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Macroeconomic Determinants of GDP per Capita in Kenya: Evidence from Labor Force, Minimum Wage, and Inflation (1990-2024

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ABSTRACT

In this research, the researcher examines how labor force participation, minimum wage policy, and inflation affect Kenya's GDP per capita between the years 1990 - 2024. With time-series data and an Ordinary Least Squares (OLS) regression model, the outcomes indicate that the effect of labor force participation is positive and statistically insignificant on the GDP per capita, whereas the minimum wages have a negative but not significant effect. The effect of inflation, however, is negative and relatively stronger on the GDP per capita, and statistically significant at the 10% level. The model describes a likely 42% of the variations in the GDP per capita, indicating that the macroeconomic factors have a significant though not a complete influence on the economic growth. Policy implications highlight that the labor market should be reformed, the balance of wages policies, and inflation control strategies should be implemented in order to enhance sustainable per capita growth.

Keywords: GDP per capita, inflation, minimum wage, labor force, Kenya, economic growth.

1.0 Introduction

GDP per capita is one of the indicators that always remain relevant in assessing the health and quality of life of the citizens of a country (World Bank, 2023). In the case of developing countries such as Kenya, it is important to determine the most important sources of growth in the per-capita income that contribute to the overall development of the economy in order to make the right economic policies. Kenyan economy has experienced major structural developments with ups and downs in the last three decades, manifested by the elections of rampant economic growth, demographics, and pending issues of inflationary strain and equitable wage policies (Odhiambo, 2020). Theoretical economic models postulate that more labor force and higher wages will jump start the aggregate demand and capital accumulation and increase the output of the economy. On the other hand, it is generally accepted that high inflation will reduce purchasing power, impose economic unpredictability, and impede long-term investment (Mankiw, 2018). Nevertheless, the empirical testing of these relations in the context of the particular Kenyan environment is to be tested strictly. The paper will be able to add to this debate through an empirical study of how labor force size, the actual minimum wage rate, and the inflation rate affect Kenya's GDP per capita. The analysis is done in the period 1990-2024, which will give a long-term outlook of these economic dynamics. Results will be used to advise policymakers, economists, and stakeholders on the best levers to be used in ensuring sustainable economic development and enhancing living standards in Kenya.

1.1 Background of the study

The economy of Kenya is highly agricultural, service-based, and an emerging industrial economy. In the past 30 years, the country has been experiencing structural reforms that have been directed to the enhancement of economic growth and alleviation of poverty. However, issues like wage rigidity, informality of the labor market, and inflationary pressures have still prevailed in affecting the level of per capita income (World Bank, 2022). Policy changes on minimum wages by the government have been made to protect the welfare of workers, yet there are doubts about whether the policies are helping to improve or reverse productivity and growth. Likewise, inflation is also a critical macroeconomic problem that degrades purchasing power and deteriorates investment, and the contribution of the labor force is determined by the quantity and quality of participation. The nexus between these variables is therefore essential in the economic policy orientation of Kenya.

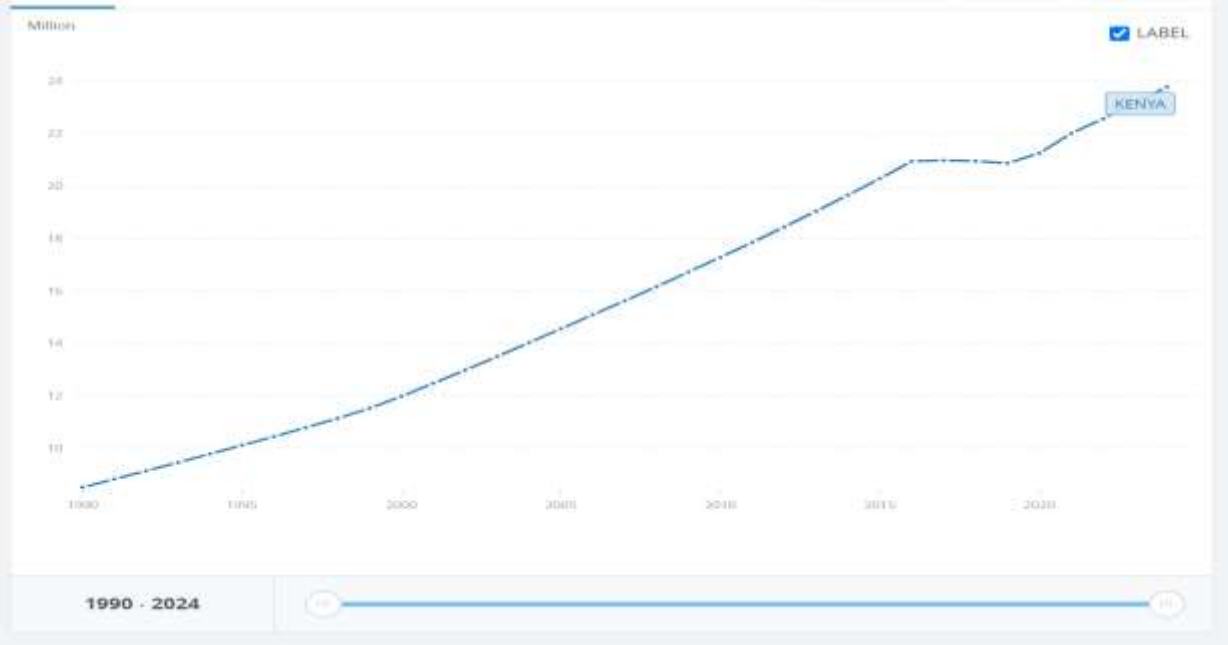

Figure 1: Map showing Kenya's labor growth since 1990-2024(Source: World Bank)

The map shows the rate of growth of Kenya's total labor force since 1990, where it has been growing at an increasing rate. The growth, however, stagnates around the year 2016 – 2019, whereby it starts to grow again. The growth is attributed to causes such as an increase in technology, which made production more efficient, causing a demand for labor, and an increase in education, among many other economic factors.

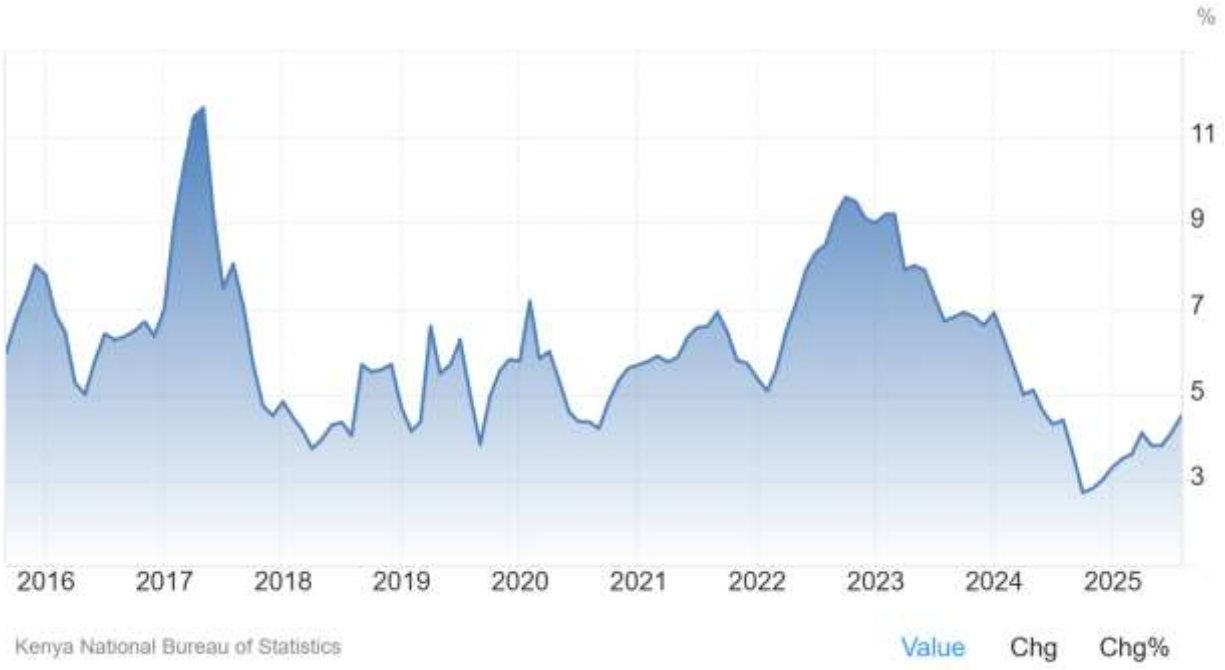

Figure 2: Kenya's inflation rate from 2016–2025(Source: Kenya National Bureau of Statistics)

The trend shows a varying inflation rate, hitting a high of 11.7% in May 2017 and a low of 2.7% in October 2024. An increase in inflation hurts the economy, as the price of goods and services rises, making them more expensive to purchase. This increases the marginal social sacrifice of consumers as their disposable income reduces. Inflation changes also affect the purchasing power of money. The trend in the inflation rate is monitored by the Central Bank, and an inflation target is set to ensure the economy operates within the target. The Central Bank also uses monetary policies like the Central Bank Rate (CBR), the Open Market Operation (OMO), and the Required Reserve Ratio (RRR) to regulate inflation within an economy.

2.0 Theoretical literature review

The basis of the present research is based on a number of economic growth theories.

2.1.1 Solow-Swan growth model

According to the Solow-Swan growth model, technological advancement, population expansion, and capital accumulation are the factors that determine the long-run economic growth (Solow, 1956). The capital accumulation equation is:

$dk/dt = s \times f(k) - (\delta + n + g) \times k$

Where:

k = Capital per effective worker

s = Savings rate

δ = Depreciation rate

n = Population growth rate

g = Technological growth

f(k) = Output function (often Cobb-Douglas)

An increasing labor force is an important input in this model, ceteris paribus; the larger the workforce, the greater the aggregate production. Nonetheless, its impact on per capita output is determined by whether it causes capital dilution or a greater investment is attained with it.

2.1.2 Keynesian model

Keynesian economics is commonly applied to the analysis of the relationship between wages and growth. Keynes (1936) claimed that a major cause of aggregate demand is wages. The equilibrium condition for a closed economy is;

$Y = C + I + G$

Where:

Y = National Income (GDP) and also the aggregate output.

C = Consumption spending by households.

I = Investment spending by businesses.

G = Government spending on goods and services.

The consumption function will be;

$C = a + b(Yd)$

Where:

C = Total consumption

a = Autonomous consumption

b = Marginal propensity to consume (MPC)

Yd = Disposable income

A higher minimum wage has the potential to boost demand in consumption and output, resulting in economic growth. In contrast, neoclassical theory suggests that an imposed wage above the equilibrium level may lead to unemployment among low-skilled laborers, offsetting the increase in demand and thereby reducing total output (Stigler, 1946).

2.1.3 Endogenous Growth Model (AK Model)

According to Endogenous Growth Theory (Romer, 1990), sustained growth is achieved through improvement in human capital and labor productivity.

$Y = AK$

Where:

Y = Total output (GDP)

A = A positive constant representing the level of technology or productivity of capital

K = Capital stock (Broadly defined to include physical and human capital)

The AK model provides a theory for why developed countries can sustain high growth rates indefinitely: by investing widely in capital (including knowledge and human skills) that do not necessarily run into diminishing returns. This leads to the conclusion that labor quality is of more significance than labor quantity.

2.2 Empirical literature review

Such relationships have been tested in empirical studies, yielding inconclusive outcomes in many cases, which often depend on the country context and method. Regarding labor supply, Bloom et al. (2010) concluded that an increasing working-aged population (a demographic dividend) can greatly enhance per capita economic growth, provided there are suitable policies relating to employment and human capital. The empirical evidence on minimum wage is very polarized. Research studies conducted in developed nations have resulted in little or adverse impacts on employment and growth (Neumark and Wascher, 2008). But there is less research in developing countries such as Kenya. According to a study by Karanja (2017) on the Kenyan manufacturing industry, steady increments in the minimum wage did not affect the employment levels at all, but only minimally, positively affected productivity and aggregate demand.

One of the strongest macroeconomic findings is the negative relationship between growth and inflation. In a cross-country study, Barro (2013) found a substantial negative correlation between inflation and economic growth, especially at the levels of inflation rates that rise above a single-digit mark. Africa-specific studies, such as that one by Ndung in (1993), have always indicated that high inflation is harmful to investment and growth in Africa. The proposed research expands on this literature by modeling these three variables in one framework in Kenya, therefore, adjusting the interdependent effect of these variables and offering current evidence of the same in the 1990-2024 period.

3.0 Methodology

The research design of this study employs a quantitative approach, utilizing secondary data to investigate the impact of labor force, minimum wage rate, and inflation on the GDP per capita in Kenya. Data is obtained from the Kenya National Bureau of Statistics (KNBS) Economic Surveys, Central Bank of Kenya inflation rate data, Salary Remuneration Commission (SRC) wage guidelines, labor force reports, and the World Bank data from 1990 to 2024. The GDP per capita is the dependent variable, and total labor force, minimum wage rate, and inflation are the independent variables. The analysis is conducted on an econometric time-series model. An Ordinary Least Squares (OLS) regression model is used to estimate the effect of total labor force, minimum wage rate, and inflation rate on the GDP per capita. Autocorrelation, serial correlation, normality, and heteroscedasticity diagnostic tests are done to ascertain the robustness of the results. The model is specified as:

$$GDP = \beta 0 + \beta 1LF + \beta 2MW + \beta 3INF + \epsilon$$

Where:

- GDP represents gross domestic product per capita growth rate
- LF denotes the total Labor force
- MW is the minimum wage rate
- INF represents the inflation rate
- ϵt is the error term
- $\beta 0$ denotes the intercept term
- $\beta 1$, $\beta 2$, and $\beta 3$ are the coefficients for total labor force, minimum wage rate, and inflation rate, respectively.

The model assumes a linear relationship among the variables and does not account for other macroeconomic influences such as foreign direct investment, trade openness, institutional quality, and technological innovation. The exclusion of these variables is a recognized limitation of the analysis.

3.1 Regression results and interpretation

Dependent Variable: GDP_PERCAPITA
Method: Least Squares
Date: 09/09/25 Time: 16:43
Sample: 1990 2024
Included observations: 35

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.839242	3.374164	-0.841465	0.4065
LABOR_FORCE	0.338763	0.336444	1.006891	0.3218
MINIMUM_WAGE_RATE__KSH_	-0.000108	0.000323	-0.334730	0.7401
INFLATION_RATE	-7.425839	4.303381	-1.725583	0.0944

R-squared	0.420329	Mean dependent var	1.000374
Adjusted R-squared	0.364231	S.D. dependent var	2.388191
S.E. of regression	1.904226	Akaike info criterion	4.233239
Sum squared resid	112.4084	Schwarz criterion	4.410993
Log likelihood	-70.08169	Hannan-Quinn criter.	4.294600
F-statistic	7.492861	Durbin-Watson stat	2.067673
Prob(F-statistic)	0.000655		

GDP per capita = -2.839242 + 0.338763LF -0.000108MW – 7.425839IN

R-squared = 0.420329

Adjusted R-squared = 0.364231

Durbin-Watson statistic = 2.067673

F-statistic = 7.492861 (Prob = 0.000655)

R-squared of 0.420329 or 42.0329% suggests that labor force, minimum wage rate, and inflation account for 42.0329% of the total variations in GDP per capita, leaving around 57.9671% of the variations to be explained by other factors.

The Durbin-Watson statistic of 2.067673 indicates no serious autocorrelation in the residuals.

The overall model is statistically significant at the 1% level (Prob(F-statistic) = 0.000655). This shows that the combined independent variables, labor force, minimum wage, and inflation, explain the variations in Kenya's GDP.

3.1.1 Labor Force

A unit increase in the labor force leads to an approximate 0.338763 unit increase in GDP per capita, holding the minimum wage rate and inflation rate constant. This aligns with the theoretical expectations that a large labor force contributes to higher economic output. However, labor force is not statistically significant (p-value 0.3281 > 0.05). While the relationship is positive, we cannot confidently reject the null hypothesis that there is no effect. This may suggest that a growth in labor force size, without improvements in skills or capital investments, has a big effect on per capita income.

3.1.2 Minimum wage

A unit increase in minimum wage leads to an approximate 0.000108 unit decrease in GDP per capita, holding labor force and inflation rate constant. Minimum wage rate is also not statistically significant (p-value = 0.7401 > 0.05). This suggests that the changes in the minimum wage within the observed timeframe have not been a key driver of the changes in GDP per capita in Kenya.

3.1.3 Inflation rate

A unit increase in the inflation rate leads to an approximate 7.425839 unit decrease in the GDP per capita, holding labor force and minimum wage rate constant. Inflation rate is statistically significant at the 10% level (p-value = 0.0944 < 0.10). This result strongly supports the theoretical postulation that inflation harms the economic well-being. This shows the severe detrimental impact of price instability on the economy of Kenya.

3.2 Residual diagnostic tests.

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

F-statistic	0.668153	Prob. F(2,29)	0.5204
Obs*R-squared	1.541740	Prob. Chi-Square(2)	0.4626

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 09/09/25 Time: 18:50
Sample: 1990 2024
Included observations: 35
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.269554	3.431422	-0.078555	0.9379
LABOR_FORCE	0.028193	0.342197	0.082387	0.9349
MINIMUM_WAGE_RATE__KSH_	-2.68E-05	0.000328	-0.081771	0.9354
INFLATION_RATE	0.090412	4.357107	0.020750	0.9836
RESID(-1)	-0.063977	0.182765	-0.350049	0.7288
RESID(-2)	-0.204702	0.183435	-1.115935	0.2736

R-squared	0.044050	Mean dependent var	-2.38E-16
Adjusted R-squared	-0.120769	S.D. dependent var	1.818277
S.E. of regression	1.924944	Akaike info criterion	4.302476
Sum squared resid	107.4568	Schwarz criterion	4.569107
Log likelihood	-69.29332	Hannan-Quinn criter.	4.394517
F-statistic	0.267261	Durbin-Watson stat	2.001011
Prob(F-statistic)	0.927302		

Figure 3: Serial correlation test

Since the probability value 0.5204 > 0.05, the residuals are not serially correlated.

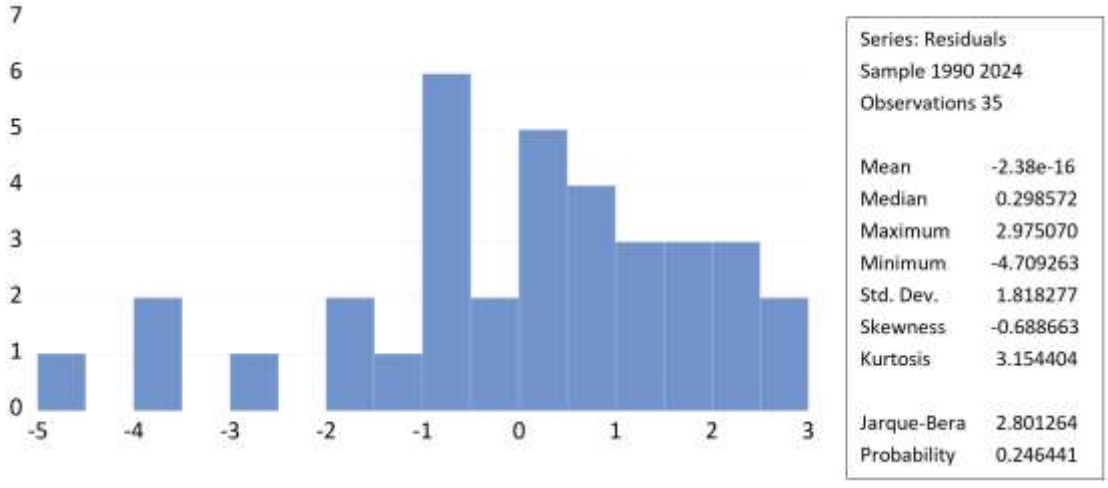

Figure 4: Normality test

Since the probability value 0.246441 > 0.05, the residuals are normally distributed.

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	0.213230	Prob. F(3,31)	0.8865
Obs*R-squared	0.707629	Prob. Chi-Square(3)	0.8714
Scaled explained SS	0.597985	Prob. Chi-Square(3)	0.8969

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 09/09/25 Time: 19:05
Sample: 1990 2024
Included observations: 35

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.773703	8.785367	0.088067	0.9304
LABOR_FORCE	0.359222	0.876006	0.410068	0.6846
MINIMUM_WAGE_RATE__KSH_	-0.000376	0.000841	-0.447042	0.6580
INFLATION_RATE	-6.494221	11.20478	-0.579594	0.5664

R-squared	0.020218	Mean dependent var	3.211669
Adjusted R-squared	-0.074600	S.D. dependent var	4.782874
S.E. of regression	4.958065	Akaike info criterion	6.147119
Sum squared resid	762.0548	Schwarz criterion	6.324873
Log likelihood	-103.5746	Hannan-Quinn criter.	6.208480
F-statistic	0.213230	Durbin-Watson stat	1.978818
Prob(F-statistic)	0.886466		

Figure 5: Heteroskedasticity test

Since the probability value 0.8865 > 0.05, the residuals are homoskedastic.

4.0 Policy recommendation and conclusion.

4.1 Policy recommendation.

According to the results of this research, the following policy suggestions can be offered:

Prioritize price stability- The Central Bank of Kenya must continue to focus on anchoring inflation expectations and keeping inflation within its target range. It is the most empirically arguably lever that is employed to safeguard and enhance GDP per capita growth as found in this study.

Concentrate on Labor Productivity- The policy should not concentrate on the size of the labor force or legislation of wage floors, but instead concentrate on improving the quality of the labor force and its productivity. This involves investment in education, job training, health, and absorption of technology so that an increase in the labor force is translated into greater per capita production.

Cautious and Evidence-Based Wage Policy- Although minimum wage policies play a crucial role in social protection, they should be changed in a cautious and well-informed manner, and the development of the change should be supported by rigorous impact analyses related to the sector. According to the findings, they are not a major instrument for attracting wider economic growth.

Further Research- Researchers and policymakers should undertake new research to examine additional important determinants of GDP per capita (e.g., foreign direct investment, trade openness, institutional quality, technological innovation) that explain the other 58% of the variation not accounted for by this model.

4.2 Conclusion.

The research concludes that as much as labor force participation has a positive effect on GDP per capita, the effect is statistically insignificant because of inefficiencies in the labor market. Evidence of minimum wage policies having little effect on per capita growth indicates poor implementation of the policy in the highly informal Kenyan economy. However, inflation is found to be a crucial determinant with serious adverse impacts on the per capita income. Sustainable growth in Kenya requires policies that will improve labor productivity, equalize wage rules, and put a check on inflation.

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