

# Public expenditure and its effects on Economic growth in the Central African Republic: An Analytical approach

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## Abstract

This study uses Ordinary Least Squares (OLS) and Prais-Winsten autoregressive modeling to examine the impact of public expenditures on economic growth in the Central African Republic (CAR) from 1999 to 2023. According to the results, gross capital formation and labor force participation significantly influence GDP per capita, underscoring their critical role in driving economic growth in the Central African Republic. The study indicates inefficient spending patterns through a negative correlation between general government final consumption expenditure and GDP per capita. The analysis reveals diverse impacts of trade on economic growth, highlighting the importance of careful trade policy management. The research advocates for increased investment in infrastructure and human capital, labor market initiatives, government expenditure methods, strategic trade policies, prudent monetary policies, and stakeholder collaboration. CAR can enhance economic growth and quality of life by emphasizing investment and smart spending. This study establishes the foundation for research and discourse on regional economic development strategies.

**Keywords:** Government Expenditure, Economic Growth, Gross Capital Formation, General Government Final Consumption Expenditure, CAR.

## 1. Introduction

Public expenditure is an important driver of economic growth in the Central African Republic (CAR), which faces a number of developmental obstacles, including political instability and limited fiscal capacity. Despite recent budget increases, serious shortcomings in service delivery and infrastructure persist, particularly in the health and education sectors, where underfunding and poor enrollment continue to be major challenges (Vandeninden, 2023a). This circumstance emphasizes the need for a more planned approach to public expenditures in order to successfully address these essential issues and ensure long-term economic growth. We can analyse the relationship between public expenditure and economic growth from multiple perspectives, including both current and capital outlays. Vandeninden (2024b) indicates that Chapter 6 of the Public Expenditure Review in Key Human Development Sectors report for the Central African Republic by the World Bank examines the nation's social safety system. The analysis identifies significant deficiencies in coverage and effectiveness, primarily attributable to inadequate funding and institutional capacity. The chapter illustrates that marginalized groups, including

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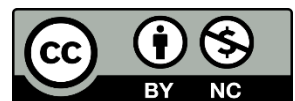
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women, children, and the elderly, often lack access to essential support services. This underscores the essential requirement for an all-encompassing social protection strategy that encompasses many initiatives, including monetary transfers and healthcare assistance.

The World Bank's report on Public Expenditure Review for Key Human Development Sectors in the Central African Republic underscores significant issues in public expenditure on health, education, and social protection. The principal findings indicate that political volatility and security apprehensions restrict public expenditure due to insufficient fiscal space (World Bank, 2023). The healthcare sector experiences considerable underfunding, resulting in increased maternal and child death rates, and the education system encounters difficulties in retention and quality. Social protection mechanisms are insufficient, leaving at-risk communities without vital assistance. Dossou et al. (2024) examine the significant economic difficulties encountered by the Central African Republic (CAR) in their paper, "International Monetary System, Special Drawing Rights (SDRs): Lessons from the Central African Republic Experience," attributing these challenges to persistent socio-political turmoil and dependence on external assistance. The writers stress how bad it is for tax collection and managing public resources when institutions fall apart. They also talk about how Special Drawing Rights (SDRs) could be used as a safety net to boost liquidity and keep the budget stable. The authors advocate for ongoing international support and enhanced flexibility from the IMF to promote private-sector financing, eventually asserting that utilizing international financial instruments is crucial for the economic recovery and stability of CAR.

Political instability, economic challenges, and reliance on external assistance have significantly influenced the trajectory of public expenditure in the Central African Republic (CAR) over time. During the pre-conflict period, governmental expenditure predominantly concentrated on infrastructure development, education, and healthcare services. The late 20th century civil conflicts significantly reduced public expenditure, diverting a significant portion to military needs, which negatively impacted social services and infrastructure (World Bank, 2023; IMF, 2017). During the 2000s, the Central African Republic experienced a gradual increase in governmental spending on rehabilitation and recovery initiatives, often supported by international assistance. Nonetheless, the resurgence of violence in 2012 realigned priorities, leading to heightened military expenditure to the detriment of essential social sectors. The government has been struggling to stabilise the economy and enhance public services in recent years due to insufficient tax production and a significant reliance on external aid. Despite the traditional prioritization of health and education, sectorial allocations reveal insufficient funding for these sectors due to conflicting demands and budgetary limitations. Security expenditures have increased markedly due to persistent violence, indicating a demand for stability. Fiscal constraints and governance issues have impeded investment in infrastructure, crucial for economic advancement. The expenditure pattern in CAR demonstrates the intricate relationship between governance, security, and economic recovery, underscoring the persistent fiscal issues the nation encounters (World Bank, 2023; IMF, 2017).

Persistent political instability and conflict have profoundly affected the economic growth and fiscal outlook for the Central African Republic (CAR). Notwithstanding projected growth rates of approximately 4.5% in 2016, ongoing violence and disturbances in critical sectors, including trade and agriculture, have impeded stronger economic performance (IMF, 2017). The financial forecast is equally difficult, marked by restricted revenue production and significant dependence on external assistance. Despite the government's progress in enhancing tax collection and public financial management, attaining fiscal sustainability is a vital objective that necessitates improved domestic resource mobilization and decreased reliance on external financing (IMF, 2017). Despite indications of potential growth, the economic and budgetary future for CAR remains tenuous, requiring sustained international assistance and effective governance to promote stability and prosperity. The Central African Republic's (CAR) public spending analysis

highlights several detrimental effects on economic growth. Excessive amounts of wasteful spending, especially in the military, hinder growth and cause inefficiency (IMF, 2023). Because ineffective resource allocation negates the benefits of government spending, corruption and governance problems make matters worse (Nagar & Nagar, 2022).

This study used data from 1999 to 2023 to ascertain the influence of gross capital formation and general government final consumption expenditures on the economic growth of CAR. Wagner's law, the Keynesian hypothesis, and classical and neo-classical theories serve as the foundation for this study. The researcher employs ordinary least squares and Prais-Winsten models to conduct analyses that account for the temporal dimension. The present study corroborates Keynes' proposition, indicating that gross capital formation, trade, and labor exert a positive and significant influence on the economic growth of CAR, but general government final consumption expenditures and CPI exhibit a negative correlation with economic growth. The goal of this study is to learn more about how government capital expenditure (shown by gross capital formation) and current expenditure (shown by general government final consumption expenditure) affect the economic growth of CAR. It will do this by looking at reports from multilateral organisations and looking at problems that keep happening with CAR's spending patterns and growth rates.

The second section of this study presents the literature review, the third section outlines the data and methods, the fourth section provides the empirical analysis and discussion of findings, and the fifth section concludes with recommendations based on the study outcome.

## **2. Literature Review**

Many economic theories explain the global investigation of the relationship between public expenditure and economic growth. These theories assist academics in pinpointing significant areas of investigation, such as the influence of government expenditure on economic growth. This study uses Wagnerian, Keynesian, Classical, and Neoclassical theories to provide a robust analytical framework that captures the nuances of this relationship and informs economists, policymakers, and academics. Wagner (1883) emphasizes that economic growth boosts government spending. Growth-led economic activity allows the government to spend more over time (Bangura, 2024). Wagner supported his hypothesis with three principles. First, industrialization and modernization would reduce the public's participation in the private sector as the economy grew. Therefore, the government will spend more on private sector regulation. Second, real income raises demand for essential infrastructure, especially education and health facilities. This increases government spending. Finally, the government should invest in the sector that needs considerable investment to reduce monopolistic tendencies and boost economic efficiency (Sek et al., 2022).

In contrast to Wagner, Keynes' theory posits that government expenditure stimulates economic growth (Keynes, 1936). The government ought to allocate public expenditures toward infrastructure, education, healthcare, and social programs to generate employment, enhance consumption, and stimulate economic activity for the collective good. Keynes emphasizes that augmenting resources for sustained economic expansion is the most cost-effective strategy to mitigate recessions. The multiplier effect of government expenditure accurately indicates that augmenting government spending significantly enhances economic growth. In understanding 'Classical' Economics, Kurz and Salvadori (1998) study the rebirth of classical economic theories, tracing their origins to Adam Smith and David Ricardo, and claim that these theories are crucial for comprehending contemporary economic happenings. The writer analyzes the analytical strengths of classical economics through arguments on economic growth, foreign trade, and the contributions of Piero Sraffa while stressing the relevance of the labor theory of value. The volume also studies neoclassical theory, finally concluding that classical economics provides important insights into modern economic challenges, therefore retaining its significance in the field of economic study.

Unlike classical theory, neoclassical theory prioritizes the optimization of individual economic agents, marginal analysis, and the significance of microeconomics in comprehending economic results. "Testing the Neoclassical Theory of Economic Growth: A Panel Data Approach" evaluates the theory's validity across multiple countries by utilizing panel data. The research uses stringent statistical methods to examine variables of economic growth, including physical capital, human capital, and technological advancement. The results validate the neoclassical paradigm by demonstrating that capital accumulation and the quality of the labor force propel economic expansion (Knight et al., 1993). Neoclassical economists contend that government expenditure can either enhance or impede economic growth. Government expenditure on public goods and services can enhance productivity and foster long-term growth, but excessive intervention and improper resource allocation may stifle private investment and adversely affect economic performance. Neoclassical ideology underscores fiscal discipline, efficient public expenditure, and market-orientated policies to enhance economic growth via government expenditure.

In the last two decades, specific categories of researchers have investigated the relationship between government expenditure and economic growth, assessing how directly government expenditure influences economic growth or the other way round. The following researchers—Bangura (2024), Sumandee et al. (2024), Okonkwo et al. (2023), and Okoroigwe (2024)—assert that substantial capital investment in the economy impacts growth. This study opposes other scholars who contend that government expenditure hinders growth and diminishes private sector contributions that could enhance economic growth and development (Buthelezi, 2023, and Ndanshau, 2023). In economic terms, government expenditure refers to the aggregate sum of money the government allocates for goods, services, investments, and transfer payments during a fiscal year. By regulating the money supply, the government fulfills public demands by providing essential social services that align with the social contract. Ahuja and Pandit (2020) assert that government expenditure stimulates economic growth. Consequently, government expenditure is vital to economic growth policy. Government expenditure is essential for economic expansion (Aluthge et al., 2021).

Several scholars have examined government expenditure and economic growth through a sector-specific lens to address this inquiry. Chindengwike (2023) examines the economic growth of West Africa and governmental expenditure on education from 1990 to 2016. The research indicates that government expenditure on education enhances economic growth in West African developing countries, as demonstrated by unit root, cointegration, and causality analyses. Nwude et al. (2023) analyze the impact of government expenditures on economic growth in Nigeria's developing economy, utilizing data from education, health, agriculture, pensions and gratuities, and public debt servicing. The Vector Error Correction Model indicates that investment in education enhances both long-term and short-term economic growth. Expenditures on health and agriculture significantly and positively influence economic growth, but pensions, gratuities, and public debt servicing exert a negative and negligible effect. Osifo and Abusomwan (2023) analyze the impact of government spending on critical economic sectors and the Nigerian stock market. The study from 1980 to 2021 analyzes governmental expenditures on agriculture, defense, education, and healthcare. All variables had beneficial and substantial impacts in both the long term and short term. Abu & Abu (2003) assess the relationship between government funding, military expenditure, and economic growth in Egypt, Israel, and Syria, identifying a correlation. They employ multivariate cointegration and variance decomposition to analyse this relationship. This analysis identified bidirectional causality between total government expenditure and economic growth, although it revealed a negative long-term causality. Rambeli et al. (2021) analyze the impact of government educational expenditures on Malaysia's economic growth amid the 2008 global financial crisis. The results indicate a long-term equilibrium link between government education expenditure and economic growth in Malaysia following the crisis. Bangura (2024) examined the impact of government fiscal expenditure on the economic growth of Sierra Leone. The researcher uses time series data from 2008 to 2022. The author

confirms government fiscal expenditures in Sierra Leone—particularly on capital projects, education, and consumption—positively and significantly impact economic growth. Chandana et al. (2024) demonstrate that capital investment considerably affects economic growth in both the short and long run, whereas recurrent expenditure does not meaningfully impact economic growth at any interval. Conversely, Onifade et al. (2020) identified a negative link between the Nigerian government's current expenditures and economic growth, whereas capital expenditures exhibited a positive correlation but lacked a substantial impact on the Nigerian economy throughout the studied period. Poku et al. (2022) identified a positive correlation between government expenditure and economic growth in Ghana, emphasizing that capital expenditure significantly enhances economic growth in both the short- and long-term. Paudel (2023) investigates the relationship between capital spending and economic growth in Nepal by disaggregating government expenditures to measure the impact of sector-specific public spending. The estimation, which applied the auto-regressive distributed lag (ARDL) approach to cointegration for data from 1981 to 2020, yielded three distinct results. Initially, both capital and current expenditures, in aggregate, do not contribute to economic growth, contrary to the hypothesis that capital expenditure is more significant than current spending for economic advancement. Secondly, more investment in education, whether via capital or operational expenditures, would significantly enhance economic growth. Third, public spending in the health sector should be judicious, prioritizing capital health expenditure over current health expenditure. Oisaozoje et al. (2023) contend that capital expenditure significantly influences economic growth in both the short and long run. Their findings underscore that critical sectors of the economy—namely, industry, services, and agriculture—are vital for promoting growth in the Nigerian economy. Also, Jibir et al. (2023) investigated the correlation between governmental capital investment and economic growth through time series data spanning from 1981 to 2021, utilizing the autoregressive distributed lag (ARDL) model for their research. Their research suggests that governmental capital investment favorably impacts economic growth in both the short- and long-term. Yasin (2011) examines the relationship between government expenditure and economic growth via empirical study in Sub-Saharan Africa. The research used an aggregate production function model that explicitly included government expenditure, foreign aid, and trade liberalization as input factors. The application of fixed and random effects regression approaches indicates that trade openness and private investment spending positively and significantly influence economic growth. Ndanshau (2023) conducts an empirical analysis of government consumption and economic growth in Tanzania from 1967 to 2020. Based on conditioning factors, the Autoregressive Distributed Lag (ARDL) cointegration test revealed a cointegration between government expenditure and economic growth. Okoroigwe (2024) examined the effects of government expenditure on Nigeria's economy from 2016 to 2022. The study analyzed agricultural, educational, health, and security expenditures as independent variables against real GDP; the research indicates that government investment in security, health, education, and agriculture influences Nigeria's GDP.

The inconsistency in results also pertains to empirical studies evaluating the relationship between government expenditure and economic growth from a cross-country perspective. Some studies (Ahuja and Pandit, 2020; Kimaro et al., 2017; Acikgoz and Cinar, 2017; Chu et al., 2020) assert a positive and significant correlation, whereas other cross-country research (Sidek and Asutay, 2021; Diyoke et al., 2017) indicates a negative relationship between government spending and economic growth. A study by Kimaro et al. (2017) on various developing nations in Sub-Saharan Africa revealed that government expenditure enhances economic growth and activity, provided that the government administers these resources effectively and sustainably. The current literature lacks a definitive theory or universally recognized empirical data about the effect of government expenditures on economic growth. This is due to the presence of many variables in different scenarios, in addition to the unique characteristics of the economies being analyzed. Consequently, further research on this new notion is necessary.

### **3. Data and methods**

This section of the research offers a thorough analysis of the data and methodology utilized to assess the influence of government expenditures on economic growth in the Central African Republic (CAR).

#### **3.1 Data**

This research employs time series data from the Central African Republic (CAR) spanning the years 1999 to 2023. The World Bank's World Development Indicators database provided the data. The researcher selected this period since it includes a pivotal interval for examining the nation's economic dynamics, particularly after notable political events and transitions. The extensive observation from 1999 enables the analysis to encompass the repercussions of prior conflicts and the initiation of recovery efforts. This period encompasses multiple stages of economic reform, alterations in governmental policy, and transformations in international assistance dynamics, all of which are crucial for comprehending the correlation between government expenditure and economic growth. The selection of data up to 2023 guarantees that the research captures the latest trends and developments, thereby offering a thorough perspective on the economic landscape in CAR. The study attempts to find patterns and causal links within this timeframe to enhance knowledge about the effects of government spending on economic growth, especially in a climate characterized by instability and recovery efforts.

#### **3.2 Methodology**

This study utilizes an ex post facto research methodology, which enables the researcher to examine existing data to infer links and effects. The researcher employs the Ordinary Least Squares (OLS) model due to its interpretability, variety, simplicity, and efficiency in managing diverse data sources. Moreover, OLS facilitates robust statistical inference, making it a preferred option among researchers, as demonstrated by prior investigations, including those conducted by Osifo and Abusomwan (2023). Researchers prefer the Prais-Winsten model due to its ability to handle autocorrelation in error terms. Rahman and Hossain (2012) show that this advanced regression method gives more accurate and useful parameter estimates, especially when working with time series data or datasets that have linked errors. This work employs both OLS and Prais-Winsten models for several reasons. Firstly, autocorrelation frequently occurs in time series data, indicating a correlation between the residuals from one period and those from another. The Prais-Winsten model specifically addresses this issue by transforming the data to eliminate autocorrelation, resulting in more reliable estimates. Second, while OLS provides unbiased estimates, it may lack efficiency in the presence of autocorrelation, which can lead to inaccurate standard errors and hypothesis testing. The Prais-Winsten model improves efficiency by adjusting for the time-dependent structure of the data. Additionally, this model utilizes the full structure of the time series, enhancing the robustness of findings, which is particularly important in economic studies where relationships between variables evolve over time. The Prais-Winsten model also allows for the examination of dynamic relationships, capturing potential lagged effects that OLS might miss. Finally, by addressing the specific characteristics of time series data, the Prais-Winsten model can provide a better fit for the data, leading to more meaningful insights into the impact of public expenditure on economic growth. Overall, incorporating the Prais-Winsten model can enhance the validity and reliability of research findings in this context. The objective of this research is to examine if gross capital formation (GCF), representing capital expenditure, facilitates economic growth and if general government final consumption expenditure (current expenditure) promotes economic growth. The study establishes two linear equations: the first employs GCF as a proxy for capital expenditure alongside relevant control variables, while the second centers on the general government's final consumption expenditure, integrating all pertinent variables to evaluate its effect on economic growth. Here is the analysis equation:

**Model 1: Comprising Gross Capita Formation on Economic Growth of CAR**

$$GDP_{it} = \beta_0 + \beta_1 GCF_{it} + \beta_2 TRADE_{it} + \beta_3 LABFORCE_{it} + \beta_4 CPI_{it} + \varepsilon_{it} \quad \text{Eqn 1.}$$

In this model,  $GDP_i$  denotes the gross domestic output per capita for country  $i$  at time  $t$ . The independent variable  $GCF_i$  captures the effects of gross capital formation, while  $TRADE_i$ ,  $LABFORCE_{it}$  and  $CPI_{it}$  accounts for trade volume, labor force participation, and the consumer price index. The error term is represented by  $\epsilon_i$ .

**Model 2: Comprising General Government Final Consumption Expenditure on Economic Growth of CAR**

$$GDP_{it} = \beta_0 + \beta_1 GGFCE_{it} + \beta_2 TRADE_{it} + \beta_3 LABFORCE_{it} + \beta_4 CPI_{it} + \epsilon_{it} \quad \text{Eqn 2.}$$

In this second model, it remains unchanged, while the independent variable now represents the impact of general government final consumption expenditure. We incorporate the other independent variables in addition to Model 1 to account for their distinct impacts on economic growth. These models offer a systematic framework for evaluating the influence of various elements of government expenditure on the economic growth trajectory of CAR, facilitating a detailed understanding of fiscal policy effects. Table 1 presents the variable descriptions used in the study.

**Table 1: Description of Variables**

Description	Variables	Sources
GDP per capita is the total gross domestic product divided by the total population.	Real GDP per capita	WDI
Gross capita formation (formerly gross domestic investment) consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories.	Gross capita formation (% of GDP)	WDI
General government final consumption expenditure (formerly general government consumption) includes all government current expenditures for purchases of goods and services (including compensation of employees.	General government final consumption expenditure (% of GDP)	WDI
Trade in services is the sum of services exports and imports divided by the value of GDP, all in current U.S. dollars.	Trades in services (% of GDP)	WDI
Consumer price index reflects changes in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly.	Consumer price index (2010=100)	WDI
Labor force comprises people ages 15 and older who supply labor for the production of goods and services during a specified period. It includes people who are currently employed and people who are unemployed but seeking work as well as first-time job seekers.	Labor force, total	WDI

*Source: World Bank's World Development Indicators (WDI)*

**4. Results and discussion**

In this section of the study, the results from different analyses are shown, talked about, and interpreted. These analyses include correlation tests, Ordinary Least Squares (OLS) regression results, serial correlation tests, and Prais-Winsten adjustments. This part corresponds with the research objectives, offering a thorough assessment of the impact of government expenditure on economic growth in the Central African Republic (CAR). By synthesizing these facts, the study seeks to derive significant insights and conclusions that enhance our comprehension of the relationship between fiscal policies and economic performance.

**4.1 Descriptive Statistics**

This study investigates the effects of public expenditure on economic growth in the Central African Republic (CAR), using an analytical approach. It employs time series data spanning 24 years, from 1999 to 2023. The research examines how gross capital formation (capital expenditure) and general government final consumption expenditure (current expenditure) impact economic growth in CAR. In this context, the designated independent variables, current and capital expenditures, influence the dependent variable, GDP, which functions as a proxy for

economic growth. Additionally, the researcher includes trade, the labor force, and the consumer price index as control variables in the analysis. Table 2 presents the description of the variables considered in the study. The table indicates that all variables have a positive mean, with the standard deviation values being lower than the mean values. These figures provide a fundamental understanding of the economic background, enabling the analysis of the impact of government expenditure on growth in the Central African Republic. This suggests that there is less variability in the data. Due to the large values of some variables, the researcher applies a logarithmic transformation to them all before conducting the analysis.

**Table 2:** Descriptive Statistics of the Economic Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
LGGDPPC	25	211108.65	37424.162	163047.78	269940.66
LGGCF	25	16.241	7.145	6.405	26
LGGGFCE	25	10.846	3.631	6.367	17.359
LGTRADE	25	41.823	7.594	31.494	57.144
LGLABFORCE	25	1734161.7	184003.68	1391731	2114113
LGINCPI	25	3.71	3.423	-2.066	14.899

*Source: Author's selection*

#### 4.2 Variance Inflation Factor (VIF)

The VIF values for the independent variables in the study demonstrate differing degrees of multicollinearity among them. The VIF for General Government Final Consumption Expenditure (LGGGFCE) is 2.107, indicating a modest association with other predictors. Likewise, Labour Force (LGLABFORCE) exhibits a VIF of 2.011, signifying a similar degree of multicollinearity. Conversely, Trade (LGTRADE) exhibits a VIF of 1.851, indicating a diminished level of correlation, whereas the Consumer Price Index (LGINCPI) presents a VIF of merely 1.107, implying substantial independence from the other variables. The VIF results indicate that, although some multicollinearity is present among the independent variables, it is not sufficiently severe to compromise the reliability of the regression analysis. While VIF values exceeding 5 or 10 typically raise concerns, the current values indicate the model's stability. Tables 3 and 4 present the VIF results for the two independent variables:

**Table 3:** Variance Inflation Factor Result

Variables	VIF	1/VIF
LGGGFCE	2.107	.475
LGLABFORCE	2.011	.497
LGTRADE	1.851	.54
LGINCPI	1.107	.904
Mean VIF	1.769	.

*Source: Stata 18 computation*

**Table 4:** Variance Inflation Factor Result

Variables	VIF	1/VIF
LgTRADE	2.709	.369
LgGCF	2.665	.375
LgINCPI	1.029	.972
Mean VIF	2.134	.

*Source: Stata 18 computation*

#### 4.3 Correlation Analysis

Table 6 displays a correlation matrix that outlines the relationships among six variables in the study. Each cell in the table presents the correlation coefficient, which measures the strength and direction of the linear relationship between the respective variables. This approach is crucial for comprehending the interactions between the independent factors and the dependent variable,



GDP per capita. Positive correlation coefficients indicate a relationship between an increase in one variable and a corresponding increase in another, while negative coefficients suggest a relationship between an increase in one variable and a reduction in another. By looking at these correlations, we can find possible multicollinearity issues that might change the results of the regression and give us more information about the economic factors that are causing growth in the Central African Republic (CAR). This preliminary analysis establishes a basis for more intricate econometric modeling and facilitates a greater understanding of the interconnections between government expenditure, trade, labor force participation, and economic growth.

**Table 6:** Matrix of correlations

<b>Variables</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>	<b>(5)</b>	<b>(6)</b>
(1) LGGDPPC	1.000					
(2) LGGCF	0.759	1.000				
(3) LGGGFCE	-0.380	-0.103	1.000			
(4) LGTRADE	0.328	0.790	0.401	1.000		
(5) LGLABFORCE	0.868	0.741	-0.419	0.327	1.000	
(6) LGINCPI	0.031	0.097	0.138	0.160	0.189	1.000

*Source: Stata 18 computation*

The correlation matrix highlights significant links among the six essential economic variables examined in this study. GDP per capita (LGGDPPC) exhibits a robust positive association with gross capital formation (LGGCF) (0.759) and the labor force (LGLABFORCE) (0.868). This suggests a close link between rising GDP per capita and augmentations in capital investment and labor participation, highlighting these elements as essential catalysts of economic growth in the Central African Republic. In contrast, LGGDPPC demonstrates a moderate negative correlation with General Government Final Consumption Expenditure (LGGGFCE) of -0.380. This discovery raises concerns over the efficacy of government expenditure in augmenting economic production, suggesting that increases in government consumption may not inherently result in improved economic performance. Moreover, LGGCF exhibits a robust correlation with trade (LGTRADE) (0.790), underscoring the interdependence between investment and trade activities, both of which are essential for economic development.

The association between LGGGFCE and LGLABFORCE is significant, exhibiting a mild negative correlation of -0.419. This implies that increased government expenditure may be associated with decreased labor force participation, potentially resulting in inefficiencies in resource allocation. Furthermore, LGTRADE exhibits a moderately positive association with LGLABFORCE (0.327), indicating that a larger labor force correlates with heightened trade activity and hence emphasizing the interrelationship of these economic variables. In conclusion, the Consumer Price Index (LGINCPI) primarily exhibits modest correlations with the other variables, suggesting that inflation has a limited impact on GDP per capita and other economic indicators within the scope of this study. The correlation study offers significant insights into the interplay between government expenditure and economic growth, establishing a foundation for advanced econometric modeling to investigate these linkages more thoroughly.

**4.4 Ordinary Least Square Result**

The Ordinary Least Squares (OLS) regression analysis showed in Table 7 how the GDP per capita (LGGDPPC) in the Central African Republic (CAR) was affected by a number of different variables. We present two models, each providing insights into distinct aspects of government expenditure and economic growth.

**Table 7: Results for Ordinary Least Square (OLS) Regression**

VARIABLES	(1) LGGDPPC	(2) LGGDPPC
LGGCF	3,690** (1,503)	
LGTRADE	-1,849* (1,009)	445.9 (708.8)
LGLABFORCE	0.0980** (0.0382)	0.172*** (0.0305)
LGINCPI	-742.9 (1,094)	-1,499 (1,216)
LGGGFCE		-446.8 (1,581)
Constant	61,275 (75,807)	-95,597* (50,697)
Observations	25	25
R-squared	0.828	0.777

*Standard errors in parentheses*

*\*\*\* p<0.01, \*\* p<0.05, \* p<0.1*

In the first model, gross capital formation (LGGCF) has a positive correlation with GDP per capita, characterized by a coefficient of 3,690, which is significant at the 5% level (p < 0.05). We anticipate that an increase in gross capital formation will lead to a rise in GDP per capita, highlighting the importance of investment in promoting economic growth. This outcome aligns with the findings of Bangura (2024), Chandana et al. (2024), Poku et al. (2022), Jibir et al. (2023), and Oisaozjoe et al. (2023). Labor force (LGLABFORCE) exhibits a positive and statistically significant correlation with GDP per capita (0.0980; p < 0.05), indicating that an expanded labor force enhances economic production. In contrast, trade (LGTRADE) exhibits a negative coefficient of -1.849, significant at the 10% level (p < 0.1), suggesting that increases in trade may correlate with a decline in GDP per capita; this outcome contradicts the study by Yasin (2011). This paradoxical outcome may require further investigation into the dynamics of trade and its economic implications, particularly in the context of the Central African Republic. A coefficient of -742.9 indicates an insignificant correlation between the Consumer Price Index (LGINCPI) and GDP per capita, suggesting that inflation may not significantly impact economic output in this model. The lack of notable outcomes for General Government Final Consumption Expenditure (LGGGFCE), excluded from the initial model, corresponds with the identified possible inefficiencies in government expenditure.

The second model incorporates distinct factors and yields diverse outcomes. Labor Force (LGLABFORCE) maintains a statistically significant positive correlation (0.172, p < 0.01), supporting the notion that an expanded workforce contributes to economic growth. Nevertheless, Trade (LGTRADE) does not exhibit a significant correlation in this model, indicating that its influence may be contingent upon the particular context of the included variables. The model reveals a negative coefficient for LGGGFCE (-446.8), which, despite lacking statistical significance, contradicts the findings of Ndanshau (2023) and aligns with Chandana et al. (2024). This further emphasizes that increased government consumption may not efficiently promote economic growth, reflecting the results of the correlation research. The OLS regression results underscore the significant influence of gross capital formation and labor force participation on GDP per capita in the CAR. The bad effects of trade in the first model and the small amount of money the government spends in both models suggest areas that could be studied further, especially when it comes to how well government spending policies work.

**Durbin-Watson d-Statistic Result**

The Durbin-Watson d-statistic for the regression analysis is  $d = 1.763216$ , with degrees of freedom (6, 25). This result signifies the existence of positive serial correlation, as it falls below the threshold of 2. Values near 2 indicate the absence of autocorrelation, whereas values far below 2, like this one, signal that positive residuals are likely to be sequential. This observation indicates that the residuals from the regression model exhibit positive correlation, potentially compromising the validity of the regression results. To resolve this issue, the researcher employed the Prais-Winsten model in order to ensure a valid outcome.

**Table 8: Results for Prais Winsten AR (1) Regression Tests**

VARIABLES	(1) GDPPC	(2) GDPPC
GCF	3,887** (1,466)	
LABFORCE	0.0925** (0.0386)	0.147*** (0.0367)
INCPI	-446.8 (980.3)	-532.4 (1,075)
TRADE	-1,955* (1,034)	748.3 (827.6)
LGGGFCE		-1,946 (1,763)
Constant	70,928 (76,462)	-52,203 (66,151)
Observations	25	25
R-squared	0.738	0.608

*Standard errors in parentheses*  
 \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

The results of the Prais-Winsten autoregressive (AR(1)) regression analysis can be seen in Table 8. This type of analysis reduces any possible serial correlation in the data. This method improves the dependability of coefficient estimates while examining time series data concerning GDP per capita in the Central African Republic (CAR). In the initial model, Gross Capital Formation (GCF) exhibits a positive and statistically significant impact on GDP per capita, with a coefficient of 3.887 ( $p < 0.05$ ). This discovery highlights the essential function of investment in propelling economic expansion, as shown by Chandana et al. (2024), Poku et al. (2022), and Jibir et al. (2023). Likewise, Labor Force (LABFORCE) exhibits a significant correlation with GDP per capita (0.0925,  $p < 0.05$ ), underscoring the significance of worker participation in improving economic success. These findings corroborate earlier assessments, emphasizing that both investment and labor dynamics are essential for economic development in the CAR. In contrast, the Consumer Price Index (INCPI) demonstrates an insignificant correlation with GDP per capita, indicating that inflation may exert a minimal influence on economic output in this scenario. The analysis indicates a negative correlation for trade in Model 1 (-1.955,  $p < 0.1$ ), suggesting that higher trade volumes may correlate with reduced GDP per capita. This paradoxical outcome may indicate fundamental problems, such as trade imbalances or inefficiencies in the interaction between trade and the economy. In Model 2, trade has a positive although non-significant correlation, suggesting heterogeneity in its impact contingent upon model settings.

Incorporating General Government Final Consumption Expenditure (LGGGFCE) into Model 2 produces a negative coefficient of -1.946, although this finding lacks statistical significance. This indicates that increased government consumption does not effectively promote economic growth, aligning with apprehensions regarding the effectiveness of government expenditure in CAR. The Prais-Winsten regression analysis confirms the importance of gross capital formation and labor force participation in influencing GDP per capita in the CAR. The varied outcomes of

trade and the minimal impact of government consumption expenditures underscore the intricacies of the economic environment, highlighting the necessity for policymakers to prioritize investment and labor market engagement while rigorously assessing the influence of government spending on sustainable economic growth.

**Summary of OLS and Prais Winsten results**

This table provides a comparative analysis of the key findings of the Ordinary Least Squares (OLS) and Prais-Winsten regression results, emphasizing the coefficients, significance levels, and standard errors for each variable assessed concerning GDP per capita in the Central African Republic.

**Table 9:** Comparing the key Findings of the Ordinary Least Squares (OLS) and Prais-Winsten Regression Results Based on each Model output

Variable	OLS Coefficient	OLS Significance	Prais-Winsten Coefficient	Prais-Winsten Significance	Notes
LGGCF	3,690	**	3,887	**	Significant positive impact
LGTRADE	-1,849	*	-1,955	*	Negative impact
LGLABFORCE	0.0980	**	0.0925	**	Positive effect
0.147	***	Stronger in Prais-Winsten			
LGINCPI	-742.9		-446.8		Not significant
-532.4		Not significant			
LGGGFCE			-1,946		Negative but not significant
Constant	61,275		70,928		Different signs in constants
-52,203					
R-squared	0.828		0.738		Good model fit for OLS
0.608		Lower fit for Prais-Winsten			
Observations	25		25		Consistent across models

*Source: Author’s computation*

The findings from the OLS and Prais-Winsten regression analyses in table 9 show a substantial positive effect of Gross Capital Formation (LGGCF) on GDP per capita, with a marginally higher coefficient in the Prais-Winsten findings. This signifies that capital investment is essential for promoting economic growth in the Central African Republic. Second, labor force participation (LGLABFORCE) is significant in both models, indicating a positive correlation with GDP per capita. The Prais-Winsten model demonstrates a more pronounced effect, indicating that increased labor involvement is crucial for enhancing economic success. Thirdly, the analysis indicates that trade (LGTRADE) adversely impacts GDP per capita in both regression models. This discovery underscores possible obstacles in international trade that could impede economic progress. Fourthly, the Consumer Price Index (LGINCPI) yields insignificant results in both models, suggesting that inflation may not be a principal determinant of economic outcomes in this setting. Moreover, the Prais-Winsten model shows a negative coefficient for General Government Final Consumption Expenditure (LGGGFCE), although it lacks statistical significance. This indicates that present government expenditure may have a constrained effect on promoting economic growth. The R-squared values show that the OLS model fits the data better than the Prais-Winsten model, which means that it has more explanatory power in the analysis. These findings emphasize the significance of strategic investment and workforce involvement in fostering sustainable economic growth in the Central African Republic.

### **Policy and Administrative Implications**

This study holds significant policy and administrative ramifications for the Central African Republic (CAR), as it endeavors to enhance economic growth via government expenditure and investment. The GCF and GDP per capita have a positive correlation, underscoring the necessity for a conducive investment environment. Policymakers should prioritize identifying key sectors, such as agriculture, manufacturing, and tourism. This includes providing financial support through subsidies and microfinance, enhancing infrastructure like transportation and energy supply, and streamlining regulatory processes to simplify business operations. Additionally, promoting skills development through vocational training programs and partnerships with educational institutions is essential. Encouraging research and development via innovation hubs and implementing supportive trade policies, such as protective tariffs and export incentives, can further strengthen local industries, making them competitive and sustainable.

The inverse correlation between General Government Final Consumption Expenditure (GGGFCE) and GDP per capita necessitates a reevaluation of government spending practices. To enhance the efficiency of public expenditure, officials should select programs that yield substantial economic benefits and directly contribute to growth. The implementation of performance-oriented budgeting and audits can guarantee the effective allocation of public funds to economic development initiatives. Transparency and accountability in government expenditure will enhance public trust and encourage economic participation. The multifaceted impact of trade on GDP per capita indicates that while it can offer advantages, it requires strict regulation to mitigate potential adverse effects. Policymakers should formulate a strategic trade policy aimed at enhancing global competitiveness while safeguarding domestic industries. This may involve investments in trade facilitation, logistics, infrastructure, and product quality to meet international standards. Regional trade agreements and collaborations can further enhance market access and stimulate growth. Maintaining stable inflation is crucial, as the Consumer Price Index (CPI) has minimal influence on economic growth. Prudent monetary policies that balance growth and inflation are essential. An effective system for monitoring inflation and addressing economic fluctuations can stabilize the economy and protect purchasing power. Sustainable growth requires a comprehensive economic strategy that includes human capital investment, efficient government expenditure, and smart trade policy. Collaboration among government institutions, the business sector, and civil society is vital to address the economic challenges facing the CAR. Consistent engagement with stakeholders can help identify developmental goals and ensure that policies align with the needs of the population.

### **5. Conclusions and recommendations**

The analysis of government expenditures on economic growth in the Central African Republic (CAR) utilized ordinary least squares (OLS) regression and Prais-Winsten autoregressive modeling. Significant relationships among economic variables highlight both growth potential and challenges for sustainable development, as revealed by the findings. The data suggests that gross capital formation and labor force participation contribute significantly to the CAR's GDP per capita. Favorable relationships indicate that investment and employee engagement drive economic growth. The negative correlation between general government final consumption expenditure and GDP per capita suggests that current government spending may not be effectively impacting economic performance. The diverse effects of trade on economic growth reveal a complex relationship that requires careful management to maximize benefits while minimizing drawbacks. The research underscores the need for inflation surveillance and economic stability. Although inflation control is significant, other variables may exert a more substantial influence on economic outcomes than the Consumer Price Index.

To capitalize on the opportunities presented by regional trade agreements, such as the African Continental Free Trade Area (AfCFTA), the Central African Republic (CAR) should pursue a comprehensive approach. First, CAR should develop its infrastructure, such as transportation

and logistics, to enable commerce and boost connectivity to regional markets. Investing in quality standards and compliance will help local producers reach international standards, improving the competitiveness of CAR goods. Furthermore, the government and central bank must implement prudent monetary policies to balance growth and inflation. Regular monitoring of economic data and flexible policy adjustments will help mitigate inflation risks. Encourage collaboration between government, business, and civil society to establish a resilient economy. Consistent engagement with stakeholders can help identify developmental goals and ensure that policies align with the needs of the population. Dialogue forums can enhance transparency and accountability in economic advancement.

Also, the government should prioritize capacity building through vocational training to provide the workforce with the requisite skills, particularly in areas targeted for growth under the AfCFTA; assisting small and medium-sized enterprises (SMEs) will encourage local entrepreneurship and employment growth. The government should prioritise special initiatives aimed at youth and women, given their heightened employment challenges. Shift the focus from consumption to high-yield investments. Establish performance objectives for public projects and conduct regular audits to enhance accountability and optimize resource allocation. CAR should also form strategic alliances with other AfCFTA member nations to pool resources and knowledge while aligning national trade policies with AfCFTA objectives to advocate for its interests. Lastly, enhancing domestic sectors and engaging civil society would guarantee the widespread distribution of trade agreement benefits, leading to inclusive economic growth.

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