Original Research Article

Analysis of the Effects of Total Population Size on Economic Growth in Kenya

Tanui Kiprotich Leonard[*]

Part-Time Lecturer, University of Eldoret, Kenya

Abstract

Policy makers aim at promoting sustainable economic growth by keeping population growth rate low but there has been a substantial debate on whether population promotes, harms or has no effect on economic growth. Motivated by the divergent views, this study aimed at examining the effects of population change in Kenya on GDP. Using Time-series data for the period 1963 - 2013, this research examined the co-integration relationship between GDP growth rates and total population, unit root was tested using Augmented Dickey-Fuller, Co-integration test using Johansen's Multivariate test and Granger causality test conducted to show the causality between the variables. The findings showed that for a unit increase in total population, there is rise of 2.221% in GDP. Its recommended that the Government needs to further promote investment level so as to increase job opportunities to utilize the population of the country.
Keywords: Economic Growth, Total Population.

INTRODUCTION

Developing countries like Kenya are still struggling to meet the needs of a rapidly growing population KPSA, 2013 [1]. The continuous rise in population has been a major concern to economists, demographers, and other policy makers in Kenya and the world at large. It's generally believed that high population growth rate hampers the economic growth of a country.

Malthus [2] showed that population increase is detrimental to a nation's economy due to overpopulation which exerts pressure on economic resources. In line with this, most countries including Kenya, have tried to reduce their population growth rate in an attempt to achieve a sustainable development [3]. Despite calls for reduction in population, it must be noted that not all economists agree with Malthus's idea. It's argued that high population can spur economic growth. some of the arguments supporting a 'population driven' economic growth are; high population leads to an increases in labour supply, high market demand, economies of scale, acceleration of technological progress, flexible market responses to emerging shortages, induced institutional change, cheaper communication and transportation, and easier collective social investments.

Kenya has been struggling to grow economically but has faced numerous problems. Among them; poverty, low capital, illiteracy, inappropriate technology, unskilled labour and most importantly high population level [4]. The Malthusian argument seems to have shaped economic policies regarding population in Kenya. In the Vision 2030, Kenya has specifically dedicated her effort to increase its economic growth by over 10% andone of the means suggested to achieve this is by reducing the total fertility rate (TFR) to 2.6. Previous studies have shown that population growth rate is positively correlated to economic growth [5]. Therefore, Kenya should focus on utilizing the existing labour and markets offered by the existing population to realize a higher economic growth.

STATEMENT OF THE PROBLEM

Kenyan population is currently above 43 million [1]. The country has deliberately strived to reduce the population size and growth rate through family planning, education, and moral persuasion among other ways, in order to obtain a level consistent with the socio-economic development. Kenyan policy makers and planners argue that the population size has gone beyond the country's economic capacity and there is need to reduce the population growth rate [1].

However, there has been substantial debate on whether population change promotes, harms or has no effect on economic growth. One school of thought (pessimist) postulates that high population impedes the economic growth. Malthus [2] stated that the population growth can reduce the output per capita because population increases at a geometrical rate while production rises at an arithmetic rate so that output growth rate cannot keep the same pace. Positivist postulates that the relationship between economic growth and population growth is positive. This divergent views creates a problems to policy makers. This study therefore applies recent statistical tools to examine the relations between GDP and population in Kenya

LITERATURE REVIEW
Theoretical Literature
The linkage between demographic factors and economic growth has been debated for long. Thirlwall [6] commented that, "the relationship between population growth and economic development is a complex one and the historical evidence is ambiguous, particularly concerning what cause is and what effect is". In addition, the debate is further propagated by the different models of economic growth and population parameters used in various studies. This study therefore reviews some of the economic and population theories that highlight the linkage between the two variables.

Issues of Economic growth are as old as the economic discipline itself. Economic growth was a central feature of the work of English classical economist like Adam Smith, David Ricardo and Thomas Malthus who are usually regarded as the precursors of modern growth theory. They sought to explain economic issues scientifically especially the operations of the economic system and the actual process involved in bringing about observed changes. Which faced sharp critiques from Karl Marx, but after that it moved to the periphery during the so-called 'marginal revolution'. John von Neumann's growth model and Roy Harrods's attempted to generalize Keynes's principle of effective demand to the long run re-ignited interest in growth theory. Following the publication of papers by Robert Solow and Nicholas Kaldor in the mid 1950s, growth theory became one of the central topics of the economics profession until the early 1970s. After a decade of dormancy, since the mid 1980s, economic growth has once again become a central topic in economic theorizing. Many theories that explain the sources, forms and effects of economic growth, however, a few theories that are core to this paper will be highlighted beginning with the very first classical theory.

Adam Smith viewed production as a factor of labour, capital and natural resources. To understand the process of growth one had to come up with a grip of the laws governing population growth, the pace of capital accumulation and the rate of technical innovation. Smith viewed the growth process as strictly endogenous with capital accumulation and labour productivity being the most important factors, in his words "growth of per capita is the first and foremost inquiry into cause of wealth" his focus was majorly on determining growth of labour productivity through division of labour. From this, it can be noted that population was indeed a major concept from the onset of the economic discipline because it determines capital per worker. This idea is echoed by the Solow growth model which postulates a continuous production function linking output to capital and labour.

The Solow Growth Model
According to the neoclassical growth model population growth reduces economic growth due to capital dilution, resource shallow and low living standard [7]. Capital dilution effect. Klasen and Lawson [8] noted that the model differentiated between the steady state of an economy and transition into the steady state. At the steady state, higher population will reduce income per capita but will have no effect on income per capita growth. As a result the economic growth and population growth rate are not related in the steady state. The negative impact of population on growth is due to the fact that economies are forced to use their scarce savings to widen but not deepen their capita.

The production function takes the form $Y = F(K, L)$, Where Y is total output K is total physical capital and L is the size of the labour input. The assumptions of the model are that both the saving rate and the consumption rate are given, one composite commodity is produced, the output is regarded as the net output after allowance for depreciation, constant return to scale, diminishing returns to scale, constant technological progress, capital depreciation is constant and at a positive rate (δ). In addition, the economy is assumed to be a one-sector economy, where output can be either consumed or invested since the household owns the input and manages the technology, the growth rate of population is exogenous and constant (n) and that labour supply per person is given. Thuku *et al.,* [5] points out that when population size is normalized at time zero and work intensity to one, the labour input will take the form $L = e^{nt}$ and the net increase in per capita capital is given by $k = sf(k) - (n + \delta)k$. where S is saving per capita out of output per capita and $(n + \delta)$ is the effective depreciation per capita. Defining a steady state as a situation in which the quantities, such as capital, population, and output, grow at constant rates. In the Solow-Swan model a steady state exists if the net increase in per capita capital is equal to zero. Denoting steady state values with an asterisk the steady state values are given by:

$sf(k^*) = (n + \delta)k^*, y^* = f(k^*)$ and $c^* = (1 - s)f(k^*)$.

Since the per capita values are constant in steady state the levels of total output, total consumption, and total capital must grow at the same rate, which is the same as that of population growth (n). An increase in the rate of population growth in steady state does not affect the growth rate of the per capita variables, since these rates are equal to zero in steady state. However, an increase in fertility does lead to a decrease in the level of capital per capita and therefore to a decrease in output and consumption per capita. This is the capital dilution effect.

An increase in the population growth rate leads to a decline in the growth rate of the per capita variables. For model with exogenous saving rates higher population growth leads to lower standard of living per capita measured either as consumption or in growth of consumption.

RESEARCH METHODOLOGY
Model Specification
The study uses growth regression equations derived from Solow's growth model (1956) which explains the long run behavior of economic growth Bloom and Canning (1999). Theoretically, the Solow-Swan growth model establishes the linkage between population growth and economic growth (Barro and Sala-i-Martin, 2004). The model takes the following form.

$$Y = K^\alpha (LA)^{1-\alpha} \quad \dots \quad (3.1)$$

Where Y is the total output, K is the amount of capital employed. L shows the amount of employed labour (equivalent to the population size due to assumption of full employment). A is the labour augmenting technology and α is the capital share of final output.

Equation (3.1) can be linearized and be specified as follows

$$Y_t = \alpha K_t + (1-\alpha)((LA)_t \quad \dots \quad (3.1.2)$$

Assuming technology and capital is kept constant for the sake of this study and specifying equation (3.1.2) to become equation (3.1.3) as follows

$$lgdp_t = \beta_0 + \beta_1 ltpg_t + \mu_t \quad \dots \quad (3.1.3)$$

Where,

$lgdp_t$ is the natural logarithm of GDP growth
$ltpg_t$ is the natural logarithm of total population growth
μ_t is the white noise
β_0 and β_1 are the long-run coefficients that show the relationship between the respective explanatory variable and the dependent variable.

The study applied VECM model whose general form is as follows

$$\Delta y_t = \Pi y_{t-1} + \Gamma_1 \Delta y_{t-1} + \dots + \Gamma_{p-1} \Delta y_{t-p+1} + \mu_t \dots 3.1.4$$

Where,

y_t is vector of the variables in the model
Πy_{t-1} is a product of two matrices α and β containing adjustment parameters and long-run coefficients respectively
Γ_i is a matrix representing the lagged differences of VECM model.
Δ is the differencing operator, specifically first difference.

Inserting equation (3.1.3) in the regression model (3.1.4) the final model specification stage produces equation (3.1.5) as illustrated below. The lagged differences disappear from the general formula since this study revealed 1 lag for co-integration.

$$\begin{bmatrix} \Delta lgdp_t \\ \Delta ltpg_t \end{bmatrix} = \begin{bmatrix} \alpha_{11} & \cdots & \alpha_{1r} \\ \vdots & \ddots & \vdots \\ \alpha_{k1} & \cdots & \alpha_{kr} \end{bmatrix} \begin{bmatrix} \beta_{11} & \cdots & \beta_{1r} \\ \vdots & \ddots & \vdots \\ \beta_{k1} & \cdots & \beta_{kr} \end{bmatrix}' \cdot \begin{bmatrix} lgdp_{t-1} \\ ltpg_{t-1} \end{bmatrix} + \begin{bmatrix} \mu1_t \\ \mu2_t \end{bmatrix} \dots 3.1.5$$

RESULTS AND DISCUSSION
Nature of Variable
Before data analysis is conducted, there is needs to display descriptive characteristics such as mean of variable observations at level and after transformation. This enables the researcher anticipate what is expected of the formal test results on each of the variables [9]. The following are the visual plots of the variables at level (a) and at first-difference (b).
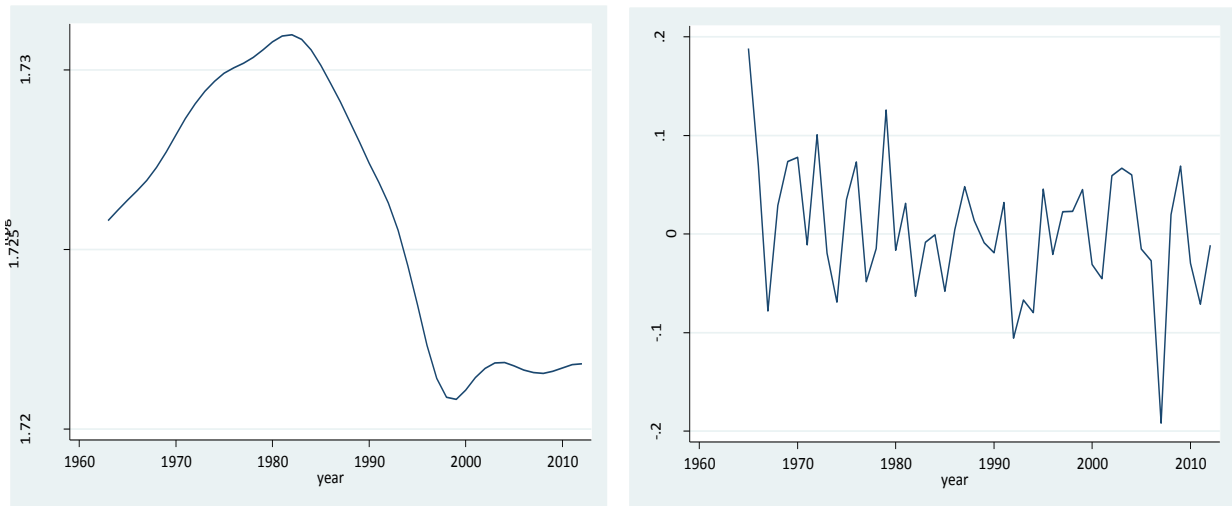
Fig-1: Plots for Total Population Growth at Level (a) and at First Difference (b)

The population growth of Kenya was rising in the early period of this study up to early 1980s after which the growth has ever declined. After 1998 to 2003 the growth improves and remained constant afterwards up to the present.

Table-1: Model Fitness

Sample: 1965 – 2013			No. of obs	=	48
			AIC	=	-7.23408
Log likelihood = 187.6178			HQIC	=	-7.02783
Det(Sigma_ml) = 2.77e-10			SBIC	=	-6.68831
Equation	Parms	RMSE	R-sq	chi2	P>chi2
D_lgdp	2	0.039564	0.6013	69.36996	0.0000
D_ltpg	2	0.065399	0.0303	1.436578	0.4876

Long-run relationship

Table-1 displays the results from the VECM for long-run relationship that exists between GDP and the independent variables. It is indicated from the analysis that in the absence of all variables under consideration GDP will grow at 48.8%. The total population growth in Kenya has a positive and significant effect on economic growth with a beta coefficient of 2.221 (p-value = 0.020 which is less than α = 0.05). Therefore, the researcher rejects the null hypothesis and it is accepted that for each per cent unit increase in total population growth, there is 2.221% increase in GDP. The effect of skill growth was stated by the z-value = 2.33 which implies that the standard error associated with the parameter is less than the effect of the parameter. The results are in line with those of Thuku et al., [5] who examined the impact of population change on Kenyan economic growth using VAR and found a positive relationship.

Table-2: The Long-run Output

		Beta Coef.	Std. Err.	Z	P>z	[95% Conf.	Interval]
_ce1							
	Lgdp	1	.	.	.	.	.
	Ltpg	2.22099	0.95421	2.33	0.020	0.350773	4.091207

Source: analysis of data by the author

The long-run relationship can be extracted from the table as follows:

$$lgdp = 48.804 + 2.221ltpg$$
$$(0.95421)$$

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS
Summary

The main objective of this study was to determine the impact of total population change on the GDP growth in Kenya. It was hypothesized that total population growths have no effect on GDP growth. The research findings revealed that total population growth in Kenya has a positive and significant effect on GDP growth in the long-run, For a percent unit increase in total population growth, there is 2.221% increase in GDP The population however plays no significant role in restoring the short-run disequilibria that may occur. Granger causality also fails to indicate where the effect comes from between GDP and total population growth.

Conclusion

The population size of a country is one of the major determinant of economic growth; it determines the market for products, invention and innovations, human capital, level of technical skills and labour supply in an economy. Depending on how population is managed, it can either be beneficial or detrimental to economic growth. Kenya's population has not surpassed the optimum population level.

Recommendations of the Study

In light of the aforementioned findings, a number of recommendations are made. First the findings of the study established that total population is essential for improving the economy up until the optimum number is surpassed. To ensure sustainable positive effect the government should create a conducive business environment for private investors who can absorb the large number of unemployed as it also tries to put in place a relevant education system which will enable the graduates to be self dependent even without formal employment.

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