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Effectiveness of The Budget Deficit Policy and Economic Growth Dynamics in Burundi

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Abstract

This study empirically analyzes the impact of the budget deficit policy on economic growth dynamics in Burundi over the period 1990-2022, by applying an autoregressive staggered lag (ARDL) model. The results show a good fit of the model with an R2 of 0.8898, indicating that 88.98% of the variation in GDP per capita is explained by the explanatory variables (trade openness rate, total population, money supply growth and budget deficit as a % of GDP). The analysis reveals the adjustment coefficient of -0.4946, suggesting that the Burundian economy converges to its long-term equilibrium at a speed of 49.46% per period after a shock. In the long run, the budget deficit has a positive and significant effect on economic growth (coefficient of 0.0066; p = 0.014), indicating that a 1% increase in the deficit leads to a 0.66% increase in GDP per capita. However, in the short term, its immediate effect is insignificant (D1. = -0.0022; p = 0.141), while a negative delayed impact is observed (LD. = -0.0031; p = 0.040), suggesting an unfavorable temporary effect. Finally, trade openness has a positive effect on GDP per capita growth in the long term, while Burundi's total population has a negative impact. These results highlight the need for prudent management of the budget deficit to optimize its effects on economic growth dynamics in Burundi.

Keywords: Budget deficit, Economic growth, ARDL model, Burundi.

1. Introduction

Over the past decade, no economic policy issue has generated as much controversy as the effects of fiscal deficits on economic growth (Adewale Abolaji, 2020; Qehaja-Keka et al, 2023). Budget deficits have been a major source of concern for many developed and developing countries alike (Aisen and Hauner, 2008).

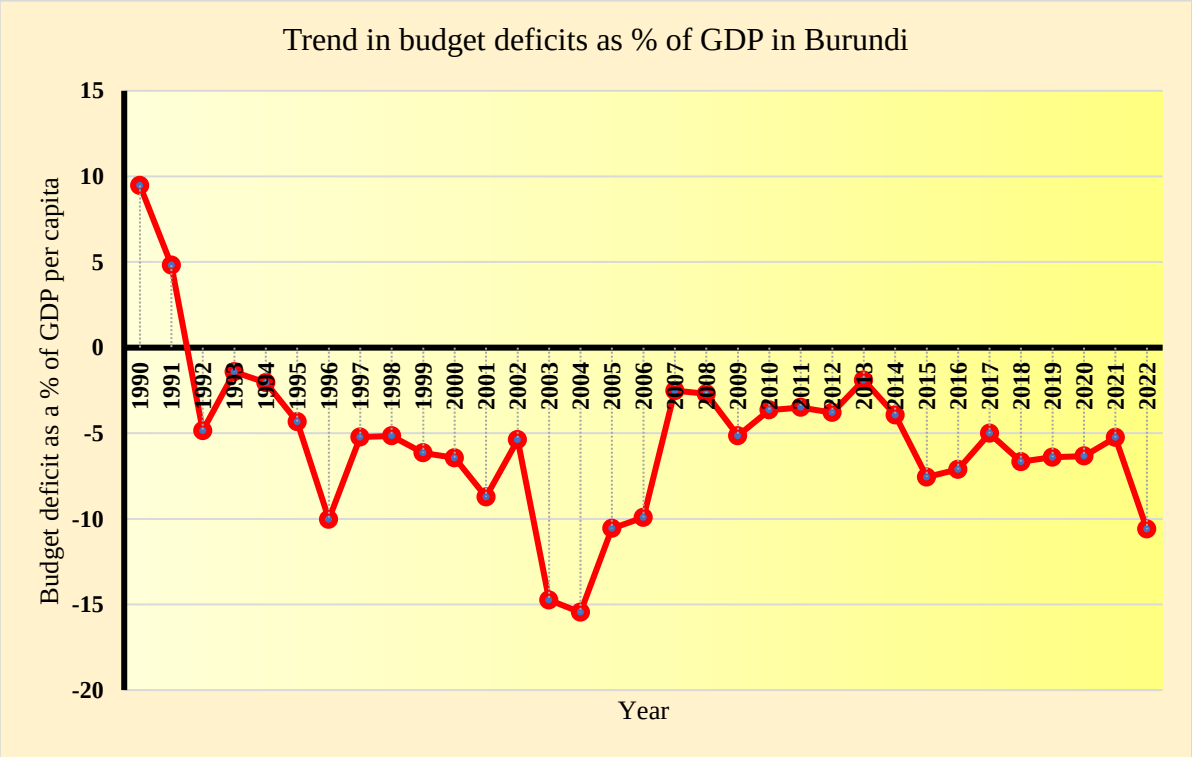
A budget deficit is a negative balance where government revenues are less than government expenditure over a given period. This situation often means that the government has to resort to new borrowing to finance the shortfall.

In Africa, budget deficits have become a growing problem. According to the IMF (2022), the budget deficit on the African continent was expected to reach 6.6% of GDP in 2022, and it has risen sharply to 7.9%. Similarly, in sub-Saharan Africa, budget deficits have continued to widen since 2016, reaching 4% of GDP. At the same time, the average debt ratio in the region has almost doubled in ten years, rising from 30% of GDP at the end of 2013 to almost 60% by the

end of 2022. This increase in deficit and debt has led to high debt repayment costs, further exacerbating the economic challenges facing these countries.

Moreover, the macroeconomic implications of these budget deficits remain controversial, oscillating between a Keynesian view that emphasises their expansionary effects and a neoclassical perspective that warns against their crowding-out effects on private investment. However, the real effects of this policy on economic growth remain uncertain, particularly in fragile economies such as Burundi. For several decades, Burundi has faced persistent budget imbalances, raising questions about their impact on the dynamics of economic growth.

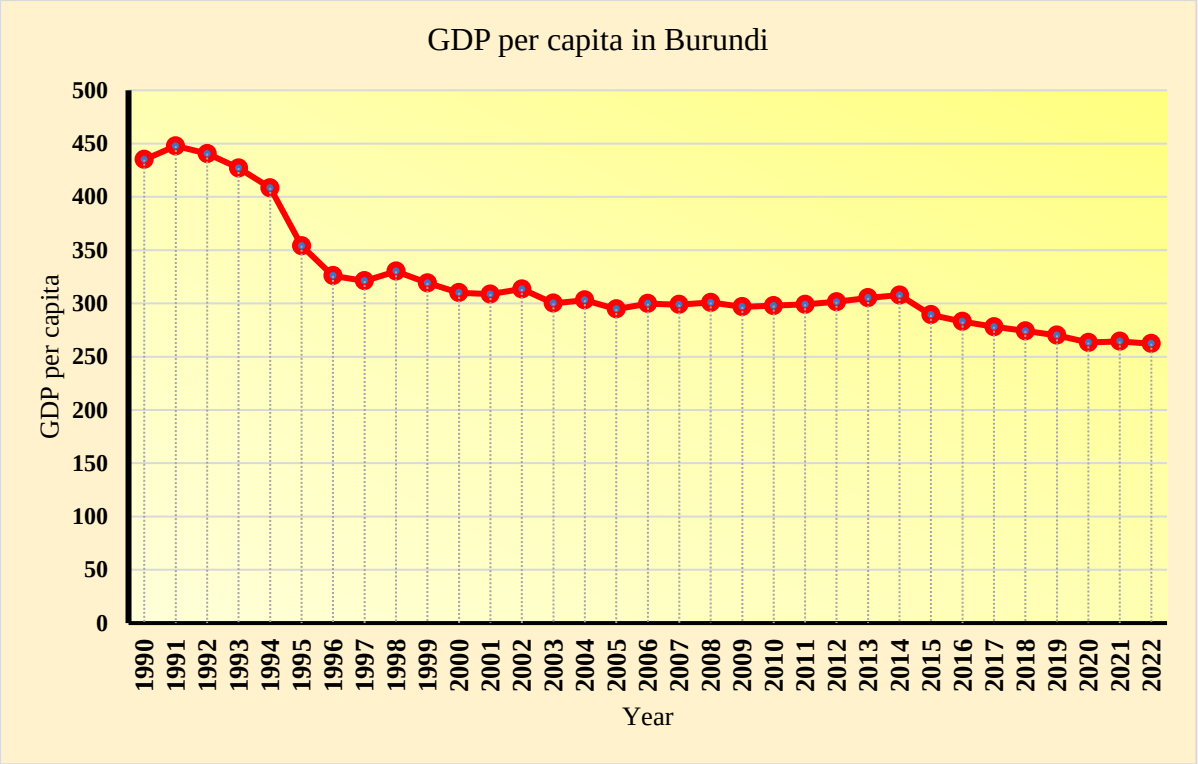
Graph n°1: Budget deficits in Burundi over the period 1990-2022



Source: Authors, based on data from « country economy, 2024 ».

The graph above illustrates the evolution of the budget deficit in Burundi between 1990 and 2022. After a surplus in 1990 (+9.47% of GDP), the deficit widened rapidly, reaching -10.03% of GDP in 1996, as a result of the socio-political crisis. The situation deteriorated further during the 1996-2003 crisis, reaching an all-time low of -14.74% in 2003 as a result of economic sanctions and military spending. Between 2005 and 2014, fiscal reforms and international aid led to a slight improvement, stabilising the deficit at around -3% to -5%. However, after 2015, political instability, a drop in external funding and an expansionary fiscal policy worsened the deficit, reaching -10.6% in 2022, which affected economic growth, marked by a worrying trend of gradual decline, as highlighted in the graph below.

Graph n°2: GDP per capita in Burundi between 1990 and 2022



Source: Authors, based on World Bank data, 2024

The graph above shows the evolution of GDP per capita (in USD) between 1990 and 2022. It reveals a worrying trend, marked by a gradual decline and an inability to generate sustained growth. Between 1990 and 1993, GDP per capita fell from USD 435.07 to USD 427.06, due to political instability and a deterioration in the terms of trade. The period 1995-2000 saw a more pronounced fall, from USD 354.11 to USD 310, due to internal and external crises. After 2003, stagnation persisted, fluctuating between USD 294.73 in 2005 and USD 305.29 in 2013. From 2013 onwards, the downward trend intensifies, reaching USD 262.18 in 2022, due to the pandemic, falling investment and a structural economic crisis. This situation highlights the urgent need for structural reforms to break the cycle of stagnation.

In this context, the economic literature offers contrasting perspectives on the impact of budget deficits on economic growth, depending on the context and the methodologies employed. Barro (1979) argues that, under certain assumptions, budget deficits have no effect on growth, in line with Ricardian equivalence theory. Keynes (1936), on the other hand, suggests that a debt-financed budget deficit can be beneficial by stimulating aggregate demand and encouraging capital accumulation. Conversely, neoclassical theory warns against the crowding-out effect, whereby excessive public borrowing to finance the deficit can reduce private investment and slow growth.

Empirically, the results vary according to the countries and periods studied. Work such as that by Nikoloski and Nedanovski (2017) on Macedonia shows that the impact of the budget deficit on growth varies according to the size of the deficit and the macroeconomic conditions of the country concerned. Tanaka (2024) extends Krugman's macroeconomic model to show that budget deficits are necessary not only to overcome recessions but also to maintain full

employment in a growing economy without inflation. According to the study by Mawejje and Odhiambo (2020), cited by Jallow (2024), in developing economies the majority of economic activities are financed by borrowing and taxation. When public expenditure exceeds revenue in a given fiscal year, this can trigger a series of economic problems in underdeveloped countries. However, few studies have looked specifically at this relationship in the Burundian context, making this research all the more relevant.

Although many studies explore the relationship between deficit spending policy and economic growth in various countries, there is a lack of empirical research specific to Burundi, particularly regarding the short- and long-term effects of this policy. The methodological approaches of existing studies often fail to capture the temporal and structural dynamics specific to the Burundian economy. In this context, the use of adapted econometric models, such as the Autoregressive Distributed Lag (ARDL) model, allows for a precise measurement of the impact of deficit spending on Burundi's economic growth. The study offers an in-depth analysis that takes into account the socio-economic and political specificities of the country, while addressing the unique challenges related to financing its development and macroeconomic stability.

In this context, this study seeks to answer the following question: to what extent does the budget deficit policy influence the dynamics of economic growth in Burundi? This article aims to empirically analyze the impact of the budget deficit policy on the dynamics of economic growth in Burundi over the period 1990-2022, by applying an Autoregressive Distributed Lag (ARDL) model.

2. Literature review

The effectiveness of budget deficit policy is analysed by exploring its theoretical foundations and the empirical research associated with it. This section highlights the different theoretical approaches to budget deficits and their influence on the economy, while presenting empirical studies that highlight the impact of this policy in various economic contexts.

2.1. Theoretical literature

According to Bernheim (1989), quoted by Shahriar-Jewel (2023), the effect of budget deficits on gross domestic product (GDP) is interpreted through three main schools of economic thought: neoclassical, Keynesian and Ricardian. Each of these theories offers a different perspective on how budget deficits influence the economy.

Table n°1: The budget deficit according to the schools of economic thought

School of economic thought	Fundamental principle
Neoclassical theory	Defenders of neoclassical theory see a negative relationship between budget deficits and aggregate output. They argue that deficits lead to higher interest rates, discouraging private bond issuance or private investment and reducing consumption, while contributing to inflation. This phenomenon can increase current account deficits and slow economic growth through a crowding-out effect.

Keynesian theory	According to Keynes, a larger budget deficit stimulates aggregate demand by increasing government spending, which in turn boosts output and employment. Through the multiplier effect, this increase in spending leads to a more than proportional increase in GDP. Contrary to the classicals, Keynesians believe that, in times of underemployment, the deficit can be financed without crowding out private investment. In an open economy, a larger deficit can increase imports, thus widening the current account deficit. According to the Mundell-Fleming model, a larger budget deficit can also raise interest rates, attracting foreign capital and causing currency appreciation, which hurts exports and growth. However, if the deficit finances productive investment, it can boost investor confidence and promote sustained growth, despite possible short-term imbalances.
Ricardian equivalence theory	Ricardian equivalence theory argues that budget deficits financed by public debt have no impact on aggregate demand or economic growth. Indeed, households anticipate a future increase in taxes needed to repay the public debt. Consequently, they increase their savings instead of consuming more, thus offsetting the effect of government spending. This reasoning is based on the idea that public debt is an intergenerational burden, and that households take into account the future taxes that will weigh on their descendants. Thus, according to this theory, fiscal policy becomes ineffective in stimulating the economy.

Source: Soukaina, K., & Hammami, S. (2023). Impact of budget deficit on macroeconomics variables: data from eurozone countries (1990-2016), page 8

2.2. Empirical literature

Empirical research indicates that fiscal deficits can both promote economic growth by producing positive effects and lead to negative effects. The relationship between fiscal deficits and economic growth exhibits a threshold effect, where excessive deficits can slow down growth. This threshold varies across contexts and countries, highlighting the importance of analyzing fiscal deficit policies.

Masheed et al. (2024) analyzed the impact of fiscal deficit on growth in Pakistan (1973-2022) and Afghanistan (2002-2022) using the ARDL method to estimate the model. Their results show a negative effect in the short and long run, challenging Keynesian theory. On the other hand, François et al. (2024) analyzed the impact of fiscal deficit on economic growth in Nigeria (1991-2021) using the ARDL method. The results show that a unit increase in the budget deficit increases GDP by 0.000172 in the short run and by 0.000191 in the long run.

Keho (2024) analyzes the impact of the budget deficit on private investment in Côte d'Ivoire (1975-2022) by applying the ARDL approach. The results show a negative and non-linear relationship: a deficit below 2.3% of GDP stimulates investment, while beyond that, its effect becomes neutral.

Slimani (2016) analyzed the relationship between fiscal policy and economic growth for a panel of 40 developing countries between 1990 and 2012. The study revealed a double threshold effect of the fiscal balance, demonstrating that when the fiscal deficit exceeds 4.8% of GDP or when a fiscal surplus reaches 3.2% of GDP, economic growth is negatively impacted.

Nikoloski and Nedanovski (2017) studied the influence of the fiscal deficit on economic growth in Macedonia. According to their results, the fiscal deficit should not exceed 6% of GDP, because beyond this threshold, it has a negative effect on economic growth.

Nayab (2015) analyzes the effect of budget deficit on economic growth in Pakistan during the period 1976-2007. Using cointegration technique, Granger causality test in VAR framework and vector error correction model, the study reveals that despite the existence of long-run relationship between the variables, budget deficit does not exert significant influence on economic growth.

Ekpo et al. (2024) examined the impact of budget deficits on economic growth in Nigeria (1981-2021) using the ARDL model to analyze the short-run and long-run relationships, and the ECM method. Their results showed that budget deficit has a positive impact, both in the short and long run, although this effect is statistically insignificant, in line with the Keynesian paradigm.

Biplob (2019) studied the impact of budget deficit on economic growth in Bangladesh (1981-2017) and found that deficit positively affects growth in both the short and long run according to the ARDL model. On the other hand, Rana and Wahid (2017) found a significant negative impact of budget deficit on economic growth using time series, ordinary least squares, vector error correction model and Granger causality test.

Momodu and Monogbe (2017) showed that budget deficit boosted economic performance in Nigeria between 1981 and 2015. These results support the Keynesian theory of the relationship between budget deficit and economic performance.

Hussain and Haque (2017) conducted a study using the VECM model and found a positive and significant relationship between budget deficit and GDP growth rate, supporting the Keynesian theory. However, the results of Hassan and Akhter (2014) show that the impact of budget deficit on GDP growth rate is negative, which contradicts Keynesian theory while being consistent with neoclassical theory, which argues that budget deficits reduce GDP.

Maghema (2015) conducted a study on East African countries to analyze the effect of budget deficit on their economic development. The results highlighted a positive relationship between budget deficit and economic development in the region, in line with the Keynesian approach. Based on the dynamic growth model, the study concludes that budget deficits can stimulate economic growth by enhancing productivity through investments in infrastructure, education and health, while reconciling private and social interests.

Kurantin (2017) studied the impact of budget deficit on economic growth, governance and development in Ghana between 1994 and 2014. Using unit root test and ordinary least squares (OLS), the results showed that budget deficit continues to have a negative effect on the country's economic growth, development and governance.

Osoro (2016) examined the relationship between fiscal deficit and economic growth, and determines the level of fiscal deficit that is beneficial to the Kenyan economy using time series data from 1980 to 2014, using the ordinary least squares (OLS) method. The results show a positive relationship between fiscal deficit and economic growth, but as the deficit increases, the impact on growth diminishes. The study identified a fiscal deficit of about 4% of gross domestic product (GDP) as optimal for the Kenyan economy, beyond which the benefits of the deficit begin to diminish.

Onwioduokit and Inam (2018) studied the relationship between budget deficit and economic growth in Liberia. Using ordinary least squares (OLS), ADF and Phillips-Perron unit root tests, Engle-Granger cointegration test, and an error correction model, the results show a long-run and significant relationship between budget deficit and economic growth. A 1% increase in the deficit leads to an increase in economic growth of about 0.42%.

Hassan and Akhter (2014) analyzed the relationship between fiscal deficit and economic growth in Bangladesh for the period 1976-77 to 2011-12. Diagnostic tests such as Augmented Dickey-Fuller (ADF) and Johansen cointegration test were applied followed by the use of Vector Error Correction Model (VECM). The results indicate a negative and statistically significant effect of fiscal deficit on GDP growth in Bangladesh, which is consistent with the results from other developing countries.

In sum, the impact of budget deficit on economic growth varies depending on the economic context.

3. Research methodology

In order to assess the impact of the budget deficit on economic growth in Burundi, we will estimate an autoregressive distributed lag model (ARDL model). This model, belonging to the category of dynamic models, makes it possible to take into account temporal effects (such as adjustment times, anticipations, etc.) in the explanation of a variable. In such a dynamic framework, the dependent variable (Y_(t)) can be explained by:

- ✓ Its own lagged values. A model of this type is referred to as an « autoregressive » (AR) model and can be expressed as:

$$Y_t = a_0 + a_1 Y_{t-1} + \cdots + a_p Y_{t-p} + \varepsilon_t$$

or

$Y_t = a_0 + \sum_{i=1}^{p} a_i Y_{t-i} + \varepsilon_t$ …… **(1)**

- ✓ Present values of the independent variables (X_t) and their time-shifted values (X_{t-i}). These are the « distributed lag models » (DL) which have the form:

$$Y_t = \beta + b_0 X_t + \cdots + b_q X_{t-q} + \varepsilon_t$$

or

$Y_t = \beta + \sum_{j=0}^{q} b_j X_{t-j} + \varepsilon_t$ …… **(2)**

- ✓ The lagged values of the dependent variable, the current values of the explanatory variables (X_t), and their time-lagged values (X_{t-i}). These models combine the characteristics of the two previous types and are referred to as « autoregressive distributed lag models » (ARDL). Here are their expressions:

$$Y_t = \alpha + a_1 Y_{t-1} + \cdots + a_p Y_{t-p} + b_0 X_t + \cdots + b_q X_{t-q} + \varepsilon_t$$

or

$$Y_t = \alpha + \sum_{i=1}^{p} a_i Y_{t-1} + \sum_{j=0}^{q} b_j X_{t-j} + \varepsilon_t \quad \ldots\ldots \textbf{(3)}$$

Note that b_0 represents the short-term effect of X_t on Y_t. To calculate the long-term effect of X_t on Y_t (i.e. «δ»), we start from the following long-term or equilibrium relationship:

$Y_t = k + \delta X_t + u$, we will do:

$$\delta = \sum b_j \Big/ (1 - \sum b_i)$$

3.1. Data and model specification

The data in our study are annual and drawn from the World Bank database « WID », and from « countryeconomy.com ». These annual data cover the period from 1990 to 2022, i.e. 33 observations. The table below provides information on the variables used.

Table n°2: The model variables presentation

Variable	Description	Expected sign	Data source
lnGDP	Logarithm of GDP per capita (constant 2010 US$)		Perspective Monde, 2024
TO	Trade openness (X + M) % GDP	+	Perspective Monde, 2024
lnPOP	Logarithm of Burundi total population	-	World Indicators Development (WID), 2024
BD	Budget deficit (% of GDP)	-/+	countryeconomy.com
MS	Money supply growth rate	+	Perspective Monde, 2024

In this study, the objective is to analyze the impact of the budget deficit on economic growth (GDP: dependent variable), by integrating essential control variables that improve the quality of the results. These variables, frequently used in research on the relationship between budget deficit as a % of GDP (BD) and economic growth (GDP), include the trade openness rate (OC), the total population (lnPOP), the money supply growth rate (MS). In order to examine this relationship, we estimate an ARDL model based on the following function:

lnGDP = (TO, lnPOP, MS, BD) … (4)

If the objective is to analyze the short-run and long-run effects of the above-mentioned explanatory variables on economic growth, the ARDL representation of function (4) is formulated as follows:

$$\Delta lnGDP_t = \beta_0 + \sum_{i=1}^{p} \alpha_1 \Delta lnGDP_{t-1} + \sum_{j=0}^{q} \alpha_2 \Delta TO_{t-1} + \sum_{j=0}^{q} \alpha_3 \Delta lnPOP_{t-1} + \sum_{j=0}^{q} \alpha_4 \Delta MS_{t-1} + \sum_{j=0}^{q} \alpha_5 \Delta BD_{t-1} + \varphi_1 lnGDP_{t-1} + \varphi_2 TO_{t-1} + \varphi_3 lnPOP_{t-1} + \varphi_4 MS_{t-1} + \varphi_5 BD_{t-1} + \varepsilon_t \quad \dots \textbf{(5)}$$

With:

Δ: First difference operator; β_0: constant; α_1,…, α_5: capture the effects of the explanatory variables on short-run economic growth; φ_1,…, φ_5 : long-run dynamics of the model; ε~iid (0, δ): error term (white noise).

3.2. ARDL bounds Test

As in any dynamic model, the optimal lags (p, q) of the ARDL model must be used. Writing an ARDL model as presented above (relation 5) is based on the existence of a cointegration relationship between the variables, thus conditioning the estimation of the short and long-run coefficients of these variables. The econometric literature proposes several cointegration tests, such as those of Engel and Granger (1987), Johansen (1988, 1991) and Johansen and Juselius (1990), as well as those of Pesaran et al. (1996), Pesaran and Shin (1995) and Pesaran et al. (2001). The cointegration test of Engle and Granger (1991) is valid only for two integrated variables of similar order (i.e., order of integration equal to 1), which makes it less effective in multivariate situations. Although the Johansen test overcomes this limitation, being based on vector autoregressive error correction modeling (VECM), it requires that all variables be integrated of similar order, which is not always the case in practice. When several variables are integrated at different orders (I (0), I (1)), one can resort to the cointegration test of Pesaran et al. (2001), called the « bounds test to cointegration ». If we use the Pesaran cointegration test to check for the existence of a cointegration relationship in an ARDL model, we then speak of the « ARDL approach to cointegrating » or the staggered lag cointegration test. The application of this test is divided into two stages:

- ✓ Prior determination of the optimal shift;
- ✓ Application of the Fisher test to verify the hypotheses (see relation 5):
  $H_0 : b_1 = \dots = b_5 = 0$: Existence of a cointegration relationship
  $H_1 : b_1 \neq \dots \neq b_5 \neq 0$: Absence of a cointegration relationship

The test procedure consists in comparing the obtained Fisher values with the critical values (bounds) simulated for different cases and thresholds by Pesaran et al. The critical values are divided into two sets: the upper bound (second set) corresponds to the values for which the variables are integrated of order I (1), while the lower bound (first set) concerns the integrated variables of order I (0). Thus :

- ✓ If Fisher > upper bound: Cointegration exists
- ✓ If Fisher < lower bound: Cointegration does not exist
- ✓ If upper bound < Fisher < upper bound: No conclusion

Applying the procedure of Pesaran et al. (2001), an error correction model (ECM) can be used to check for the presence or absence of a cointegration relationship between variables. In the context of our study, this model will take the following form:

$$\Delta lnGDP_t = \beta_0 + \sum_{i=1}^{p} \alpha_1 \Delta lnGDP_{t-1} + \sum_{j=0}^{q} \alpha_2 \Delta TO_{t-1} + \sum_{j=0}^{q} \alpha_3 \Delta lnPOP_{t-1} + \sum_{j=0}^{q} \alpha_4 \Delta MS_{t-1} + \sum_{j=0}^{q} \alpha_5 \Delta BD_{t-1} + \boldsymbol{\theta u_{t-1}} + \varepsilon_t$$

In an error correction model (ECM), the term u_(t-1) represents the equilibrium error of the previous period. It therefore makes it possible to assess the extent to which the variable moves away from its equilibrium level over time. While the coefficient θ measures the speed of adjustment towards the long-run equilibrium or it indicates how quickly the dependent variable returns to its equilibrium level after a shock (after a disturbance).

Relations 5 and 6 will be estimated. But first of all, we will:

- ✓ Determine the degree of integration of the variables (stationarity test): Augmented Dickey-Fuller test/ADF;
- ✓ Test the possible existence of a cointegration relationship between variables: Pesaran et al. (2001) cointegration test or bounds cointegration test;

Furthermore, it should be noted that the ARDL model is not applicable to integrated variables of an order greater than 1 (I (1)).

3.3. Robustness and validity of the model results

To ensure the robustness and validity of the ARDL model results, several diagnostic tests are performed:

- ✓ Breusch-Godfrey LM test for autocorrelation: This test examines the presence of autocorrelation of the residuals. An autocorrelation indicates that the errors are not independent over time.
- ✓ Shapiro-Wilk normality test: This test checks whether the model residuals follow a normal distribution.
- ✓ Breusch-Pagan homoscedasticity test: This test assesses whether the variance of the residuals is constant (homoscedasticity) or variable (heteroscedasticity).
- ✓ CUSUM squares test: This test assesses the stability of the model over time. It thus offers a more precise measure of structural stability.

4. Presentation and empirical results analysis

Table n°3: Descriptive statistics

Variables	Obs	Mean	Std.dev.	Median	Min	Max
lnGDP	33	5.754036	0.150101	5.708708	5.56905	6104224
TO	33	32.47064	8.340211	31.576	20.964	47.2
lnPOP	33	15.89219	0.2879571	15.85129	15.51731	16.37193
MS	33	17.2526	11.85466	17.08356	-7.970726	47.58568
BD	33	-5.399394	4.682058	-5.22	-15.46	9.47

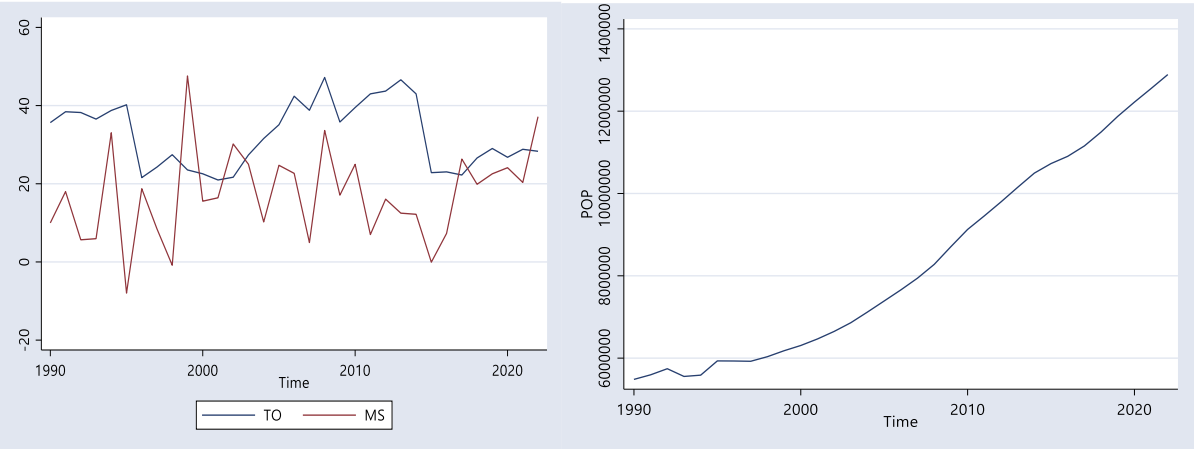
Source: Authors, based on STATA 16 estimations

Table n°4: Stationarity Result: ADF test

Variable	Level		First difference		Integration degree
	t-statistic	p-value	t-statistic	p-value	
lnGDP	-2.882	0.0475	-	-	I (0)
TO	-2.069	0.2570	-4.016	0.0013	I (1)
lnPOP	1.626	0.9979	-3.534	0.0072	I (1)
MS	-6.569	0.0000	-	-	I (0)
BD	-3.947	0.0017	-	-	I (0)

Source: Authors, based on STATA 16 estimations

Graph n° 3: Trade openness (TO) and total population (POP)



Source: Authors, from STATA 16

Table n°5: ARDL bounds test to cointegration results

F-statistic = 10.498		
k= 4		
Significant level	**I (0)**	**I (1)**
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06
t-statistic = -5.688		
k= 4		
Significant level	**I (0)**	**I (1)**
10%	-2.57	-3.66
5%	-2.86	-3.99
2.5%	-3.13	-4.26
1%	-3.43	-4.60

Source: Authors, based on STATA 16 estimations

Since 10.498 is greater than 4.01 and -5.688 is less than -3.99, we reject the null hypothesis (H0). The results in table n°5 indicate that there is a significant long-run relationship between

the variables at the 5% level. This means that changes in one variable affect the other variable in the long run.

Table n°6: Long and short-run coefficients of the ARDL

					ARDL (1,0,4,0,2) regression	
					R-squared = 0.8898	
					Adj R-squared = 0.8185	
					Log likelihood = 88.837353	
					Root MSE = 0.0148	
D.lnGDP	*Coef.*	*Std. Err.*	*t*	*P>t*	*[95% Conf. Interval]*	
ADJ						
lnGDP						
L1.	-0.4946246	0.0869579	-5.69	0.000	-0.6780897	-0.3111596
Long Run						
TO	0.0045767	0.0011587	3.95	0.001	0.002132	0.0070213
lnPOP	-0.2685113	0.0305069	-8.80	0.000	-0.3328752	-0.2041474
MS	0.0013282	0.0006964	1.91	0.074	-0.0001411	0.0027975
BD	0.0066029	0.0024142	2.74	0.014	0.0015094	0.0116965
Short Run						
lnPOP						
D1.	-1.323769	0.3978404	-3.33	0.004	-2.163139	-0.4843989
LD.	-0.2154109	0.2737748	-0.79	0.442	-0.7930252	0.3622033
L2D.	-0.1285829	0.2747093	-0.47	0.646	-0.7081689	0.4510031
L3D.	0.9926865	0.3098221	3.20	0.005	0.339019	1.646354
BD						
D1.	-0.0022407	0.0014508	-1.54	0.141	-0.0053015	0.0008202
LD.	-0.0031178	0.0013999	-2.23	0.040	-0.0060714	-0.0001642
cons	4.889885	0.8406416	5.82	0.000	3.116287	6.663484

Source: Authors, based on STATA 16 estimations

In light of the table above, the R-squared (R2), here equal to 0.8898, indicates that the model is well adjusted. Indeed, 88.98% of the total variation of the dependent variable (GDP/capita) is explained by the independent variables included in the model (trade openness rate, total population, money supply growth rate, budget deficit as a % of GDP).

The results reveal an adjustment coefficient of -0.4946, indicating a speed of return to long-term equilibrium after a shock. This suggests that the economy is approaching its long-term equilibrium at a speed of 49.46% per period. In other words, when the GDPH per capita deviates from its equilibrium level, 49.46% of this deviation will be corrected in each period. The analysis of the budget deficit (BD) shows a positive and significant relationship in the long run, with a coefficient of 0.0066 (p = 0.014), indicating that a 1% increase in the budget deficit leads to a 0.66% increase in GDP per capita. In the short run, the immediate impact of the deficit on GDP per capita is not significant (D1. = -0.0022, p = 0.141), while a negative lagged effect is observed: a 1% increase in the budget deficit from a previous period leads to a 0.31% decrease in GDP per capita (LD. = -0.0031, p = 0.040), suggesting that the budget deficit temporarily harms economic growth. In addition, in the long run, trade openness has a positive effect on GDP per capita growth, while Burundi's total population has a negative effect.

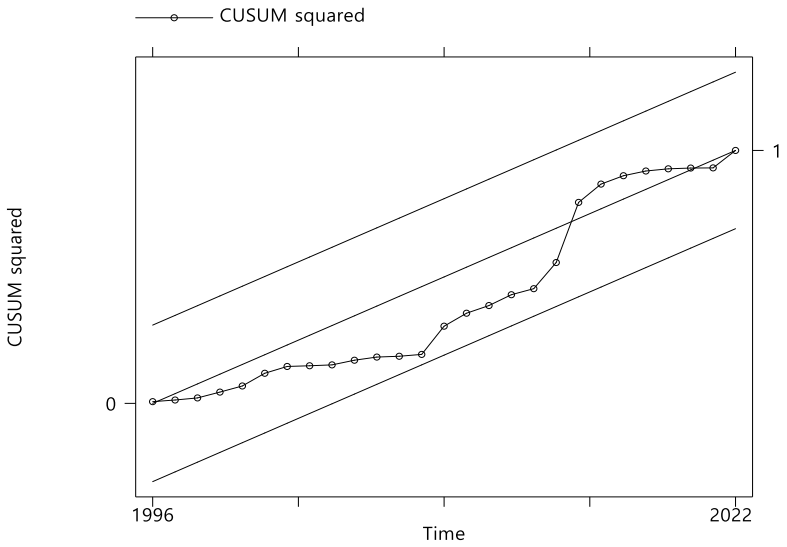
Table n°7: Diagnostic test for ARDL model

Hypothèses du test	Tests	F-Statistic	Probability	Remarks
Normality	Shapiro-Wilk	-0.045	0.51777	Normally distributed residuals
Serial correlation (LM)	Breusch-Godfrey	2.283063	0.1265	No serial correlation
Heteroskedasticity	Breusch-Pagan-Godfrey	29.00	0.4125	No heteroscedasticity

Source: Authors, based on STATA 16 estimations

We can conclude that the null hypothesis is accepted for all tests because, according to the above-mentioned results, their probabilities are greater than the 5% threshold.

Graph n° 4: Model stability results



Source: Authors, from STATA 16

From the above graph, the line remains inside the bounds (control lines), this indicates that the ARDL model (1,0,4,0,2) is certainly stable over the study period.

5. Conclusion

The main objective of this study was to empirically analyze the impact of the budget deficit policy on the dynamics of economic growth in Burundi over the period 1990-2022, using an ARDL model. The results obtained show that the model is well adjusted, with an R2 of 0.8898, which indicates that the independent variables included in the model (trade openness rate, total population, money supply growth rate, budget deficit as a % of GDP) explain 88.98% of the variation in GDP per capita. The rapid adjustment towards the long-term equilibrium is demonstrated by a coefficient of -0.4946, indicating that 49.46% of the deviation from the equilibrium is corrected each period. The budget deficit has a positive and significant effect on long-term economic growth, with a 1% increase in the budget deficit leading to a 0.66% increase in GDP per capita. However, in the short run, the immediate impact of the deficit on

GDP per capita is insignificant, and the lagged effect reveals a decrease of 0.31% in GDP per capita for each 1% increase in the budget deficit from a previous period, suggesting a temporary negative effect. The analysis also reveals that, in the long run, trade openness has a positive effect on economic growth, while Burundi's total population has a negative effect.

Given the results found, it is appropriate to suggest the following to Burundian policymakers:

- ✓ Consider prudent deficit management, particularly to finance productive investments in infrastructure, education, and health, which generate long-term economic returns;
- ✓ Prioritize financing that directly supports long-term productivity, such as investment in productive and exporting sectors, rather than current expenditure;
- ✓ Limit the increase in the deficit, especially in periods when the economy does not have the capacity to absorb such shocks, in order to prevent negative short-term effects;
- ✓ Consider strategies for diversifying public financing in order to avoid over-reliance on external financing, which often proves costly in the long term.

It is important to note that, although the study revealed an overall impact of the budget deficit on long-term economic growth, the threshold beyond which the deficit becomes harmful to growth was not determined. This gap represents a limitation of our research, because the question of the optimal budget deficit threshold is crucial for formulating effective and sustained economic policies.

For future research, it would be relevant to continue the analysis by integrating econometric models that allow determining this threshold, such as the nonlinear regression approach, or threshold models such as ARDL models with threshold effects. Such a study will make it possible to determine more precisely at what point the budget deficit begins to have deleterious effects on the economy.

In addition, it would be interesting to explore other contextual factors that could interact with the budget deficit to affect economic growth. A comparative analysis with other countries in the region or with a similar context could also enrich the understanding of the specific dynamics in Burundi.

References

1) Adewale, S., & Abolaji, A. (2020). THE IMPACT OF BUDGET DEFICIT ON ECONOMIC GROWTH IN AN EMERGING MARKET: AN APPLICATION OF THE ARDL TECHNIQUE.
2) Aisen, A., & Hauner, D. (2008). Budget Deficits and Interest Rates: A Fresh Perspective: IMF working paper, 42.
3) Barro, R. J. (1979). On the determination of the public debt. Journal of political Economy, 87(5, Part 1), 940-971.
4) Bernheim, B. D. (1989). A neoclassical perspective on budget deficits. Journal of Economic perspectives, 3(2), 55-72.
5) Biplob, M. N. K. (2019). Does budget deficit impede economic growth? Evidence from Bangladesh. Journal of Management, Economics, and Industrial Organization, 3(2), 66-94.
6) Ekpo et al. (2024). An Examination of Fiscal Deficit-Economic Growth Nexus for Nigeria using the Bound Test Approach.

7) Ekpo, A. H., & Omoruyi, S. (2013). Fiscal policy coordination: Issues with illustration from Nigeria. West African Financial and Economic Review, 10(1), 1-29.
8) Francis et al. (2024). Empirical analysis of impact of deficit budget on economic growth of Nigeria from 1991 to 2021. International Journal of Accounting Research, 9(1), 37-39.
9) Hassan, H., & Akhter, A. (2014). Budget deficit and economic growth of Bangladesh: A VAR-VECM approach. Janata Bank Journal of Money, Finance and Development, 1(2).
10) Hassan, H., & Akhter, A. (2014). Budget deficit and economic growth of Bangladesh : A VAR-VECM approach. Janata Bank Journal of Money, Finance and Development, 1(2).
11) Hussain, M. E., & Haque, M. (2017). Fiscal deficit and its impact on economic growth: Evidence from Bangladesh. Economies, 5(4), 37.
12) Jallow, A. (2024). Effects of Budget Deficits on Developing and Under-Resourced Economies: A Case Study Approach. Available at SSRN 4754565.
13) Keho, Y. (2024). Does Budget Deficit Crowd Out Private Investment? Cote d'Ivoire As A Focus. International Journal of Economics and Finance, 16(2), 1-86.
14) Keynes, J. M. (1936). The General Theory of Employment Terest and Money. Macmillan and Company.
15) Khan, M. S., & Ssnhadji, A. S. (2001). Threshold effects in the relationship between inflation and growth. IMF Staff papers, 48(1), 1-21.
16) Kurantin, N. (2017). The effects of budget deficit on economic growth and development : The experience of Ghana (1994–2014). European Scientific Journal, ESJ, 13(4), 2-16.
17) Magehema, T. J. (2015). The effect of budget deficit on economic development in East African countries (Doctoral dissertation, University of Nairobi).
18) Masheed et al. (2024). The impact of fiscal deficit on economic growth: empirical evidence from Pakistan and Afghanistan. Liberal Arts and Social Sciences International Journal (LASSIJ), 8(1), 22-47.
19) Mawejje, J., & Odhiambo, N. M. (2020). The determinants of fiscal deficits: a survey of literature. International Review of Economics, 67(3), 403-417.
20) Momodu, A., & Monogbe, T. (2017). Budget deficit and economic performance in Nigeria. Journal of Business and Management Studies, 10, 21276.
21) Nayab, H. (2015). The relationship between budget deficit and economic growth of Pakistan. Journal of Economics and Sustainable Development, 6(11), 85-90.
22) Nikoloski, A., & Nedanovski, P. (2017). Influence of budget deficit on economic growth: The case of the Republic of Macedonia. Muhasebe ve Finansman Dergisi, (Temmuz 2017 (Özel Sayı)), 116-126.
23) Nikoloski, A., & Nedanovski, P. (2017). Influence of budget deficit on economic growth: The case of the Republic of Macedonia. Muhasebe ve Finansman Dergisi, (Temmuz 2017 (Özel Sayı)), 116-126
24) Onwioduokit, E. A., & Inam, U. S. (2018). Budget deficit and economic growth in Liberia : an empirical investigation. American Journal of Social Sciences and Humanities Research, 2(6), 68-78.
25) Onwioduokit, EA (2012). Une estimation empirique du niveau optimal du déficit budgétaire en Guinée. Revue économique et financière, 50 (2), 3.

26) Osoro, S. (2016). Effects of budget deficit on economic growth in Kenya (Doctoral dissertation, University of Nairobi).
27) Qehaja-Keka, et al. (2023). THE EFFECT OF FISCAL DEFICITS ON ECONOMIC GROWTH : EVIDENCE FROM EUROZONE COUNTRIES. Economic Studies, 32(6).
28) Rana, E. A., & Wahid, A. N. (2017). Fiscal deficit and economic growth in Bangladesh: A time-series analysis. The American Economist, 62(1), 31-42.
29) Shahriar-Jewel, J. (2023). The influence of budget deficit on the economic growth of Bangladesh.
30) Slimani, S. (2016). Threshold effects of fiscal policy on economic activity in developing countries. International journal of business and social research, 6(3), 20-37.
31) Soukaina, K., & Hammami, S. (2023). IMPACT OF BUDGET DEFICIT ON MACROECONOMICS VARIABLES: DATA FROM EUROZONE COUNTRIES (1990-2016). The EUrASEANs: journal on global socio-economic dynamics, (3 (40)), 7-15.
32) Tanaka, Y. (2024). An overlapping generations version of Krugman's world's smallest macroeconomic model and fiscal deficit. Journal of Economic Analysis, 3(4), 10-58567.