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Analysis of the Effects of Budget Adjustments based on Public Revenues on Economic Growth in the Franc Zone

Kayaba Juste-Calliste ZABSONRE[1], Pam ZAHONOGO[1] & Hamidou SAWADOGO[2]

[1] Faculty of Economics ,Thomas Sankara University, Burkina Faso
[2] Faculty of Economics, Joseph Ki-Zerbo University, Burkina Faso

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Abstract

Public revenue is an important element of fiscal adjustment, even if its macroeconomic consequences are controversial. It is with this in mind that this research sets out to analyse the effect of fiscal adjustments based on increased government revenue on economic growth in the Franc Zone. To this end, panel data extracted from the BCEAO and BEAC database, the WDI and WGI for the 14 countries and covering the period 1995-2020 are used. Fiscal adjustment episodes are identified on the basis of the recent definition proposed by Afonso et al (2022), making it possible to count 135 episodes, 75 of which are based on increases in public revenue. Estimates are made using the generalised least squares method. The results indicate that fiscal adjustments through higher government revenues have a positive and significant impact on growth in the Franc Zone. The lesson to be drawn from these results is that one way of improving the budget balance and boosting economic growth in the Franc Zone would be to increase public revenue. In addition, for greater impact, this should be done in the presence of a stable political sphere and control of corruption.

Keywords: economic growth, government revenue, budget deficit, gls, franc zone

JEL Classification: E60, H20, H62, O40

Correspondance:

Kayaba Juste-Calliste ZABSONRE, Faculty of Economics ,Thomas Sankara University, Burkina Faso

Pam ZAHONOGO, Faculty of Economics Thomas Sankara University, Burkina Faso

Hamidou SAWADOGO, Faculty of Economics, Joseph Ki-Zerbo University, Burkina Faso

Email addresses: justecallistezabsonre@gmail.com (Kayaba Juste-Calliste ZABSONRE), pzahonogo@gmail.com (Pam ZAHONOGO), sawmidou@yahoo.fr (Hamidou SAWADOGO)

1. Introduction

Since the 2000s, fiscal policy has re-emerged in the global discourse, even though a coherent understanding of fiscal consolidation is rare and inconclusive (Woldu and Szakálné Kanó, 2023). These authors confirm that fiscal adjustment is essential in situations of high public debt and deterioration of the budgetary system. Public finance is seen as the study of the economic aspects of revenue and expenditure in government budgets. According to Mohamed (2022), tax revenue is an original multidisciplinary science whose definition is tricky and whose sources are varied. It is in this sense that they constitute an important instrument used by the authorities to carry out their actions. With this in mind, Moustabchir and Ouakil (2022) show that taxation has always been an important lever for public policy, whether based on classical or Keynesian economic doctrines. The introduction of a tax system is generally a governmental option for implementing incentive policies in favour of specific objectives, making tax policy a tool for state intervention in the economic and social sphere.

According to the Regional Economic Outlook (REO, 2022) for sub-Saharan Africa, the level of government revenue excluding grants as a percentage of GDP in the Franc Zone fell from 17.6% over the period 2004-2010 to 16.8% over the period 2010-2020, a decline of 0.8%. It can be seen that efforts to mobilise domestic revenue in recent years have fallen behind those of low-income SSA countries, for which the figures for the same periods are 11.7% and 14.07%. This situation also rhymes with a year-on-year deterioration in their fiscal position, from -1.2% to -4.2% of GDP, compared with low-income SSA countries whose fiscal balances improved from -6.3% to -4.9% of GDP over the same periods. This deterioration in the budget balance in the Franc Zone is leading to a rapid upward trend in their sovereign debt.

As long as these deficits continue to grow, fiscal adjustment measures are inevitable to stabilise public finances and reverse the upward trend in the public debt/GDP ratio. With this in mind, Georgantas et al (2023) point out that the macroeconomic effects of fiscal adjustment are now attracting renewed interest. This is particularly relevant at this stage as it will enable policymakers to design a credible medium-term fiscal consolidation plan. Inspired by the unfavourable public finance environment in the Franc Zone, this research examines the effect of fiscal adjustment through public revenues on growth in the Franc Zone.

The stabilisation of the economy, which is one of the three functions defined by Musgrave (1959), is a responsibility of the State, which seeks to defend the major macroeconomic balances and achieve strong, steady growth. As such, the aim of tax revenue responsibility legislation is to impose sustainable fiscal discipline and resolve the problems associated with the trend in budget deficits.

Meanwhile, while tax reforms are a central element of fiscal adjustment, their macroeconomic consequences are still the subject of controversy. The traditional debate on the subject is between the classical and Keynesian schools of thought. According to classical doctrine, any state intervention in the economic sphere has no effect on macroeconomic variables. Other authors include Say (1836), Ricardo (1817), Lucas and Sargent (1981), Barro (1974), etc. As a result, the classical school demands that the role of the state should be limited to the minimum necessary to exercise its regalian functions and to guarantee the proper functioning of the market. In such circumstances, it must not intervene in the economy so as not to destabilise the self-regulatory mechanisms. Thus, any state intervention simply paralyses the macroeconomic dynamic. Classical thinking was also absolutely opposed to any kind of state intervention in the economy.

On the other hand, Keynesian ideology argues in favour of state intervention to resolve market failures, particularly from the 1930s onwards, when the crisis revealed the limits of the liberal economy. At the heart of this theory is the idea of the fiscal multiplier, in the case of lower taxes, and the budgetary multiplier, in the case of higher public spending. Among many other authors, we have Keynes (1936), Mankiw (1987) , Burnside et al. (2004) , Romer and Romer (2010) . According to this doctrine, a tax cut can lead to an increase in GDP via mechanisms based on agents' disposable income and their marginal propensity to consume. In this context, a tax cut leads to an initial wave of virtuous effects, starting with an increase in disposable income and then an increase in consumption, which in turn generates additional income for sellers, leading to hiring, national investment, additional tax receipts, and so on. Conversely, tax increases lead

to adverse effects on economic activity.

This debate has taken another turn with the emergence of the New Anti-Keynesian Theory (NAK), which argues for the expansionary nature of budgetary adjustments following increases in tax revenues. As Feldstein (1982), the precursor of this theory, points out, if current changes in taxes herald future changes in public spending, then the temporal structure of taxes has real effects on the economy. Thus, according to this school of thought, tax increases can have non-Keynesian effects.

Note that another model postulates that Keynesian and non-Keynesian effects could coexist given threshold variables. This is the threshold effects model. The idea is that fiscal adjustment can have a Keynesian or non-Keynesian effect above a certain threshold. By way of illustration, Perotti (1999) and Blanchard (1990) estimate for a low initial tax rate, the disincentive effect of taxation on economic activity will be weak. A high initial tax rate, on the other hand, will have the greatest disincentive effect on activity. Sutherland (1977) supports Perotti and Blanchard's reasoning by taking into account the initial level of public debt.

These theoretical debates reveal the importance of the subject and the intensity of the related controversies. Similarly, at the empirical level, there is not yet unanimity on the effects of fiscal adjustment based on increased public revenues. Indeed, some authors support the idea of expansionary effects of fiscal adjustment on production (Acocella et al., 2020 ; Baldacci et al, 2015 ; Afonso and Leal, 2022) while others reject the idea of expansionary effects (Moustabchir and Ouakil, 2022 ; Hussain et al, 2021 Ağca and Igan, 2019 ; Geerolf and Grjebine, 2018 ; Romer and Romer, 2010 ; Arizala et al., 2021 ; Yabré and Semedo, 2021) . Another stream in the literature provides less mixed evidence that, compared to expenditure-based consolidations, revenue-based adjustments are more restrictive (Woldu and Szakálné Kanó, 2023; Georgantas et al., 2023; Alesina et al., 2019; Yang et al, 2015).

Apart from these mixed results, little is known about the effects of fiscal adjustment through increased government revenue on growth in Franc Zone countries. This research analyses these effects in the aforementioned zone, where there are few empirical studies to guide policy. These economies are mainly characterised by their sensitivity to external and internal shocks, political instability, volatile economic growth, high levels of public debt and chronic budget deficits. Thus, a successful rebalancing of tax revenues would improve the fiscal situation in a sustainable and efficient way, while minimising the social costs. In the context of developing countries, Baldacci et al (2004) reveal that fiscal adjustment tends to be sustainable and more favourable to growth. In addition, Baldacci et al. (2015) argue that deficit reduction by broadening the tax base in a situation of credit constraints contributes to economic growth.

This being the case, we would like to know what effect fiscal adjustments through public revenues have on economic growth in the Franc Zone. The answer to this question, which is the objective of this research, would help guide policymakers in their decision-making on fiscal consolidation. To guide our research, we assume that fiscal adjustment based on public revenues positively affects growth in the Franc Zone.

The remainder of this paper is organised as follows. Section 2 presents the debates on the subject, followed by the identification of episodes of fiscal adjustment in Section 3. Next comes the methodology in section 4, then the results are presented in section 5 and finally section 6 concludes the work by drawing out the economic policy implications.

2. Method

2.1. Episodes of budgetary adjustment through public revenue

This section presents the procedure adopted to identify budgetary adjustment episodes and the various budgetary adjustment episodes based on public revenue.

2.1.1. Identification method

Most studies have identified episodes of fiscal adjustment as the change in the cyclically adjusted primary balance (ΔCAPB), a readily available indicator that excludes automatic responses of fiscal variables and reflects only discretionary changes in fiscal policy. There are

several ways of defining episodes of fiscal adjustment in the literature. Indeed, Alesina and Ardagna (1998), Afonso (2010) define fiscal adjustment episodes as cases where the cyclically adjusted primary balance improves by more than 2.0% of GDP in one year or by 1.5% on average over two consecutive years. However, Giavazzi and Pagano (1996), consider additional criteria for identifying the most significant episodes of fiscal adjustment. According to these authors, a fiscal adjustment episode is defined as the cumulative increase in the cyclically-adjusted primary balance of at least 5, 4, 3 percentage points of GDP in 4, 3 or 2 years respectively, or 3 percentage points in one year.

This approach is criticised on the grounds that changes in the cyclically adjusted primary balance could be affected by other factors such as rises and falls in asset prices. Yang et al (2015) criticise it for not taking into account changes in asset prices. They proposed a new definition of CAPB that takes into account asset price fluctuations and reflects the idiosyncratic characteristics of each country's fiscal policy. Also, the ΔCAPB could reflect an intentional change in fiscal policy driven by economic conditions, which could be anticipated by economic agents knowing the policymaker's fiscal policy reaction function (Georgantas et al., 2023).

In this context, several other studies, such as de Agnello et al. (2015), Guajardo et al. (2014b), Jordà and Taylor (2016) Engler and Klein (2017) Banerjee and Zampolli (2019), Ağca and Igan (2019) have criticised the CAPB approach for not being fully exogenous and have relied on the narrative approach constructed by Leigh et al. (2011) to identify episodes of fiscal adjustment. Most of these studies conclude that there is no evidence of expansionary austerity.

However, the narrative approach is also open to criticism for two reasons. First, because it relies heavily on judgement in identifying episodes of fiscal consolidation. Second, because it cannot be ruled out, after examining the relevant legislative documents, that there is no endogeneity between changes in fiscal policy and economic conditions (Alesina et al., 2019). Also, Afonso et al. (2022) highlight the problem of availability of legislative documents.

Consequently, in the light of these existing definitions and the limitations of each approach, we adopt that of Afonso et al. (2022) who propose a more recent definition according to which episodes of fiscal adjustment are those that show at least a positive annual variation in CAPB of 0.5% of GDP for two consecutive years. This idea was proposed by Ahrend et al. (2006) who argue that fiscal adjustment starts when CAPB improves by at least 0.5% of potential GDP in the first year of two consecutive years. In addition, instead of using the commonly used technique, these authors have proposed other alternatives that make it possible to calculate a more appropriate CAPB. These are the filtering technique using the Hodrick-Prescott filter or the Hamilton filter (2018), following Wiese et al. (2018) who had already proposed the Bai and Perron filter (2003) for identifying episodes of fiscal adjustment.

In addition, Afonso et al (2022) distinguish expenditure-based episodes if the absolute change in primary expenditure as a percentage of GDP divided by the absolute change in CAPB as a percentage of GDP is greater than 0.5, provided that consolidation occurs and provided that the change in primary expenditure is negative. Thus, a fiscal adjustment episode is said to be expenditure-based when $|\Delta PEXP|/|\Delta CAPB| > 0.5$ and $\Delta PEXP < 0$. In the opposite case, when there is a budgetary adjustment, when $|\Delta PEXP|/|\Delta CAPB| < 0.5$, the budgetary adjustment is said to be based on an increase in public revenue.

2.1.2. Identification of budgetary adjustment episodes

The fiscal adjustment episodes identified for the fourteen (14) Franc Zone countries over the period 1995-2020 are summarised in the table below. A total of 135 episodes of fiscal adjustment have been identified. Of these episodes, 75 are based on increasing public revenue. Details are given in the table below.

Table 1. Breakdown of fiscal adjustment episodes by country

	Budget adjustments		Budget adjustments based on increased public revenues	
Country	Years	Number	Years	Number
Benin	1996, 1998, 2006, 2007, 2010, 2016, 2017, 2018	8	2007, 2017	2
Burkina Faso	1996, 2003, 2008, 2010, 2013, 2014, 2018	7	1996, 2010, 2013	3
Ivory Coast	2000, 2001, 2007, 2012, 2013, 2018	6	2001, 2007, 2012, 2013	4
Guinea Bissau	1997, 1999, 2001, 2002, 2006, 2009, 2010, 2013, 2015, 2017	10	1997, 1999, 2009	3
Mali	1996, 1998, 2002, 2003, 2008, 2012, 2015, 2017, 2019	9	2003, 2017, 2019	3
Niger	1996, 2000, 2002, 2006, 2008, 2010, 2011, 2016, 2018	9	2002, 2006, 2008, 2011, 2018	5
Senegal	2002, 2007, 2010, 2012, 2015, 2016	6	2002, 2007, 2010, 2012, 2016	5
Togo	1996, 1997, 1999, 2001, 2003, 2006, 2010, 2014, 2017, 2018, 2019	11	2003, 2006, 2010, 2014, 2018,	5
Cameroon	1999, 2000, 2002, 2005, 2006, 2012, 2014, 2015, 2017, 2018	10	1999, 2000, 2005, 2006, 2012, 2017	6
Central African Republic	1997, 1998, 2000, 2002, 2003, 2005, 2008, 2012, 2014, 2015, 2017	11	1997, 1998, 2002, 2005, 2008, 2015, 2017	7
Congo	1996, 1999, 2003, 2004, 2005, 2008, 2010, 2013, 2016-2019	12	1996, 1999, 2005, 2008, 2010, 2013, 2016, 2019	8
Gabon	1999, 2000, 2003, 2005, 2008, 2011, 2013, 2018, 2019	9	2000, 2005, 2011, 2018, 2019	5
Equatorial Guinea	1998, 2000-2002, 2006, 2007, 2011, 2012, 2014, 2017-2020	13	1998, 2001, 2002, 2006, 2007, 2012, 2014, 2018-2020	10
Chad	1997-1999, 2002, 2004, 2005, 2007, 2009, 2011, 2012, 2014, 2015, 2017, 2019	14	1999, 2002, 2004, 2007, 2009, 2012, 2013, 2017, 2019	9
Total		135		75

Source. Author (Based on BCEAO and BCEAC data, 2021)

2.2. Methodology

This section briefly presents the theoretical framework, the empirical model, the data and their sources, the descriptive statistics and the various preliminary tests.

2.2.1. Theoretical framework

Like the previous chapter, this analysis draws on public choice theory, also known as collective choice theory, which is an economic theory of the role of the state and the political behaviour of voters, elected representatives, civil servants and interest groups. Based on postulates borrowed from neoclassical economics, namely methodological individualism and rational choice, it originally refers to this research programme, the founding text of which was published by Buchanan and Tullock (1965) . Moreover, public decisions are subject to the cognitive and emotional biases inherent in behavioural economics that we see in the market, although these biases are less subject to natural self-correcting mechanisms. It is in this sense that the Swedish economist Wicksell (1896) sees government action as a political exchange based on the search for benefits through a trade-off between public spending and taxes.

In this context, this analysis refers to the modelling of the macroeconomic effects of tax changes proposed by Romer and Romer (2010) . This approach begins with a minimalist specification of how tax changes affect real output growth, as follows:

$$\Delta Y_t = \alpha + \beta \Delta T_t + \varepsilon_t \quad (1)$$

WhereY_t is the logarithm of real GDP andT_t is a measure of legislated tax changes. The model assumes that tax changes do not only affect output in the current year. These authors point out that it is clear that many factors other than legislated tax changes affect real growth and are captured by ε_t . We can therefore assume thatε_t is made up of a large number of disparate factors.

$$\varepsilon_t = \sum_{i=1}^{K} \varepsilon_t^i \quad (2)$$

There is no reason to consider thatε_t^i are not correlated.

Let us now consider a specification for the determinants of legislative tax changes.

$$\Delta T_t = \sum_{i=1}^{K} b_t^i \varepsilon_t^i + \sum_{j=1}^{L} \omega_t^j \quad (3)$$

Whereε_t^i are the same as above, and ω_t^i are the additional influences on tax policy. Specification (3) reflects the crucial fact that some tax changes are made in response to factors that are likely to cause output growth to differ from normal (the ε_t^i). This idea that some tax changes are exogenous to other factors affecting output is captured by the assumption that eachω_t^j is uncorrelated with ε_t^i and b_t^i . It makes the response of taxes to ε_t^i (the b^i) specific to each episode, hence the index t. This reflects the fact that legislated tax changes are inherently discrete events.

Combining the equations for production and taxes gives the following equation:

$$\Delta Y_t = \alpha + \beta \left[\sum_{i=1}^{K} b_t^i \varepsilon_t^i + \sum_{j=1}^{L} \omega_t^j \right] + \varepsilon_t \quad (4)$$

This specification shows why a simple regression of output growth on all tax changes is likely to lead to a biased estimate of the effect of tax changes, as some tax changes are correlated with the error term in this regression. This bias is also likely to be even greater if we use measures of changes that go beyond simple legislative changes. For example, Romer and Romer (2010) point out that a conventional measure of fiscal change is the change in cyclically adjusted revenues. More fundamentally, the fact thatb^i varies from episode to episode and can be correlated with otherε_t^i means that it is unlikely to introduce the obvious known shocks to remove the correlation between tax changes and the error term.

We can rewrite equation (4) by including the effects of tax changes driven by other shocks in the error term.

$$\Delta Y_t = \alpha + \beta \sum_{j=1}^{L} \omega_t^j + v_t \quad (5)$$

Where $v_t = \sum_{i=1}^{K}(1 + \beta b_t^i)\varepsilon_t^i$. Provided that ω_t^j are accurately identified, this measure of tax changes should not be correlated with the error term. Thus, a regression of output growth on $\sum \omega_t^j$ should produce an unbiased estimate of the impact of a change in fiscal policy on output. Each year's $\sum \omega_t^j$ is the new measure of fiscal shocks.

2.2.2. Empirical model

With reference to this theoretical model by Romer and Romer (2010) and the empirical model by Baldacci et al. (2015) , the model to be estimated is specified as follows:

$$Txpibh_{i,t} = \alpha_i + ABDP_{i,t} + \beta \sum_{j=1}^{k} X_{ji,t} + \gamma_t + \varepsilon_{i,t} \quad (6)$$

Where$Txpibh_{i,t}$ is the growth rate of GDP per capita for country i in period t. $ABRP_{i,t}$ the size of the fiscal adjustment based on the increase in government revenue is our variable of interest. $X_{ji,t}$ is the vector of k control variables. This vector is composed of government revenues $(RP_{i,t})$, outstanding public debt $(DETP_{i,t})$, the inflation rate $(Infl_{i,t})$, the degree of trade openness $(Ouvcom_{i,t})$, the government stability index $(Stabgov_{i,t})$ and the corruption control index $(Corrup_{i,t})$ δ_i represents the country-specific effects, λ_t are the temporal effects and $\varepsilon_{i,t}$ the error terms.

Note that for the estimation of the model, the appropriate estimator cannot be chosen a priori. The various model specification tests and the related preliminary tests will guide us in choosing the best estimator.

2.2.3. Data and variables

In this research, we use annual data for the various Franc Zone countries covering the period 1995-2020. Data on the growth rate of GDP per capita, the primary budget balance, public revenue, public debt and the inflation rate are obtained from the database of the Central Bank of West African States (BCEAO) for the countries of the West African Economic and Monetary Union (WAEMU) and from the Bank of Central African States (BEAC) for the countries of the Central African Economic and Monetary Community (CEMAC). Some data, however, such as the degree of trade openness is obtained from World Development Indicators (WDI, 2022) data, and the government stability index and the control of corruption index are extracted from the Worldwide Governance Indicators (WGI, 2022) database. It should be noted that the data on these last two variables cover the period 1996 to 2020, since there is no data on the WGI database prior to 1996. The variables used in our estimates are defined as follows:

Growth rate of GDP per capita (txpibh) which is our dependent variable. It is used to measure economic growth because we believe that it better reflects the level of production in developing countries than the real GDP growth rate.

The size of the fiscal adjustment based on the increase in government revenue (noted ABRP), measures the change in the cyclically-adjusted primary budget balance (SBPCVC) the periods when the fiscal adjustment based on the increase in government revenue took place and 0 otherwise. It is our variable of interest. The SBPCVC is obtained by filtering the primary budget balance using the filtering technique of Hodrick and Prescott (1997)). This allows us to identify the various episodes of budgetary adjustment based on increased public revenue (noted ABRP) during the period under review.

Among the control variables, we chose a number of variables considered relevant in the literature because they are likely to influence the effect of fiscal adjustment programmes on

production (Corsetti et al., 2012 ; Ilzetzki et al., 2013 ; Guajardo et al., 2014a ; Ağca and Igan, 2019 ; Yabré and Semedo, 2021 ; Mohamed, 2022) . We have among others:

Public revenue (PR), which represents the government's tax and non-tax revenue as a percentage of GDP.

Public debt (DETP), which measures outstanding public debt as a percentage of GDP.

The inflation rate (Infl), measured by the percentage change in the general price level.

The degree of openness to trade (Ouvcom), which represents the average of exports and imports in relation to GDP.

The government stability index (Stabgouv), which assesses the government's ability to carry out its declared programmes and remain functional. This index has three sub-components: popular support, government unity and legislative strength.

The Corruption Control Index (Corrup), which includes financial corruption, which makes it difficult to do business and political corruption, which constitutes the quid pro quo and close foreign links between government and business.

2.3. Description of variables

In this section, descriptive statistics and correlation relationships are presented.

2.3.1. Descriptive statistics

The data in Table 2 show a high degree of variability in the variables considered, with the exception of the growth rate of GDP per capita and the governance variables in the Franc Zone. The average growth rate of GDP per capita in the zone is very low, at 0.054%. This reflects the fact that economic growth in the Franc Zone remains mediocre. The proof is that the maximum growth rate of GDP per capita is only 1.383% in the zone. At the same time, debt as a percentage of GDP averages 50.354%, while public revenue as a percentage of GDP is low, averaging 17.895%. This situation could lead to very low primary budget balances as a percentage of GDP (1.439% on average), and even negative balances in many cases. When we look at the governance variables, they have average values of less than 0, reflecting the poor state of governance in the region.

Table 2. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Txpibh	364	0.0546385	0.1485981	-0.3639967	1.383777
SBPCVC	364	1.439209	4.089183	-5.602144	15.32764
RP	364	17.89594	8.167808	3.01134	53.23328
DETP	364	50.35473	54.20702	0.7260907	405.0904
Infl	364	2.892818	8.883166	-100	93.10345
Ouvcom	364	30.31789	11.33406	12.52097	72.33411
Stabgov	308	-0.6229138	0.750663	-2.699193	1.050372
Corrup	308	-0.8830069	0.4211423	-1.627693	0.2479137

Source. Author's calculations, based on data from BCEAO, BEAC (2021), WGI (2022) and WDI (2022).

2.3.2. Correlation between variables

Table 3 shows the correlation coefficients for the different variables. There is a positive correlation between the cyclically-adjusted primary budget balance and the growth rate of GDP per capita in the Franc Zone. This suggests that an improvement in the budget balance could lead to an increase in economic growth in the zone. The same is true for public revenues, which are positively correlated with the per capita GDP growth rate. Efforts to mobilise revenue to finance expenditure at the expense of public debt could lead to an improvement in per capita income in the region, as debt is negatively correlated with the growth rate of GDP per capita. Government stability could accompany economic growth, as it is positively correlated. Meanwhile, corruption is negatively correlated with per capita GDP growth, suggesting that corruption does not allow the average citizen to enjoy the fruits of growth as he or she should.

Table 3. Correlation relationship

	Txpibh	SBPCVC	RP	DETP	Infl	Ouvcom	Stabgov	Corrup
Txpibh	1.0000							
SBPCVC	0.2283***	1.0000						
	(0.0000)							
RP	0.1205**	0.6599***	1.0000					
	(0.0214)	(0.0000)						
DETP	-0.0171	0.1932***	0.0248	1.0000				
	(0.7458)	(0.0002)	(0.6369)					
Iinfl	0.0220	0.0211	-0.0256	0.1199***	1.0000			
	(0.6750)	(0.6886)	(0.6259)	(0.0221)				
Ouvcom	0.3095***	0.4087***	0.4456***	-0.1589***	0.0033	1.0000		
	(0.0000)	(0.0000)	(0.0000)	(0.0024)	(0.9494)			
Stabgov	0.1034**	0.1853***	0.2921***	-0.1212**	-0.0244	0.2410***	1.0000	
	(0.0486)	(0.0004)	(0.0000)	(0.0208)	(0.6430)	(0.0000)		
Corrup	-0.0437	-0.1779***	-0.0497	-0.1316**	-0.0837	-0.3205***	0.3284***	1.0000
	(0.4054)	(0.0007)	(0.3440)	(0.0120)	(0.1108)	(0.0000)	(0.0000)	

Note. values in brackets are p-values
Source. Author's calculations, based on data from BCEAO, BEAC (2021), WGI (2022) and WDI (2022).

2.4. Preliminary tests

The preliminary tests to be carried out depend on the nature of the data we are dealing with. The first test is that of series stationarity.

2.4.1. Stationarity test for model variables

There are two types of root tests: first-generation and second-generation. According to Hurlin and Mignon (2005)), while first-generation tests apply when individuals are independent, second-generation tests apply when individuals interdependent. So, before testing the stationarity of the variables, we need to be sure that the inter-individual residuals are independent. To do this, the independence test developed by Pesaran (2004) is used (see appendix 3). The results of this test indicate that the residuals are dependent from one individual to another. Second generation tests therefore appropriate in our context.

Second-generation tests are more recent and tend to remove the hypothesis of independence between individuals. Numerous studies have been developed in this context. These include Choi (2002) who model cross-dependence using a two-factor error component model which imposes the same pairwise error covariances in the different cross-sectional units. We also Moon and Perron (2004) who use residual factor models to account for cross-sectional dependence. Also, we have Pesaran (2007) who adopts a method is based on augmenting the usual ADF regression with the lagged cross-sectional mean and its first difference to capture the cross-sectional dependence that arises from a single factor model. This method has the advantage of being simple and intuitive. It is also valid for panels where N and T are of the same order of magnitude. Here we present the Pesaran (2007) test.

The hypotheses of the Pesaran test are formulated as follows:

H0: series are non-stationary

H1: series are stationary

If the probability is below the threshold, H0 is rejected. The results of the Pesaran test are shown in the table below. The results indicate that only the growth rate of GDP per capita, the stock of public debt and the inflation rate are stationary at level, with the rest of the variables exhibiting a unit root. If we differentiate them by order 1, all the variables are stationary, which means that practically all the series in our panel are integrated by order 1. This means that there is likely to be a long-term relationship between the variables in the model.

Table 4. Results of the stationarity test

Variables	Pesaran test		Decision
	A level	Primary difference	
Txpibh	-2.969***	-4.252	I(0)
	(0.000)	(0.000)	
SBPCVC	-1.720	-3.115 ***	I(1)
	(0.577)	(0.000)	
RP	-1.288	-2.920 ***	I(1)
	(0.968)	(0.000)	
DETP	-2.288*	-2.719***	I(0)
	(0.023)	(0.000)	
Infl	-2.940	-4.129	I(0)
	(0.000)	(0.000)	
Ouvcom	-1.344	-2.658***	I(1)
	(0.950)	(0.000)	
Stabgov	-1.544	-2.257**	I(1)
	(0.809)	(0.031)	
Corrup	-1.576	-2.344***	I(1)
	(0.773)	(0.000)	

Note. Values in brackets are p-values,*, (**) [***] signify rejection of the null hypothesis of unit root existence at the 10%, (5%) and [1%] thresholds respectively.
Source. Author's calculations, based on data from BCEAO, BEAC (2021), WGI (2022) and WDI (2022).

2.4.2. Analysis of the co-integration relationship

The co-integration test is used to check whether there is a long-term relationship between the variables in the model. Thus, since the stationarity test has revealed the probable existence of co-integration between the variables, it is appropriate to test this co-integration. It should be noted that the first co-integration tests proposed for panels excluded a priori not only the existence of inter-individual co-integration relationships, but more generally the existence of any dependency between individuals (Mignon and Hurlin, 2007). Another category of test incorporating inter-individual dependency in panel data has been proposed by Pedroni (2004), Kao (1999) and Bai and Ng (2004), but these tests assume the existence of at most one co-integration relationship for each individual in the panel and assume that all the variables involved in this relationship are known a priori. On the other hand, Westerlund (2007) proposes a test that is sufficiently general to allow for considerable heterogeneity and dependency within and between cross-sectional units. In addition, this test has good properties for small samples and high power compared to other popular panel co-integration tests based on residuals.

In our analysis, we adopt the approach of Westerlund (2007) who has developed four panel co-integration tests based on error correction. The first two tests, whose statistics are given by Gt and Ga, which are called group mean statistics, test the null hypothesis of no co-integration for the panel as a whole against the co-integration alternative for certain panel units, and the other two, whose statistics are Pt and Pa, which are called panel statistics, test the null hypothesis of no co-integration against the co-integration alternative for the panel as a whole.

The results in Table 5 show that for the panel as a whole, there is no co-integration relationship between the variables. As a result, the non-stationarity of certain variables in the model does not indicate the existence of a co-integration relationship in our panel.

Table 5. Results of the co-integration test

Variables	Panel statistics		Average group statistics	
	Pt	*Pa*	*Gt*	*Ga*
(Txpibh. SBPCVC. RP. DETP. Infl. Ouvcom. Stabgov. Corrup)	-5.251	-0.364	-8.022***	-0.459
	(0.928)	(1.000)	(0.000)	(1.000)

Notes. Values in parentheses are p-values, (***) means rejection of the null hypothesis of non-cointegration of variables at the [1%] threshold.
Source. Author's calculations, based on data from BCEAO, BEAC (2021), WGI (2022) and WDI (2022).

Analysis of the results of the various preliminary tests will guide us in choosing the best estimator for our model. Firstly, by performing the Hausman specification test (see Appendix 3), we find that our model is fixed-effects. On the other hand, it should be noted that the application of the fixed-effects estimator requires the errors to be homoscedastic and not self-correlated. However, the independence test of Pesaran et al (2004) (see appendix 2) indicated a cross-sectional dependence between the individuals in the panel. In this case, the inter-individual error terms are correlated, hence the presence of error autocorrelation. But this does not give an idea of the homoscedasticity of the errors, hence the Breusch Pagan heteroscedasticity test (see appendix 4). This test reassures us that the errors are heteroscedastic. In this situation, the conditions for applying the fixed-effects estimator are not met.

It should also be noted that the stationarity analysis revealed that some of the variables in our model are non-stationary in level. This automatically rules out the generalised method of

moments (GMM), which requires the variables to be quasi-stationary. This method also requires the individual dimension to be greater than the temporal dimension. This MMG condition is not met in our context. In addition, as the variables in the model are all stationary only in first difference, they are integrated of order 1. Thus, if there is a co-integration relationship among the variables, the error correction model (ECM) is appropriate. Analysis of co-integration using Weslerland's (2007) method, which takes into account heterogeneity and error autocorrelation, shows that there is no co-integration among the variables. Thus, the ERM is not appropriate for estimating our model. Given all these econometric constraints, the generalised least squares (GLS) method is used. It is the appropriate method in this context because it corrects for both heteroskedasticity and autocorrelation errors.

3. Results

This section highlights the estimation results. The estimation is carried out in several stages, since the control variables are first introduced gradually and then simultaneously. The results are shown in Table 6. The output results are appended (see Appendix 5). First, we regress the growth rate of GDP per capita on the measure of fiscal adjustment by government revenue and a set of control variables. This benchmark regression shows that fiscal adjustments based on increased government revenues have not been detrimental to growth in Franc Zone countries. According to these results, a 1 percentage point improvement in the budget balance, obtained by increasing public revenue, has a positive and significant effect on the growth rate of GDP per capita, increasing it by 0.00748 percentage points. At the same time, the inflation rate and the degree of trade openness have a positive and significant effect on the growth rate of GDP per capita.

Secondly, if we consider the level of public debt as a percentage of GDP, we see that budgetary adjustment through public revenue continues to have a positive and significant effect on growth, but with a slight reduction in the coefficient linked to the level of debt. In fact, an improvement in the budget balance of 1 percentage point, following an increase in public revenue, leads to an increase in GDP per capita of 0.00745 percentage points. However, public debt as a percentage of GDP has no significant effect on growth.

We then examine whether government stability influences the effect of fiscal adjustment in the zone. The results show that political stability helps to reinforce the effect of fiscal adjustment on economic growth. By way of illustration, the coefficient of the political stability index is positive and significant, reflecting the positive effect of political stability on growth. Also, fiscal adjustment through higher revenues continues to have a positive and significant effect on growth, with a higher coefficient than in the basic model, which rose from 0.00748 to 0.00798. Thus, government stability would help to reinforce the positive effect of fiscal adjustments on growth in the Franc Zone.

In addition, another parameter we consider in this study is the corruption control index. The results show that in addition to its direct positive and significant effect on growth, the control of corruption also reinforces the effect of fiscal adjustment on growth. The coefficient increased from 0.00748 to 0.00796. This implies that improving the budget balance by 1 percentage point, in the presence of a low level of corruption, leads to an increase in GDP per capita of 0.00796 percentage points.

Another finding is that even if the control variables are introduced into the model at the same time, the effect of fiscal adjustments on growth retains its sign and significance. This reveals the stability of our result, whether the control variables are introduced gradually or simultaneously.

Table 6. Estimation results

Variable	(1)	(2)	(3)	(4)	(5)
ABRP	0.00748***	0.00745***	0.00798***	0.00796***	0.00827***
	(0.00123)	(0.00126)	(0.00123)	(0.00149)	(0.00155)
RP	-0.000673	-0.000629	-0.000692	-0.00108*	-0.000918
	(0.000552)	(0.000563)	(0.000527)	(0.000582)	(0.000653)
Infl	0.000680**	0.000683*	0.000487	0.000771**	0.000861*
	(0.000339)	(0.000354)	(0.000341)	(0.000381)	(0.000441)
Ouvcom	0.00341***	0.00340***	0.00279***	0.00359***	0.00366***
	(0.000481)	(0.000495)	(0.000460)	(0.000548)	(0.000634)
DETP		-8.18e-06			5.04e-05
		(7.22e-05)			(0.000103)
Stabgov			0.00798***		-0.00651
			(0.00291)		(0.00455)
Corrup				0.0216***	0.0282***
				(0.00604)	(0.00732)
Constant	-0.0456***	-0.0466***	-0.0244**	-0.0297**	-0.0386**
	(0.0120)	(0.0132)	(0.0122)	(0.0138)	(0.0185)

Note. Standard errors are in parentheses; (*), (**) and (***) indicate the significance of the coefficient at the 10%, (5%) and [1%] thresholds respectively.
Source. Author's calculations, based on data from BCEAO, BEAC (2021), WGI (2022) and WDI (2022).

Generally speaking, the results of this research reveal a positive effect of fiscal adjustments on economic growth in the Franc Zone, via an increase in public revenue. These results are in line with the New Anti-Keynesian Economics (NAK) framework, which postulates that fiscal adjustments are expansionary and, at worst, neutral. Thus, our research hypothesis, which anticipates that fiscal adjustments via public revenues have a positive impact on economic growth in the Franc Zone, has been verified. This result corroborates the empirical work of Afonso and Leal (2022) for the case of 19 eurozone countries, Afonso et al. (2022) on highly indebted advanced countries, Acocella et al. (2020) for the specific case of the Italian economy, Baldacci et al. (2015) concerning a group of advanced and developing economies. It should be noted that public revenues play a major role in the fiscal adjustment process in developing countries, particularly those in the Franc Zone. These countries have a potential for revenue mobilisation that is under-exploited. This is justified by the fact that the procedures for mobilising revenue, especially tax revenue, are mostly precarious, which encourages tax evasion. Also, the informal sector, whose activities escape taxation, is still large in these economies, which means that they cannot exploit their fiscal potential to the full. Gupta et al (2022) have pointed out that tax collection in sub-Saharan Africa is generally weak. In this context, revenue mobilisation efforts can promote growth. Other mechanisms by which Franc Zone countries could mobilise more public revenue include broadening the tax base and tax

collection procedures

It should be noted that the positive effect of fiscal adjustments on growth is supported by the control of corruption, as the results of this research reveal. Mohamed (2022) has supported this argument by postulating that transparency in the management of public finances favours the adoption of sound and sustainable policies, since it enables the general public to better understand the structure and functions of government and the objectives of fiscal policy. This author also believes that it makes budgetary adjustment measures more sustainable by increasing taxpayers' understanding and support. Thus, in the Franc Zone countries, which are suffering from a growing level of corruption, controlling corruption would improve the effect of adjustments on growth. Transparency in the management of public funds could give taxpayers confidence and encourage them to contribute more.

Furthermore, our results show that political stability is an equally important factor in the success of fiscal adjustment measures in stimulating growth in the Franc Zone. In this context, Yabré and Semedo (2021) in their studies of 27 SSA countries have shown that fiscal adjustments based on public revenues tend to be significantly associated with political stability and that the effect is greater during periods of economic recession. According to these authors, greater political stability leads to greater fiscal adjustment, as governments facing less risk of reversal and with the institutional capacity to pursue fiscal policies tend to implement fiscal adjustment.

4. Discussion

While public revenue is an important element of fiscal adjustment, its macroeconomic consequences continue to arouse curiosity in the research world. It is against this backdrop that this research set out to analyse the effect of fiscal adjustment through increased government revenues on economic growth in the Franc Zone. To achieve this, panel data on all fourteen (14) countries covering the period 1995-2020 were used. The data were obtained from the economic and financial statistics of the BCEAO (2021), the BEAC (2021), the WGI (2022) and the WDI (2022). In addition, before proceeding with the econometric analyses, episodes of fiscal adjustment in the Franc Zone over the period under review were identified using the recent method proposed by Afonso et al. (2022) . This exercise enabled us to identify 135 episodes, 75 of which were based on increases in government revenue.

In order to find the appropriate estimator, preliminary tests were carried out. The specification and diagnostic tests showed that our panel is fixed-effect, with heteroskedastic and autocorrelated errors. The stationarity test showed that most of the variables contain unit roots, but the co-integration test revealed that there is no co-integration among the variables in the model. Given the econometric constraints, we estimate our model using the generalised least squares (GLS) method, which is the most appropriate in this context.

The GCM estimate yielded convincing results. According to these results, the improvement in budget balances resulting from the increase in public revenue has a positive and significant impact on economic growth in the Franc Zone. In addition, certain variables likely to influence this effect were controlled and it was found that the budget adjustments maintained their positive and significant effect. Thus, our research hypothesis, which assumes a positive effect of budget adjustments through public revenues on growth, is verified. It should be noted, however, that control of the variables revealed that public debt tends to attenuate the positive effect of budget adjustments. On the other hand, political stability and control of corruption tend to reinforce this positive effect.

Important lessons can be drawn from these results, since the improvement in the budget balance in the Franc Zone, achieved by increasing public revenue, has a positive and significant impact on economic growth. Indeed, one way of effectively reducing budget deficits and stimulating growth would be increase public revenues by mobilising domestic revenue. To achieve this, efforts to broaden the tax base and modernise collection procedures should be implemented with a view to mobilising more public revenue

Another important element is the fight against corruption, since the rebalancing of tax revenues is facilitated by budget transparency. Budgetary transparency could give taxpayers confidence, which would encourage them to contribute more and avoid tax evasion and tax avoidance. As Mohamed (2022) has shown, budget transparency promotes the adoption of sound and

sustainable policies by increasing understanding and popular support. In the same context, governments should ensure political stability, as Yabré and Semedo (2021) have shown that in SSA, stable governments are significantly associated with fiscal adjustment.

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Appendix

Specification test between fixed and random effects

This test discriminates between the fixed-effect model and the random-effect model. The hypotheses of the test are as follows:

H0: the random effects model is appropriate

H1: the fixed-effects model is appropriate

If the probability of the Hausman test is lower than the threshold considered, the null hypothesis is rejected.