveness of the curriculum in preparing youth for the job market. An increase in labour productivity will result from increasing youth employment.

Keywords: *Youth Unemployment, Per Capita Income, Kenya*

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INTRODUCTION

Youth unemployment gradually increased from 6.69% in 1991 to 13.84% in 2021 in Kenya (The World Bank, World Development Indicators, 2023). Kenya had a higher unemployment rate than Uganda and Tanzania. Youth are most disadvantaged in the job market. Okun's law argues that positive economic growth results in a decrease in unemployment. Studies on growth have mainly focused on GDP, but GDP per capita is often overlooked. The effect of GDP per capita on youth unemployment has been studied in European countries. However, a study of GDP per capita on youth unemployment in the Kenyan context is required to develop existing knowledge on studies of the effect of GDP on youth unemployment because income distribution may have different significance on growth. Only empirical findings can shed light on the quantitative effect of per capita income on youth unemployment in the country.

Equilibrium in the labour market results from an equal supply and demand for jobs. Unemployment can be voluntary or involuntary (Smith, 2012). For instance, a person who quits a job for personal reasons is in the voluntary unemployment category. Involuntary unemployment may result from an unfavourable economic environment. A recession presents few job opportunities and leaves many people jobless.

According to the United Nations (2019), youth are 15-24 years old. They comprised one-sixth of the total world population in 2019 and 60% of Africans. The 15-24 youth proportion was approximately 20.4% in Kenya in 2019 (KNBS, 2019). World Bank development statistics show that the youth's population between 15 and 24 years old has doubled from 1991 to 2021. The high youth unemployment rate has resulted in an emphasis on youth in economic programs and policies.

According to the KNBS (2019) report, 18.9 million people are outside the active labour force. The figure is significant for a country primarily comprised of the informal sector (UNDP 2013). The publication by UNDP indicates that policies promoting secondary and tertiary education are better at improving the lives of youth. Less effective policies are those that create jobs for primary school dropouts. That is because primary school dropouts have fewer employment opportunities with low pay. According to UNDP (2013), the rise in the global poverty level is highly correlated with the unemployment level that resulted from recent economic downturns.

The population of Kenyans increased exponentially while the economy improved geometrically. A lower economic growth rate increases unemployment (Kunst, 2006). The bulging population can be a blessing through the demographic dividend. However, a large unemployed population exposes the country to political and social instability. The 2007-2008 post-election violence highlighted economic weakness that resulted from low youth participation in national development.

Adults over 35 have secured most employment opportunities resulting from economic growth in Kenya. The government of Kenya developed the Kazi Kwa Vijana (KKV) policy in 2009 to increase job opportunities for the youth to participate in the country's development. That was after the Sector Plan for Labour, Youth, and Human Resource Development Sector, (2012). Both programs aim to provide an average of 250,000 jobs annually in labour-intensive public

works project. Income, inflation, and gender are some of the factors affecting unemployment. The national unemployment rate for 2021 was 5.742%, while the youth unemployment rate for 15 to 24 years was 13.844%. The figures show an unemployment gap of 6.102%.

Per Capita Income

Studies on the effect of GDP on unemployment include a panel study in Jordan from 1992–2014 (Soylu et al., 2018), and one with ARDL, ECM, and HP filter from 1980–2011 (Alamro, 2014). Eze et al. (2016) conducted a study on similar variables in Nigeria using VECM on data ranging from 1980 to 2013. All three studies show that GDP has an inverse relationship with unemployment, with different magnitudes of coefficients.

The studies on this concept include a study by Dreymann (2013), on the effect of GDP per capita on youth unemployment in European countries, while Mutua (2019) studied the effect of GDP on youth unemployment in Kenya. However, this study sought to determine the effect of per capita income on youth unemployment in Kenya, given that Kenya has a different economic, social, and political environment from those of European countries for 1984–2021. The youth form the bulk of workforce and have the largest unemployed population. Solving youth unemployment challenge in Kenya is solving Kenya's unemployment challenge.

This study excluded youth between 25 and 34 years old because of a lack of time series data in that category. Unemployment is a multidimensional issue that results from many factors. Given the broad nature of factors affecting unemployment, this study is limited to per capita income. Finally, this proposal is geographically limited to Kenya for 1991–2021. Data availability has affected the period selected. It is the period when there was increased global attention on youth unemployment as a key issue affecting the development of countries.

LITERATURE REVIEW

Theoretical Review

Classical Theory

J. B. Say and Smith advanced this theory. Unemployment is an obstruction to the smooth functioning of the labour market. The labour market is assumed to be perfect, single, and static (Goodwin et al., 2006). Labour is measured in terms of the quantity of labour services. That can be the number of workers working in a given place at a particular time frame. A real wage is the price of labour and is calculated daily. Employers demand labour while employees supply it.

The classical theory was analysed by Solow in 1981 after Pigou, who analysed it in the year 1933. It argues that labour is affected by the economic forces of demand and supply. The demand for labour is a derivative of the marginal product of labour. Demand for labour is inversely related to wages since it's a negative function of the wage rate. The supply curve is derived from the work-leisure trade-off. The supply of labour rises when there is an increase in the existing market wage rate.

Pigue argues that unemployment results from the wage demand above the equilibrium wage.

This results in voluntary unemployment. Involuntary unemployment results from a similar situation when a trade union or the government enforces a minimum wage that is higher than the equilibrium wage. Employers respond by reducing employees, resulting in unemployment. Theoretically, the best response of the market is that the increase in labour supply should result in a decrease in wages. That is practically impossible because people will hardly accept a direct wage cut. Employers can reduce real wages indirectly in the long-run by maintaining the same salary regardless of the lower purchasing power due to inflation.

However, unemployment exists even at an equilibrium wage due to other factors. Frictional unemployment occurs when a new plant opens, a plant closes, or during the search for better jobs. Other causes of unemployment are economic business cycles, "insiders' barriers to employment," and the unemployment rate. Neo-classical and Solow's model focuses on population, technology, savings, and investment in a closed economy.

Okun's Law

Okun studied the US economy in 1962. The study revealed an inverse relationship between the output gap and unemployment. A 1% decrease in output gap results in a 2% increase in unemployment in the United States of America. The model used is shown by the equation below.

$$u=u^*-[\beta(y-y^*)/y^*] \quad (2.1)$$

Considering country-specific factors when analysing the relationship between unemployment and output. These unique factors are labour market institutions, demographics, and policy responses. Okun's Law has remained a valuable tool for policymakers and economists in understanding the dynamics between unemployment and economic growth despite limitations in previous discussions. It provides insights into the impacts of economic policies and shocks on the labour market. Policymakers can gauge economic performance by examining the relationship between the output gap and unemployment. They can make informed decisions regarding monetary and fiscal policies to stabilise the economy and promote job creation.

Okun's Law describes the inverse relationship between changes in the unemployment rate and GDP. It suggests that unemployment decreases during economic growth and increases during economic downturns.

Empirical Review

The profit maximisation condition gives the demand for labour (Sheila, 2014). The study used lags in the maximisation model to account for the delayed effect of macroeconomic variables in the model. The study argues that unemployment in Kenya is highly correlated with income levels. The higher the income in many sectors, the lower the unemployment rate. Open and wage unemployment declined by 15% and 13% in 1998/1999 and 2005/2006, respectively. Causes of unemployment identified in previous studies include the high cost of labour, slow economic growth, low levels of education, labour-substituting technology, and foreign competition. They reduce the profitability of local firms and contribute to a high preference for formal employment in Kenya. The increase in informal jobs had a low contribution to quality

job creation. However, increasing the value of products leads to an increase in employment opportunities in the country. The profit-maximising model is less suitable for macroeconomic time series data.

A study by Wangmo (2012) sampled youth between 15 and 24 years of age and used primary data. CS entry software was used for data entry and analysed using the SPSS statistical package. The study on youth unemployment and its consequences in Bhutan concluded that youth are aware of available job opportunities. Generous relatives encourage the youth to remain unemployed. 39 out of 60 respondents believed they could not secure jobs because of a lack of experience.

A study on European unemployment focused on age, income, and sector factors as independent variables (Dreymann, 2013). The author argues that unemployment has persisted in European countries, prompting this study on unemployment. The study uses regional data from fourteen countries from 1970-1990. The study examines of the relationship between youth in the early 1970s and unemployment in the following years. The same structure is used in GDP per capita and the large service sector. Using ordinary least squares (OLS) regression, the study found that GDP per capita negatively correlated with unemployment. The extensive service sector and a young population positively correlated with unemployment. The author recommends government expenditure as a solution to the unemployment challenge. The study shows the relationship between unemployment and growth and studies dependent and independent variables in different periods.

Economic growth has an inverse relationship with inflation in the panel data study (Mamo, 2012). The study used Sub-Saharan Africa (SSA) data from 1969-2009. Economic growth is a dependent variable, while investment, population, and inflation are independent variables. The study used the panel Granger causality test to show the relationship between variables because panel Granger has higher accuracy and gives more meaningful results in a shorter time frame than normal Granger. Findings showed that real GDP per capita is inversely related to inflation.

This study used data for 1992-2014 and panel data to investigate relationships between economic growth and unemployment in Eastern European countries. Pooled panel OLS, panel unit root, and panel Johansen cointegration tests show that a 1% rise in GDP reduces unemployment by 0.08%. The study used horizontal section data and time series data. The regression model used is given below.

$$lnUNEMP_i=\beta_0+\beta_1 lnGDP_i \quad (2.2)$$

The vector error correction model (VECM), cointegration test, and Granger causality test were used to analyse data from 1980-2013. The variables in the study are real GDP, unemployment, and private consumption. The Johansen cointegration test showed a significant long-run relationship between the variables. VECM showed that unemployment negatively affects real GDP in Nigeria, while Granger's causality showed a unidirectional movement of GDP and unemployment. The study recommends job creation by modernising the agricultural sector (Eze et al., 2016).

According to Alamro (2014), a study on economic growth's impact on Jordan's unemployment was conducted. The period under study is from 1980 to 2011, implementing Okun's law. Using the autoregressive distributed lag (ARDL) and error correction model (ECM) models, the results show that economic growth has a weak and significant effect on unemployment in the short and long-run. The general equation of the Hodrick-Prescott filter is used in the study. A similar study in Jordan by Hjazeen et al. (2021) found a negative relationship between unemployment and economic growth over 1991-2019 using the ARDL model.

Mutua (2019) studied the relationship between economic growth and youth unemployment in Kenya. The study's objectives are to analyse the effects of economic growth and youth unemployment and the relationship between the two variables. The study focused on Keynesian theory, the Solow-Swan model, the theory of surplus value, and Okun's law. The OLS method and Granger causality test methodology are used in secondary data for 1991-2015. The study concluded that Okun's law coefficient did not apply to youth unemployment in Kenya.

Further analysis shows that an increase in FDI leads to a decrease in youth unemployment of 23%. As a result of the positive relationship between wages and prices, the theory of surplus value does not apply in Kenya. Inflation showed a positive coefficient.

A study by Maitah et al. (2015) verifies and extends Okun's law, which shows a 2% increase in GDP reduces unemployment by 1% in Germany, the Czech Republic, and Austria. The study used the autoregressive integrated moving average (ARIMA) model for time series analysis.

Studies find a correlation between income and youth unemployment. The studies have examined income in terms of GDP, wage rate, and income of household heads (Sheila, 2014; Kahraman, 2011). A look at per capita income is yet to be studied in the Kenyan context from 1991 to 2021 (Sheila, 2014). Studies in Jordan (Alamro, 2014; Hjazeen, Seraj, & Ozdeser, 2021) contradict Okun's law. Lastly, the period considered in this study is longer than that of Mutua (Mutua, 2019). These facts have made it necessary to explore the effect of economic factors on youth unemployment in Kenya.

In terms of methodology, this study will employ the ARDL model, which is superior to the OLS model used by Mutua in 2019. Unlike OLS, the ARDL model can use mixed variables and give short-run and long-run effects. Lastly, the model allows control variables to test the effect of experimental variables.

METHODOLOGY

According to Cresswell (2009), correlational research designs are used by investigators to describe and measure the degree of relationship between two or more variables or sets of scores. This study used time-series data. The design was relevant to the current study because it aimed to establish the effect of independent variables on youth unemployment.

Kenya is a lower-middle-income economy. It is the largest economy in East and Central Africa and the third largest in sub-Saharan Africa after South Africa and Nigeria. Kenya is divided into two, as evidenced by Kenya's latitude of 0.0236° S and longitude of 37.9062° E. According to the KPHC Volume 1 Report (2019), Kenya had a population of 47.6 million in 2019. Kenya

had an inflation rate of 6.11% in 2021. The GDP in 2021 was approximately 3.142 trillion Kenyan shillings. The GDP per capita (constant) was KES 190,303.

The data set comprised unemployed youths within Kenya. This study used time-series data from the World Bank website. Time-series data formed the basis of quantitative analysis in this study. E-views application assisted in data analysis of a time series nature.

Pre-estimation Procedures

From equation (1.4), the general ARDL equation is specified below.

$$YU_t = {}^{p}\beta_0\, YU_{t-1} - \beta_1 (GGDP_t) - {}^{q}\beta_2 (GGDP_t) + \beta_3 I_t + {}^{q}\beta_4 I_t - \beta_5 F_t - {}^{q}\beta_6 F_t + e \quad (3.1)$$

Where; p is the lag of the dependent variable and q is the lag of independent variable, YU is Youth unemployment, b is the coefficient of GGDP, GGDP is the per capita income, I is the inflation rate, F is the female participation rate, and e is the error term.

According to Okun's law, per capita income has an inverse relationship with youth unemployment. Inflation and female participation are included in the econometric model to make it robust (Pesaran & Shin, 1999). Lagged value of YU is $YU_{t-I,}$ and it accounts for inertia in the model.

$$YU_t = \beta_0 + \sum_{I=0}^{p} \beta_i\, Y_{t-i(v1)} - \sum_{I=0}^{q} \beta_{1i} GGDP_{t(v2)} - \sum_{I=0}^{q} \beta_{3i} F_{t(v3)} + \sum_{I=0}^{q} \beta_{4i} I_{t(v4)} + \sum_{I=0}^{q} \mu_1 z_t$$

$$_i + \lambda_{1i}\, YU_{t-i} - \lambda_{2i} GGDP_t - \lambda_{4i} F_t + \lambda_{6i}\, I_t + \lambda_{7} z_{t-i} + \mu_t \quad (3.2)$$

where p is the lag of the dependent variable, and q is the lag of the independent variable. YU is the change in youth unemployment; β is the coefficient of GGDP; GGDP is the per capita income; I is the inflation rate; F is the female participation rate; and e is the error term. Short-run dynamics are given by β_0, $\beta_{i\ i,}$ β_{1i}, β_{2i}, β_{3i}, β4i, μ_1 while λ_{1i}, λ_{2i}, λ_{3i}, λ_{4i}, λ_{5i}, $\lambda_{,}$ μ_t show long-run effects. $V1, v2, v3,\ldots$ denote lag length. The equation (3.2) gives the long-run effect of independent variables on dependent variables. It works with variables having different orders of integration. The ECM version is given by equation (3.3).

This study outlined a short-run model after the cointegration test and subsequent establishment of a long-term relationship. The short-run model is a difference in youth unemployment as a function of the difference between the independent variables. This model gave the speed of adjustment from shot-run to long-run equilibrium. The speed of adjustment should be negative to allow convergence from short-run to long-run equilibrium after short-run shocks (Engle & Granger, 1987). The bigger the absolute figure, the better up to a maximum value of one.

$$\Delta YU_t = \beta_0 + \sum_{I=0}^{p} \beta_i\, \Delta Y_{t-i} - \sum_{I=0}^{q} \beta_{1i} \Delta GGDP_t - \sum_{I=0}^{q} \beta_{3i} \Delta F_t + \sum_{I=0}^{q} \beta_{4i} \Delta I_t + \sum_{I=0}^{q} \mu_1 \Delta z_t$$

$$_i + \lambda_{1i}\, Y_{t-i} - \lambda_{2i} GGDP_t - \lambda_{3i} F_t + \lambda_{4i}\, \Delta I_t + \lambda_{7} \Delta z_{t-I} - \mu\, ECM_{t-1} \quad (3.3)$$

Where Δ denotes change, p is the lag of the dependent variable, and q is the lag of the independent variable. ΔYU is the change in youth unemployment, β is the coefficient of the independent variable, ΔGGDP is the change in per capita income, ΔI is the change in inflation

rate, ΔF is the change in female participation rate, and μ is the error term. Long-run dynamics is given by β_0, $\beta_{i\ i,}$ β_{1i}, β_{2i}, β_{3i}, β4i, μ_1 while λ_{1i}, λ_{2i}, λ_{3i}, λ_{4i}, λ_{5i}, μ_t show short-run effects.

The quantitative data collected was analysed using descriptive statistics using the E-Views application. Descriptive analyses such as percentages, frequency, mean, and standard deviations were used to present the data. OLS uses stationary variables. The inferential analysis method used is ARDL analysis. It provides a means of objectively assessing the degree of the cause-and-effect relationship between the independent and dependent variables. Moreover, ARDL shows long-run and short-run effects. Lastly, it can be used in models with non-stationary and mixed variables.

The correlation shows the direction and strength of the relationship between variables. The correlation coefficient determined the correlation between dependent variables and independent variables. The hypothesis to be tested is shown below.

H_0: r =0; There is no correlation

$H_{r:}$ r ≠0; There is correlation

The study used the Box-Cox transformation to give the data a normal bell shape.

After constructing the regression model, this study performed three tests. The first test was the unit root test. Augmented Dickey Fuller (ADF). ADF was used to determine the presence of a unit root because PP allows residuals to be serially correlated. A stationary variable would be corrected by lagging back two years and selecting the optimal lag (Wooldridge, 2015).

If the model satisfies the unit root test, the cointegration test follows. If the model is non-stationary, the equation is differenced. That can be done with a random walk such that β_0 =0, and β_{1t}=0, random walk with a drift such that β_{1t}=0, and random walk with a drift around a stochastic trend. Hypothesis testing of the unit root is shown below.

$$\Delta y_t = \lambda y_{t-1} + \mu_t \qquad (3.4)$$

The one-tail test, assuming 25 observations, then calculated t to be -4.25, rejecting the null because it is more negative than the tabulated critical value of -3.60 at 95% confidence level.

H_0: λ =0; non-stationery, has a unit root

$H_{1:}$ λ <0; stationery/trend stationery

Rejecting null means the series is stationary.

Where; Δ= first differencing operator

Y_t=time series being tested.

t= time trend variable

μ_t = a pure white noise error term

These relationships between variables are established using mathematical notation, where the effect of per capita income, inflation, and gender participation on youth unemployment was assessed using a time series equation (Mukras, 2012).

International Journal of Economics
ISSN 2518-8437 (Online)
Vol.8, Issue 2, No.1. pp 1 - 18, 2023

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The second test was the cointegration test. It could be done using Johansen cointegration or the ARDL bound test, among other tests, to detect spurious regression. This study used the bootstrap ARDL bound test because it gives desired results for cointergration with order I (1), order I (0), or both, unlike Johansen, which works with order I (0) only. It also works well with a small sample size. Bootstrap's ARDL-bound test is better than ARDL-bound because it avoids inconclusive tests by deriving critical.

Moreover, it considers the relevance of lagged estimates of the regressor for a better understanding of the cointegration nature of the model. The bounds test estimates two bounds: the lower bound (F-statistic) and the upper bound (t-statistic) critical values. These critical values depend on the 95% significance level and the lag lengths of the ARDL model.

The null hypothesis of the bounds test is that there is no cointegration, indicating no long-term relationship among the variables. The alternative hypothesis is that cointegration exists. Reject the null hypothesis if cointegration relationships exist between dependent and independent variables. It holds when the calculated F-statistic or t-statistic is greater than the upper bound.

Where $\gamma = 1 - \sum k\alpha$, $\theta = \sum k\beta$, (3.5)

I=0 I=0

$H_0: \lambda = \lambda_{1i} = \lambda_{2i} = \lambda_{3i} = \lambda_{4i} = \lambda_{5i} = \lambda_{6i} = 0$; No short-run relationship

$H_1: \lambda \neq \lambda_{1i} \neq \lambda_{2i} \neq \lambda_{3i} \neq \lambda_{4i} \neq \lambda_{5i} \neq \lambda_{6i} \neq 0$; short-run relationship (equation 3.3)

$H_1: \beta_0 = \beta_i = \beta_{1i} = \beta_{2i} = \beta_{3i} = \beta = \beta_{5i} = 0$; Cointegration; existence of a long-run relationship (equation 3.2)

Finally, the long-run and short-run effects of independent variables are tested using the ARDL test. A cointegration of two or more variables, such as YU and GGDP, means that YU affects GGDP, GGDP affects YU, or YU and GGDP affect each other. Lack of cointegration means that variables do not affect each other. Granger causality determines the pattern of relationships in the presence or absence of cointegration. If current and lagged values of GGDP improve prediction and the future value of YU, it is said that GGDP causes' YU. Simple causality models are 3.4 and show the current value of YU is related to the past value of itself and that of ΔYU, and ΔGGDP is related to the past value of itself and that of ΔYU.$H_0: \beta_1 = 0$; $\Delta GGDP_1$ does not Granger cause ΔYU

$H_0: \beta_1 = 0$; ΔYU does not Granger cause ΔGGDP

Diagnostic Tests

Diagnostic tests were executed to inspect the consistency and efficiency of the coefficient estimates and determine the adequacy of the data collected. These tests were heteroskedasticity, autocorrelation, and multicollinearity. The value R is used in univariate regression, while R2 squared is used in multivariate regression models. The more variables, the higher R2 becomes. Adjusted R2 only increases when a variable improves the predictive power.

The Jarque-Bera (JB) test verified if residuals were normally distributed. It is superior to the Anderson-Darling test in determining error term distribution. The test is always positive. A

normal distribution signal occurs when the data is closer to zero. It is sensitive to small samples because it has a chi-square distribution with two degrees of freedom. Inaccuracy may lead to a type I error, whereby a true null hypothesis is rejected. It is calculated as shown below.

$$JB=\frac{n-k}{(S^2+0.25(K-3)^2)} \quad (3.9)$$

Where, S is skewness and K is Kurtosis.

H_0: JB =0, Normal distribution.

H_1: JB <0, non-normal distribution.

VIF tests if independent variables are highly correlated. It was excluded from this study because the model makes no assumptions about multicollinearity.

Breuch pagan LM test was tested for heteroskedasticity. It is used in a linear regression model. The assumption made in this model is that error terms are normally distributed. It is a chi-squared test that establishes if there is a constant variance of residuals, a situation referred to as homoscedasticity. The null hypothesis in this test is that there is no heteroskedasticity.

H1: $p < 0.05$ Reject hypothesis. Heteroskedasticity present

The Durbin-Watson test (DW) shows the presence of autocorrelation in a model. The values near two show a correlation-free model. Breusch-Godfrey tests serial correlation in regression models. It is superior to the Durbin-Watson test, which only applies to nonstochastic regressors. Ljung-Box test is equally unsuitable for this study because it is a portmanteau test.

H0: $p =0$ There is no autocorrelation at any order less than or equal to p

H1: $p \neq 0$There exists autocorrelation at some order less than or equal to p

RESULTS

Pre-estimation Procedures

Descriptive statistics showed the characteristics of variables in the study and gave meaning to the data on display. YU had the lowest mean, median, maximum, and minimum. It had a standard deviation that was below GGDP. None of the variables is mesokurtic. GGDP had the lowest kurtosis among variables in the study. Four variables had kurtosis that ranged between 2.214019 and 3.456618. GGDP had the highest Jacque Berra value at 0.884744, while YU had the least at 0.299393.

Table 1: Descriptive statistics

	F	GGDP	I	YU
Mean	2.07397	5.716903	2.291745	0.322844
Median	2.210505	5.908011	2.305486	0.292633
Maximum	3.517991	13.54456	4.219095	1.096057
Minimum	0	-0.73794	0.445942	-0.72062
Std. Dev.	0.846992	3.941553	0.809782	0.420367
Skewness	-0.274	0.129611	0.188041	-0.11144
Kurtosis	2.554553	2.214019	3.456618	3.426742
Jarque-Bera	0.644201	0.884744	0.452004	0.299393
Probability	0.724625	0.642511	0.797717	0.860969

Source: Author, 2023

The table shows descriptive statistics shown vertically on the right. The first row contains variables used in the model. All the variables have 31 observations. GGDP has a mean of 5.716903, median of 5.908011, a maximum of 13.54456, and a minimum of -0.73794. F and YU were the variables with negative dispersion in this study. The negative skewness shows that the mean is to the furthest left, while median was in between the two measures. I, and GGDP have positive skewness. The skewness and Kurtosis of all variables satisfy assumptions of OLS.

YU, I, F, and GGDP had the highest probabilities, range from 0.642511 to 0.860969, respectively. These values showed that the descriptive statistics depicted normally distributed data after the Box-Cox transformation. The Box-cox transformation was taken to enhance normality. Shapiro Wilk normality test is the best test under skewed conditions (Sim, 2011).

GGDP and F had the strongest positive correlation. YU and F had a weak positive correlation. GGDP had a very weak positive correlation with YU. I was the only variable that was negatively correlated with YUP. The highest negative correlation was between I and GGDP. A high correlation indicated the presence of multicollinearity. The VIF test was done to confirm the presence of severe multicollinearity given by a centred VIF value of 10 and above.

A unit root test was necessary before data analysis of a time series nature to prevent spurious regression. The ADF test of the presence of a unit root guided this study into the choice model. This test determined the number of lags required to make individual variables stationary. The test was based on a sample of 1991–2021 with 176 total observations. Out of a maximum of six lags, AIC selected optimal lags between zero and one. Only GGDP, YU, and I were stationary at level including individual intercept, because the probability was less than 0.05%,

while F had a unit root prompting differentiation. All variables are stationary at the first difference, including the individual intercept.

The ADF test results from e-view showed F, GGDP, I, and YU had a lag length of one at a zero probability when running the test for unit root in the first difference, including individual intercept. The VAR lag order selection in the table below confirmed the one-lag length. AIC and HQ have an asterisk at a 5% confidence level on the first lag. SC is the only test with zero lag length.

The Cointegration test followed the determination of stationarity to determine the long-run relationship between variables. The unit root test showed that variables were of I(0) and I(1). That confirmed the suitability of the ARDL model. Cointegration established a stable long-run relationship between the endogenous and exogenous variables and the speed of adjustment.

The study tested the hypothesis of all independent variables and equated them to zero. The F statistic of 7.028453 is higher than the I(1) upper limit of 5.415, considering a 5% confidence level. The study rejected the null hypothesis because there was a long-term relationship between dependent and independent variables. The results confirmed the relationship between dependent and independent variables observed in the general ARDL equation.

Table 2: Long-run Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
YU(-1)	0.100012	0.193929	0.515715	0.6112
F	-0.12027	0.064789	-1.85628	0.0769
F(-1)	-0.13738	0.062597	-2.19462	0.039
GGDP	-0.03666	0.013556	-2.70422	0.013
GGDP(-1)	0.048836	0.01498	3.259956	0.0036
I	0.064718	0.068648	0.942739	0.3561
C	-0.04748	0.249655	-0.19017	0.8509
@TREND	0.043782	0.016006	2.735438	0.0121

R-squared	0.664771	Mean dependent var	0.321559
Adjusted R-squared	0.558108	S.D. dependent var	0.427492
S.E. of regression	0.284175	Akaike info criterion	0.544725
Sum squared resid	1.776619	Schwarz criterion	0.918378
Log likelihood	-0.17088	Hannan-Quinn criter.	0.66426
F-statistic	6.232409	Durbin-Watson stat	2.161651
Prob(F-statistic)	0.000419		

Source: Author, 2023

Table 2 shows the general ARDL coefficients and probabilities. The general ARDL equation gave the long-run equation. The dependent variable was youth unemployment (YU). Independent variables were the lagged value of youth unemployment (YU (-1)), inflation (I), female participation (F), and per capita income (GGDP). A selected sample of the period 1992–

2021 gives 30 observations. The deterministic was an unrestricted constant with a restricted trend, and the model selection method is AIC. Out of the eight models run, the fourth model with 1 lag on each independent gave the results in the table above. Lastly, the test has Huber-White-Hinkley (HC1) heteroskedasticity as a consistent standard. Durbin-Watson's p-value of 2.161651 is greater than R squared, which has a value of 0.664771, showing that the regression model is not spurious.

YU = 0.1000*YU(-1) - 0.1202*F - 0.1374*F(-1) – 0.03666*GGDP + 0.0488*GGDP(-1)

(0.6112) (0.0769) (0.039) (0.013) (0.0036)

+ 0.0647*I – 0.0475

(0.3561)

According to the analysis, female participation, lagged female participation, and per capita income negatively affected youth unemployment. Lagged value of per capita positively affected the youth unemployment rate in Kenya. The negative relationship between youth unemployment and per capita income agreed with Okun's law. Lagged youth unemployment, lagged per capita income, and inflation positively affected youth unemployment. From Table 2, it was evident that lagged female participation, per capita income, and lagged per capita income were significant at the 95% level, while the rest of the variables were insignificant at the same level. Female participation significantly affected youth unemployment at the 0.1 confidence level.

A 1% increment in the previous female participation rate resulted in a 13.738% decrease in the youth unemployment rate in Kenya at a p-value of 0.039. As more women enter the education system, their human capital increases, increasing their employment prospects and thus reducing the youth unemployment rate. Two-thirds majority rule had increased the number of female parliamentarians in Kenya. This reduced labour market segmentation that resulted from female gender discrimination in jobs traditionally considered for men. Subsequent positive improvements in social and cultural factors that affected female employability increased female job demand, thus decreasing general future female and youth employment.

It is plausible to say that as more women participated in the job market, the youth unemployment rate decreased due to increased gender equality practices by employers, as required in Article 27(6). The two-thirds gender rule increased the demand for women in the labour force, thus reducing the youth unemployment rate. The increase in per capita income in Kenya supported the argument by Khraise (2019) that linked the employment of women with favourable economic conditions. The findings were also agreed with those of Anyanwu (2016), who showed a positive relationship between GDP per capita and gender equality.

A 1% increase in per capita income resulted in a 3.666% decrease in youth unemployment at a p-value of 0.013. The inverse relationship between per capita income and youth unemployment agreed with Okun's law and aggregate demand theory. As income increased, demand for goods and services increased, resulting in more production and employment. Assuming all factors were held constant, a decreased income results in decreased consumption, resulting in lower production and subsequent retrenchment. That led to an increase in youth unemployment rates.

A 1% increase in previous per capita income resulted in a 4.8836% increase in the youth unemployment rate. It is plausible to say that past levels of unemployment have had a persistent effect on future unemployment rates. That is attributed to human capital and skills lost due to a lack of practice and subsequent discouragement from vigorous job searches. As a result, increased per capita incomes hardly translated to an immediate reduction in youth unemployment due to the lingering effects of past unemployment, as pointed out in hysteresis theory. Labour matching theory supported the argument that the positive relationship between previous per capita income and youth unemployment could be due to frictional unemployment.

The ECM results showed that the speed of adjustment was 89.999%. The speed of adjustment is significant because it has a probability of 0.0000, which is less than 0.05%. In the short-run, DGGDP and trend are significant at a 5% level, given that their p-values are less than 0.05.

This study found a short-run negative relationship between per capita income and youth unemployment. A 1% decrease in per capita income resulted in a 3.666% increase in youth unemployment in Kenya in the long-run. The short-run effect was significant at a 5% confidence level.

It is plausible that the increase in per capita income resulted in increased disposable income. Consumption and investment increased as income increased. An increase in investment created jobs that eventually decreased the youth unemployment rate. The findings also aligned with Okun's law, given the negative relationship between youth unemployment and per capita income. Solow Swan, a proponent of classical economic theory, brought to light the relationship of demand and supply of labour. A higher production level means a high supply of goods and services, resulting in a high demand for jobs.

The findings were similar to those of Soylu (2018), Dreyman (2013), Maitah (2015), and Mutua (2019), who concluded an inverse relationship between GDP per capita and unemployment. While Soylu (2018) studied general unemployment, Dreyman (2013) focused on youth unemployment. According to Mutua (2019), 70.8084% of youth unemployment in Kenya was explained by a 1% change in economic growth. A study by Maitah (2015) concluded that a 2% increase in per capita income increased employment by 1%.

Diagnostic Tests

Granger causality results below show no significant causality between I, YU, and F variables. Significant effects had probabilities less than 0.05. GGDP granger caused YU at a p-value of 0.0005. YU did not granger cause GGDP. Granger causality had a limitation due to its failure to forecast the interdependency between two variables.

Jaque Barra's test showed a normal distribution with a p-value of 0.288477, which is greater than 0.05. Therefore, the study did not reject the null hypothesis. Moreover, a visual inspection of the blue histogram showed a bell shape of normal distribution. Kurtosis of 2.864490 and skewness of -0.701901 are acceptable.

The Breuch-Godfrey serial correlation test result showed an acceptable p-value that meets the OLS correlation requirement at the 5% level. P-value of 0.5878> 0.05.

A P-value of 0.661411 was greater than 0.5 in the Heteroskedasticity test. The test result showed an acceptable p-value that gives precise OLS estimates.

Table 3: VIF Test

	Coefficient	Uncentered	Centered
Variable	**Variance**	**VIF**	**VIF**
YU(-1)	0.03761	4.68051	3.12793
F	0.0042	19.5388	2.13531
F(-1)	0.00392	13.9354	2.58836
GGDP	0.00018	7.95158	1.92022
GGDP(-1)	0.00022	11.1976	1.85579
I	0.00471	27.6436	2.15816
C	0.06233	48.2476	NA
@TREND	0.00026	48.2879	9.20883

Source: Author, 2023

Null hypothesis: Homoskedasticity

Table 3 shows the absence of severe multicollinearity in all selected independent and dependent variables. There were 30 observations included.

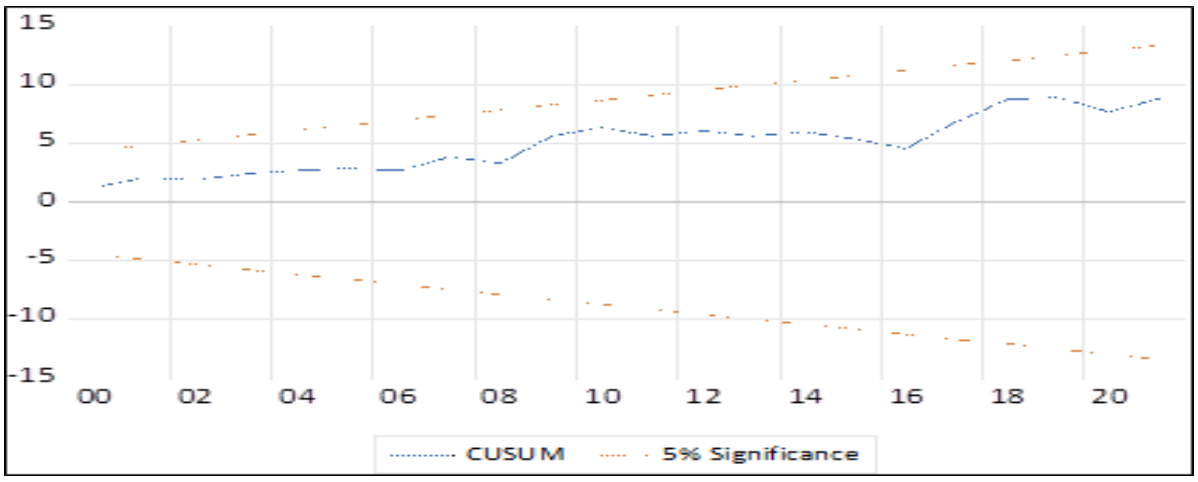

Figure 1: CUSUM

Recursive stability tests showed that the model in the study is dynamically stable. This study uses the cusum and cusum squared tests. The blue continuous line was between the red dotted lines, showing that the model was stable.

Based on the plots of cumulative sum (CUSUM), the CUSUM of residuals for the youth unemployment model falls within the critical lines set at 5 percent. That indicated that there was parameter stability in the youth unemployment model. It suggested the absence of any structural break during the study period. The findings aligned with Brown, Durbin, and Evans

(1975) perspective, who argued that if the CUSUM remains within the boundaries defined by the 5 percent critical lines, it implies parameter stability. From an econometric standpoint, this implied that the explanatory variables and the disturbance term were not positively correlated. That indicated that the explanatory variables were truly exogenous. Based on these analyses, this study concluded that the parameters of the youth unemployment model exhibited stability.

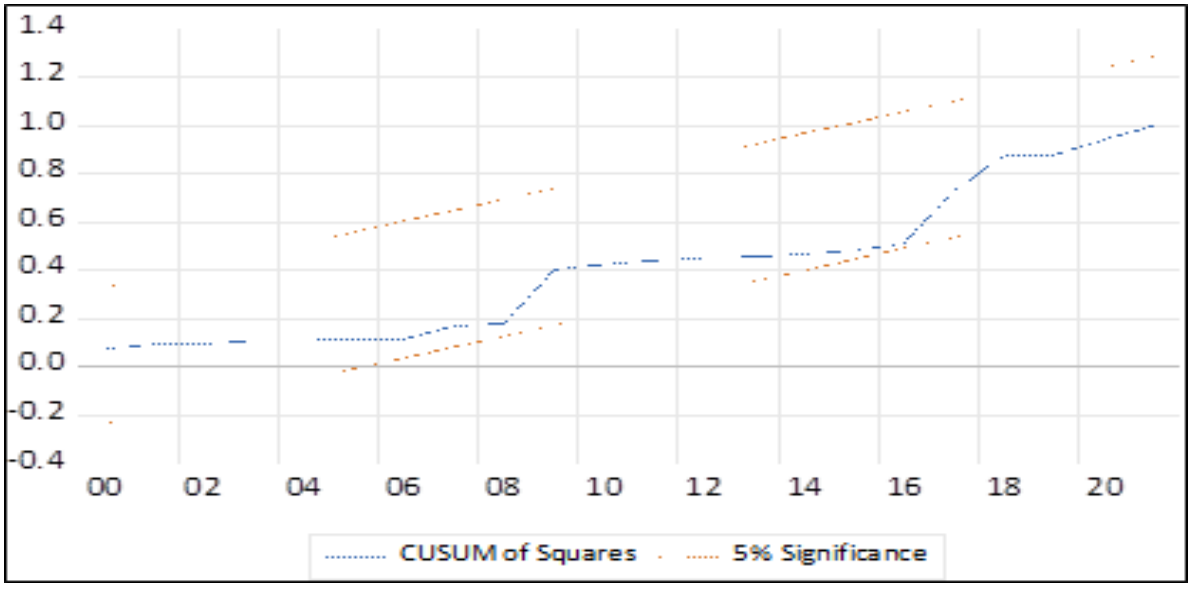

Figure 2: CUSUM of Squares

The blue line lies in between the two red lines showing model stability.

The control charts for cumulative sum of squares (CUSUMSQ) supported the findings of the CUSUM chart. However, it is worth noting that the CUSUMSQ test is more stringent than the CUSUM test when diagnosing serial correlation in ARDL estimation. According to Shrestha and Chowdhury (2005), the optimal lag was determined by the residual sum of squares. The CUSUMSQ method, developed by Brown, Durbin, and Evans (1975), plotted the cumulative sum of squares of residuals and the 5 percent critical lines against time.

In line with the approach proposed by Brown et al. (1975), if the CUSUMSQ of recursive residuals remains within the region defined by the 5 percent boundaries, it could be concluded that variance stability exists. Based on the CUSUMSQ chart, this study concluded that there was no positive correlation between the explanatory variables and the disturbance term.

CONCLUSION

These findings demonstrated that the model estimates successfully passed all econometric diagnostic tests. Consequently, this allowed for the interpretation of statistical tests and the discussion of the estimates in light of economic theory and comparison to previous studies. That confirms the meaningful conclusion that per capita income has an inverse relationship with youth unemployment in Kenya. A policy recommendation on increasing per capita income in Kenya to reduce youth unemployment at 3.666% is without the risk of reaching erroneous or spurious outcomes.

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