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Single Currency in the SADC Zone: Is It Necessary to Adjust the Convergence Criterion Relating to the Budget Deficit? Is the Norm Relating to the Budget Balance Pro-Growth?

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Abstract

With a view to the introduction of a single SADC currency, this study uses a non-linear Hansen (1999) model to estimate the budget deficit threshold that maximizes economic growth and whose observance by countries is conducive to the convergence of economic cycles. The analysis covers the fifteen countries in the Eurozone over the period 2000-2019. The results of this empirical analysis reveal that the budget deficit threshold that should not be exceeded to support growth and whose observance is favourable to the convergence of economic cycles is 10.92% of GDP over the entire estimation period, within an interval of [10.89; 10.98]. As a result, compliance with the convergence criterion limiting the budget deficit to 3% of GDP is not optimal and not conducive to the convergence of economic cycles. Furthermore, the results show that since the start of public debt relief in the SADC region in 2006 (a period of substantial debt reduction in SADC countries), the budget deficit threshold that must not be exceeded has been 5.58% of GDP, within a range of [5.48 to 5.98]. Thus, the current convergence criterion on the budget deficit (3% of GDP) seems rigorous and restrictive in terms of fiscal discipline and could therefore be adjusted to 5.58% of GDP. Under the current SADC framework, the additional margin of around 2.5% of GDP could be used to finance the fight against terrorism, economic transformation, the fight against Covid-19 and investment in human capital.

Keywords

Single Currency, Budget Deficit, Convergence Criterion, Business Cycles, SADC

1. Introduction

The creation of a single currency by an African central bank has been a political objective of the founders of the African Union since independence (Abuja Treaty, 1993). The strategy advocated by the AU is structured in two stages: firstly, the establishment of sub-regional currencies, followed by the introduction of a single African currency (Abuja Treaty, 1993). It is within this framework that there are plans to create a wider monetary zone involving all the countries in the SADC region (Southern African Development Community, which already has a common monetary zone)[1]. It should also be noted that the countries of the SADC region are characterized by structural heterogeneity, particularly in terms of economic size, economic and social structure, legal framework and fiscal and monetary policies. This strong heterogeneity in the region has been confirmed by numerous studies, with country-specific responses to common shocks (Opimba, 2009). Despite this great disparity (heterogeneity) between the economies, the political authorities are aiming to create a single currency by 2063. Such an initiative is inherited from the divergences between the economies making the future monetary area, a priori, sub-optimal due to the asymmetric response of the member countries to a common shock; at least in terms of the theory of optimal monetary areas (Mundell, 1961). This sub-optimality is further reinforced by the lack of factor mobility and price and wage flexibility (Cooper, 1976; Ingram, 1962; Kenen et al., 1969; Kindleberger, 1986; McKinnon, 1963; Mundell, 1961).

Alongside the traditional theory of optimal currency areas (OCAs), another theory emerged in the 1990s which emphasizes the endogeneity of OCA criteria. According to this new paradigm, any monetary union creates, some posteriori, its own optimality factors (Frankel and Rose, 1998; Rose, 2000). Consequently, strong heterogeneity within the region is not an obstacle to the formation of a monetary union. Therefore, from a theoretical point of view, the creation of a monetary union within SADC is not impossible in terms of the theory of endogenous optimal monetary zones. To speed up the process of monetary integration, SADC member countries adopted convergence criteria in 2004 and set up a multilateral surveillance mechanism to ensure economic convergence as a prelude to the emergence of a single currency. The main convergence criteria (level 1 criteria) are as follows: 1) the overall budget deficit must not exceed 3% of GDP, 2) the annual inflation rate must not exceed 3%, 3) the budget deficit of each Member State's central bank financing Foreign exchange reserves are capped at 5% of the budget revenue forecast for the previous year and 4) foreign exchange reserves must be sufficient to cover imports of goods and services for at least six (6) months. However, economic disparities within the region, the region's economic situation in relation to the spread of the Covid-19 pandemic throughout the world and security problems mean that some of the convergence

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[1]Common monetary area (CMA): a monetary arrangement for fixing exchange rates involving South Africa (SA), whose GDP accounts for 95% of the regional total (Tavlas & Dellas, 2009), and three other countries: Lesotho, Namibia and Swaziland.

pact's criteria need to be reviewed in order to prepare the ground for the future single currency. In this uncertain economic context, where the combined effect of the reduction in budgetary resources and the increase in expenditure to meet these resources is weighing on public finances, the question of re-evaluating the criteria linked to a balanced budget arises acutely.

This article is part of a series that aims to provide empirical evidence on whether the convergence criterion limiting the overall budget deficit (including grants) to 3% of GDP should be revised. Referring to Buti et al. (2002), it is clear that budget deficit norms are indispensable criteria for economic convergence in regional processes. Compliance with this criterion not only fosters economic convergence, but also has the potential to create more fiscal discipline (Manasse, 2005; Buti et al., 2002) to increase the resilience of countries and allow fiscal policy to support economic growth (Amadou & and Kebalo, 2019; Adam & Bevan, 2005). In addition, compliance with the convergence criterion limiting the budget deficit to 3% of GDP helps to bring economic cycles closer together. Better budgetary discipline through compliance with the budget deficit limit is conducive to better synchronisation of economic cycles with a view to the introduction of a single currency. The work of Agnello et al. (2013) shows that synchronized fiscal consolidation programs (stimuli) carried out simultaneously by different countries help to bring their economic cycles closer together. The empirical analysis is based on data from the fifteen countries in the SADC region and covers the period 2000-2019. The results of this empirical investigation, using non-linear approach (Hansen, 1999) reveal that the budget deficit threshold that must not be exceeded to sustain growth and whose observance is conducive to the convergence of cycles (an essential condition for the launch of the single currency or the establishment of the monetary zone) is 10.92% of GDP, within a range of [10.89; 10.98]. Consequently, the convergence criterion of limiting budget deficits to 3% of GDP is not optimal for accelerating the coordinated pace of economic cycles in the region.

However, the results also shows that since the start of public debt relief in the SADC region in 2006 (a period when SADC countries were substantially reducing debt), the budget deficit must not exceed the threshold of 5.58% of GDP in the range [5.48; 5.98]. Consequently, notwithstanding the draconian nature of the convergence standard in force in the SADC region with regard to fiscal discipline, the current threshold for the budget deficit not to be exceeded could be adjusted to 5.58% of GDP in the light of recent developments and the challenges facing the region's economies. Indeed, compliance by the countries with this new (estimated) threshold would have the following advantages 1) firstly, revitalizing (accelerating) the process of synchronization of cycles between the economies of the region, 2) secondly, on the basis of the current Community framework, the Member States can use the additional margin of 2.58% of GDP to finance more economic activities, the fight against terrorism, economic transformation, the response to Covid-19, environmental protection and human capital. This realignment of the convergence criteria linked to budget deficits would help to streng-

then the economic viability necessary for the creation of monetary union.

Apart from the introduction, the rest of the paper is as follows. Section 2 briefly reviews the literature on the problems analyzed. Section 3 presents some typical facts needed for the study. Section 4 presents the empirical methodology and data. Section 5 presents and discusses the results. The conclusion is given in section 6.

2. Review of Related Literature

According to the literature, limiting the public deficit to a given threshold is the most fundamental criterion of the various existing convergence pacts and is necessary for monetary integration Buti et al. (2002). However, a review of the empirical literature on the issue of not exceeding the deficit threshold is still recent and sparse. In fact, most of the works listed in this note concern the West African Economic and Monetary Union and ECOWAS zones, which are monetary union projects in Africa that are nearing completion. Amadou and Kebalo (2019) address the problem of limiting the threshold of public deficit not to be exceeded in order to facilitate the introduction of a single currency in the Economic Community of West African States (ECOWAS). Using a non-linear panel data this study assesses the validity of the (current) threshold while determining the public deficit threshold that must not be exceeded for fiscal policy to have a positive effect on economic growth. The results of this empirical investigation reveal that over the decade 2007-2016, this threshold is estimated at 4.74% of GDP. Furthermore, the authors argue that the proposed convergence criterion of 3% of GDP is pro-growth but can be revised upwards to exploit the additional room for manoeuvre provided by the new estimated threshold. This margin could obviously be used to support economic growth and strengthen the resilience of the zone's various economies. The analysis also reveals that only four ECOWAS countries are on track to meet the proposed budget criterion in the future, and are therefore taking an important step towards adopting the future currency. However, the other countries in the region must carry out major budget consolidation operations before they can hope to adopt the single currency on the basis of budgetary discipline.

Kebalo and Zouri (2022), working on the same issue for the WAEMU zone, use Hansen's (1999) model to estimate the budget deficit threshold that maximizes economic growth and whose observance by countries is conducive to the convergence of economic cycles. The results of this analysis, which covers the 8 EU countries over the period 1990-2018, show that the budget deficit threshold that should not be exceeded in order to support growth and whose observance is favourable to the alignment of cycles is 11.42% of GDP. The study also concludes that the criterion for the budget balance prevailing in the region could be adjusted to 4% of GDP, to enable the various economies in the region to accelerate the pace of convergence of their economies. The work by Alagidede, Mensah and Ibrahim (2018) on the effects on growth of a budget deficit in Ghana over the period 1967-2013, using the Hansen (1999) model, finds an optimal budget deficit threshold of 7.6% of GDP. As Ghana is a member of the future ECOWAS

monetary zone, these results call for a revision of the convergence criterion relating to the budget balance for countries in the zone, with a view to accelerating the process of synchronization of cycles and convergence of the region's economies. Barcola and Kebalo (2018) tested the validity of the 5% inflation threshold, proposed as a convergence criterion for the 15 countries in the region that are to form a monetary union by 2020 in West Africa. Adopting a non-linear approach over the period 2007-2016, the results of this study reveal that there are two (02) endogenous inflation thresholds, estimated at 8.01% and 15.46% for West Africa. These results therefore invalidate the 5% inflation threshold proposed as a convergence criterion to support economic growth in the future monetary zone. For a successful monetary union, it would be preferable to define an inflation threshold of between 8.01% and 15.46% as a convergence criterion.

Léleng Kebalo (2019) shows that the desynchronization of economic cycles as a result of fiscal divergence is counterproductive for the viability of the future ECOWAS monetary union. Using a gravity model based on the double least squares method, the author analyses the effect of fiscal divergences between West African countries on the synchronization of their economic cycles (an essential condition for the establishment of the single currency). The results of this empirical verification show that a 1% increase in fiscal divergence is associated on average with a 0.105% reduction in business cycle coherence, or that a 1% decrease in fiscal divergence is associated on average with a 0.105% improvement in business cycle coherence. As a result, these fiscal divergences could be detrimental to the viability of the future regional monetary union. Onwioduokit (2012) determines the relationship between budget deficits and economic growth in Guinea and finds the budget deficit threshold conducive to growth in order to suggest a revision of the budget deficit threshold in the WAEMU zone. The empirical results indicate that there is a positive relationship between budget deficits and economic growth in Guinea and that the budget deficit threshold conducive to economic growth for Guinea has been identified at 3.0%. Indeed, this threshold, which corresponds to the convergence criterion relating to the budget balance of the WAEMU convergence pact, suggests that the Guinean authorities should endeavor to implement policy measures aimed at reducing budget deficits to levels of 3.0% or less in order to accelerate the process of synchronization of the economies. Seleteng et al. (2013) examine the budget deficit-growth link in the Southern African Development Community (SADC) region, using Panel smooth transition regression (PSTR) to endogenously determine the pro-growth inflation threshold. The results of this empirical analysis, covering the period 1980-2008, reveal a threshold level of 18.9%, above which inflation is detrimental to economic growth in the SADC region. These results imply that the criterion relating to the budget balance contained in the SADC zone's stability pact needs to be reconsidered.

Adam and Bevan (2005) find evidence of a threshold effect at a public deficit level of around 1.5% of GDP. Thus, when this public deficit threshold is not exceeded, expansionary fiscal policy has a positive effect on economic growth (the

deficit threshold is pro-growth). The magnitude of this positive effect necessarily depends on how the deficit is financed and how changes in the deficit are taken into account in the budget. On the other hand, when the public deficit threshold of 1.5% of GDP is exceeded, expansionary fiscal policy has a negative effect on economic growth. Onwioduokit (2012) analyses the relationship between fiscal policy and economic growth in the countries of the West African Monetary Zone (WAMZ). He sets out to determine the public deficit threshold that should not be exceeded and that is compatible with economic growth in the countries of the West African monetary zone. Empirical results indicate that fiscal policy has a positive effect on economic growth when a country's public deficit does not exceed 5% of GDP. Consequently, the public deficit criterion within the WAMZ, set at 4%, can be maintained, as this level is within the acceptable range of the 5% deficit identified. Salma et al. (2016), for a panel of 40 developing countries covering the period 1990-2012, find, unlike Adam and Bevan (2005) and Onwi-oduokit (2012), a public deficit threshold of around 4.8% of GDP and a budget surplus threshold of 3.2% of GDP. They therefore find that public spending has a negative impact on economic growth above these two thresholds. In the opposite case, the effect of fiscal policy on economic growth is positive. Overall, it emerges from this brief review of the literature that most of the studies tackling the issue under analysis have used the model of Hansen (1999). They generally conclude that the budget deficit thresholds used as convergence criteria in the various stability pacts are pro-growth but sub-optimal in terms of the pace of synchronization of economic cycles.

This study is intended to be innovative in that it makes a substantial contribution to the scant and less recent empirical literature on the analysis of the budget deficit threshold that must not be exceeded in order for fiscal policy to have a positive effect on economic growth in the SADC region.

3. Some Stylized Facts on the Evolution of the Budget Balance in the SADC Region

Three main lessons and two trends can be drawn from Figure 1, which shows the evolution of budget balances in the SADC region: Firstly, countries in the SADC region consistently run budget deficits, with very few periods of surplus. These economies face challenges in terms of revenue mobilization, fraudulent activities and tax evasion, resulting in expenditure that exceeds revenue. Secondly, the introduction and strengthening of the convergence pact is the result of the lack of a culture of budgetary discipline in the Member States and the failure to comply with the primary and secondary standards of the convergence pact, with the exception of that relating to inflation. On the whole, most countries in the region are finding it difficult to comply with the budgetary convergence criterion concerning the overall budget deficit, including other aspects. Finally, an analysis of Figure 1 shows that the majority of countries in the region made fiscal consolidation efforts before their debt was cancelled in 2006 under the IMF's Heavily Indebted Poor Countries Initiative. For most countries, budg-

et balances improved. However, after 2006, the majority of countries in the region experienced a deterioration in their budget balances due to the use of fiscal space resulting from the reduction in funding for major infrastructure projects.
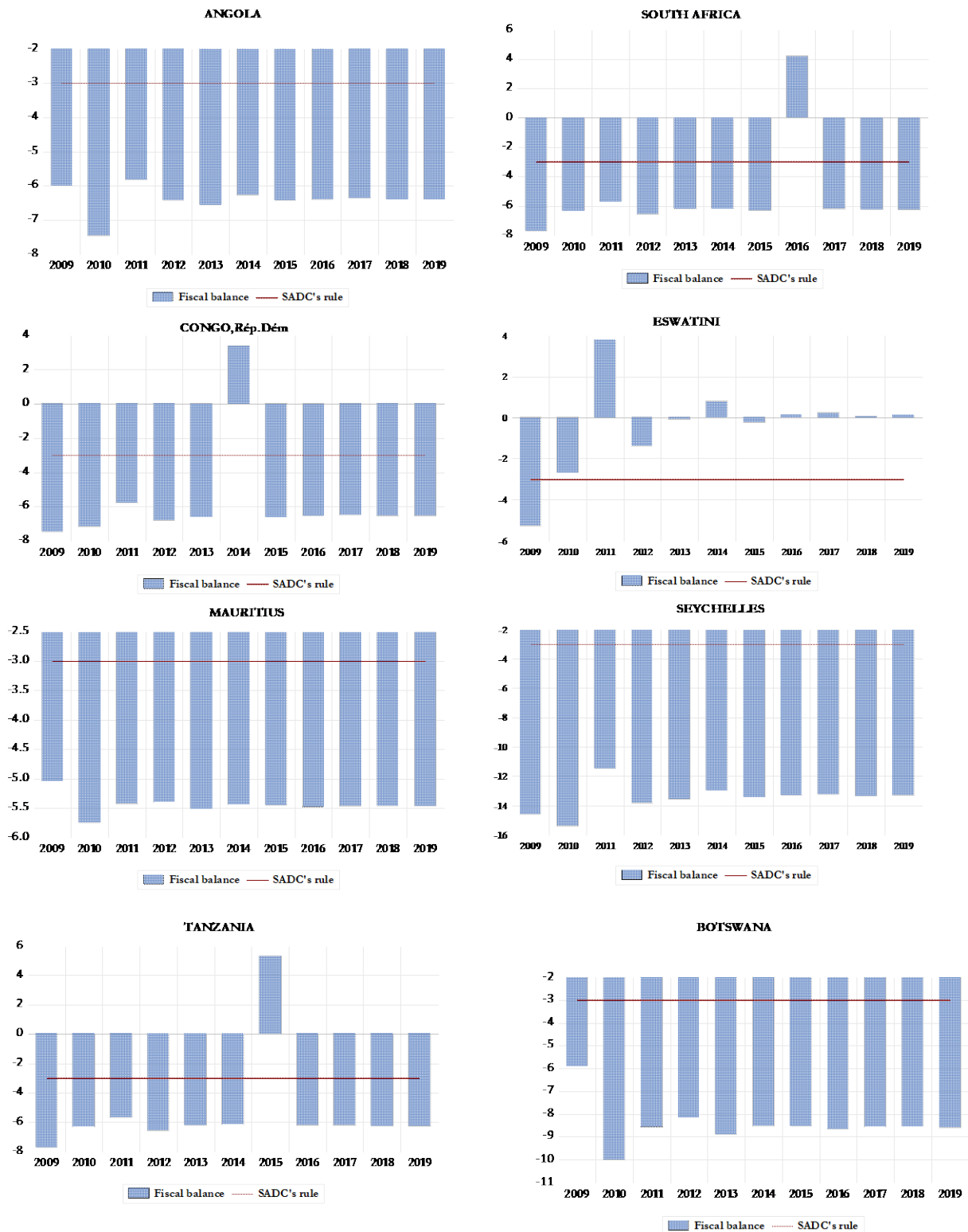

Figure 1. Evolution of fiscal balance for some SADC's countries (during 2009-2019).

4. Methodology

The panel threshold model introduced by Hansen (1999) is used to determine the endogenous budget deficit threshold that maximizes economic growth for synchronization of economic cycles (a necessary condition for future monetary union) within SADC. There are four reasons for choosing this approach. Firstly, according to the economic literature, the approach proposed by Hansen (1999) allows non-linearity in a relationship and/or temporal heterogeneity and instability of slope coefficients to be taken into account. This approach is considered to be a regime-switching model because it can be used to model situations where the economic relationship between two variables changes from one regime to another, depending on an endogenously estimated threshold (Fouquau, 2008). Secondly, the thresholds estimated using this technique better reflect economic realities while taking into account temporal and individual dimensions (Ndoricimpa, 2017; Alagidede et al., 2018). Thirdly, the approach proposed by Hansen (1999) can be used in various fields to estimate thresholds. Hansen initially used it to describe the non-linear relationship between firms' investment behavior and the financial constraints they face. Hurlin (2005) applies this approach to highlight network effects in the analysis of infrastructure productivity via threshold effects, while Savvides and Stengos (2000) adopt it to represent the Kuznets curve linking inequality to economic development. Fourthly, this approach develops an analysis based on disaggregated data, which provides a better understanding of economic dynamics and individual heterogeneities (Canry et al., 2007).

The empirical model proposed by Hansen (1999) is as follows:

$$Y_{i,t} = \mu_i + \beta_1 X_{i,t} \Pi \left(q_{i,t} \leq \gamma_1 \right) + \beta_2 X_{i,t} \Pi \left(\gamma_1 < q_{i,t} \leq \gamma_2 \right) + \cdots + \beta_r X_{i,t} \left(\gamma_r < q_{i,t} \right) + \varepsilon_{i,t} \quad (1)$$

With $\gamma_1 < \gamma_2 < \cdots < \gamma_r$, $q_{i,t}$ the transition variable the number of thresholds, $\gamma_1, \gamma_2, \cdots, \gamma_r$ the different thresholds, $Y_{i,t}$ the dependent variable, $X_{i,t}$ the independent variable, $\Pi(.)$ the independent variable, μ_i the fixed effects and $\beta_1, \beta_2, \cdots, \beta_r$ the model parameters. The endogenous variable is the economic growth rate of real GDP of SADC countries (Y). The overall budget deficit including grants (DB) is both the variable of interest and the transition variable. With reference to the economic literature and given the availability of data, a number of control variables will be mobilized. Indeed, the economic literature shows that there are several factors that can influence the economic growth of a geographical entity. Four control variables will be used in this empirical investigation. 1) Gross Capital Formation (GFCF). Gross capital formation has a positive impact on economic growth. 2) Trade openness (TO): the impact of trade openness on a country's economic growth has been the subject of much research, with studies suggesting a positive correlation (Zahonogo, 2017). According to Nordås (2019), more outward-looking economies tend to experience higher levels of growth than closed economies. In this study, trade openness is measured by total traded goods as a percentage of gross domestic product, following the approach adopted by Zahonogo (2017). 3) The population growth

rate (POP): the size of the population (especially a skilled workforce) could have a positive effect on economic growth (Zahonogo, 2017; Amadou & Kebalo, 2019). Furthermore, in the ECOWAS context, Agbékponou and Kebalo (2019) find that population growth helps to sustain economic growth via the demand channel. 4) A dummy variable which takes the value 1 when the countries in the zone have a budget deficit including grants ≤ 3% of GDP and 0 otherwise. This dummy variable is used to measure the effect on economic growth of a country with an overall budget balance including grants (as a % of GDP) ≤ 3% of GDP. In concrete terms, panel data estimation techniques will also be used to demonstrate that countries that meet the fiscal convergence criterion limiting the budget deficit to a certain threshold tend to have synchronous economic cycles. To do this, a fixed-effects model (within estimator) will be used. In the light of recent literature (Cesa-Bianchi et al., 2019; Kalemli-Ozcan et al., 2013; Zouri, 2020), business cycle synchronization will be defined as follows:

$$S_{ij,t} = -\left|G_{i,t} - G_{j,t}\right| \tag{2}$$

where $G_{i,t}$ et $G_{j,t}$ represent the growth rates of real GDP per capita at time t of countries i and j respectively. The definition is such that $S_{ij,t}$ increases as a function of the degree of synchronization with negative values close to zero between countries with synchronized cycles. In order to analyze the relationship between compliance with the budgetary convergence threshold and the synchronization of economic cycles, we estimate the following equation:

$$S_{ij,t} = \alpha_{ij} + \gamma_t + \beta_t * DDB_{ij,t} + \beta_2 + IC_{ij,t} + \beta_t + CF_{ij,t} + \eta_{ij,t}, \tag{3}$$

where γ_t represent time fixed effects that capture global shocks that affect countries in the same way. Compared to the literature (Baxter and Kouparitsas, 2005; Frankel & Rose, 1998; Tapsoba, 2009), we introduce α_{ij} in order to take into account the specific characteristics of each pair i, j. $DDB_{ij,t}$ is the variable of interest that takes the value 1 if the pair of countries i, j at date t respect the budget deficit to GDP ratio ≥ the estimated threshold and 0 otherwise. As a robustness check, it will be verified whether having an overall budget deficit to GDP ratio (including grants) ≤ 3% as defined in the current SADC convergence pact, also contributes to cycle matching. The control variables IC and CF represent bilateral trade and fiscal convergence respectively. CF is defined on the basis of the absolute public spending differential between two economies i and j relative to their GDPs (Gammadigbe et al., 2018; Mpatswe et al., 2011). Following Kalemli-Ozcan et al. (2013), we retain a lag of order 1 in fiscal convergence in order to account for potential endogeneity issues. IC is defined as the ratio of bilateral trade between two economies i and j to the sum of their total trade (Baxter and Kouparitsas, 2005; Frankel and Rose, 1998; Tapsoba, 2009).

Given the possible endogeneity of bilateral trade, the "bilateral trade" variable is instrumented by bilateral trade costs following the work of Egger et al., (2019) and Zouri (2020). In order to consolidate the results obtained, another estimation technique will be used to analyse the link between having a budget balance ≤3% of GDP and the synchronisation of cycles. The dynamic panel Generalised

Method of Moments (GMM) will be used as it provides solutions to the problems of simultaneity bias, reverse causality and omitted variables. In addition, the GMM method provides the results of Hansen's over-identification test and Arellano and Bond's (1991) error autocorrelation test, which respectively test the validity of the lagged variables as instruments and the null hypothesis of the absence of second-order error autocorrelation in the difference equation. Based on the work of Blundell and Bond (1998), the GMM system estimator is suitable for this analysis[2].

The data used comes mainly from the World Bank database (WDI) for GDP per capita (in constant 2010 dollars). Data on bilateral exports and imports, total exports (respectively total imports) to the rest of the world (respectively from the rest of the world) come from the Trade Statistics Division of the International Monetary Fund (IMF). Finally, the data on fiscal balances and public expenditure come from the SADC database. This empirical analysis covers the fifteen SADC countries over the period 2000-2019. Given the unavailability of certain statistics, the panel data is non-cylindrical, so the heteroscedasticity is removed by the cluster technique (Table A1).

5. Empirical Results

- Unit root test

Before estimating the model, it is advisable to carry out the panel data unit root tests of Im et al. (2003) and Levin et al. (2002) on the variables selected, with the exception of the dummy variable. The results of these tests are shown in Table 1 and indicate that all the variables are stationary of order 1.

Table 1. Results of the unit root test.

Variables	IPS	LLC
GDP	−6.891	−4.4567
	(0.0000)	(0.0001)
SB	−5.4590	−3.0389
	(0.0000)	(0.0012)
FCBF	−3.0356	−1.7665
	(0.0000)	(0.0678)
TO	−2.0340	−5.7891
	(0.0509)	(0.0000)
POP	−2.4981	−7.6513
	(0.0081)	(0.0000)

The values in brackets are the probabilities associated with the test statistics. IPS (Im, Pesaran and Shin, 2003) and LLC (Levin, Lin and Chu, 2002). The null hypothesis of two tests is the presence of a unit root.

[2]The instrumentation method differs according to the nature of the explanatory variables: 1) for purely exogenous variables, current variables are used as instruments; 2) for weakly exogenous variables, values lagged by at least one period are used as instruments; 3) for endogenous variables, values lagged by two or more periods can be used as valid instruments.

• Linearity test

The linearity test is recommended for a better specification of the model. The results reveal the existence of a marked non-linear structure with two regimes and an endogenous threshold estimated at 10.92% of GDP and significant at the 5% level (Table 2).

As a result, the estimated model is as follows:

$$Y_{i,t} = \mu_i + \vartheta_1 SB_{i,t} \Pi\left(SB_{i,t} \le \delta\right) + \vartheta_2 SB_{i,t} \Pi\left(SB_{i,t} > \delta\right) + \Gamma' N_{i,t} + \varepsilon_{i,t} \qquad (5)$$

$N_{i,t}$ is the vector of exogenous variables containing GFCF, TO, POP and Dummy.

The results (Table 3) of the estimates reveal the following facts: On the face of it, gross capital formation (GFCF) and trade openness (TO) have a positive effect on economic growth in SADC countries. These results corroborate those found by Zahonogo (2017) and Amadou and Kebalo (2019) working on UEMOA. Secondly, the results show that population growth (POP) in SADC has no effect on economic growth. Finally, with regard to the non-linear relationship between the overall budget deficit and economic growth, these estimates show that when the overall budget deficit does not exceed 10.92% of GDP, lax or expansionary fiscal policy has a positive effect on economic growth within the zone. On the other hand, when the overall budget deficit exceeds 10.92% of GDP, expansionary fiscal policy has no effect on economic growth. Consequently, the convergence standard for the budget deficit, including grants of 3% of GDP, is proving to be sub-optimal for accelerating the pace of convergence of economic cycles within the zone. These results call on the leaders of the zone to consider revising the convergence pact with regard to the budget deficit criterion.

• Synchronization of cycles within SADC

The aim is to provide a theoretical (economic) basis for compliance with the various thresholds selected (Table 4).

The results of the estimates shown in the table above reveal that (Table 4), with several degrees of robustness, a pair of SADC countries with budget deficits of less than or equal to 10.92% of GDP at the same period, or within the confidence interval [10.89 to 10.98], tend to see their economic cycles converge over time. On the other hand, when the zone's economies post budget deficits exceeding (or below) 10.92% of GDP, this obstructs the process of convergence of economic cycles, increasing structural disparities between countries in the region. Thus, for the SADC countries, compliance with the budget deficit threshold of 10.92% of GDP has a positive effect on economic growth and helps to bring economic cycles closer together, especially as the economic literature (Manasse, 2005; Buti et al., 2002) indicates that the desynchronization of economic cycles is counter-productive for the viability of monetary unions.

In fact, the estimated endogenous budget deficit threshold that should not be exceeded and that maximizes economic growth is 10.92% of GDP over the entire

forecast period. When compared with the convergence criterion for the overall budget balance in force in the region (budget deficit ≤3% of GDP), this new estimated endogenous threshold offers a margin that can be exploited to support economic growth through expansionary fiscal policies and accelerate the convergence of the economic cycles of the SADC economies. In the context of the future SADC currency, the standard of 3% of GDP could be progressively adjusted in order to reach the estimated endogenous threshold (10.92%) within a reasonable timeframe. This gradual revision of the standard can be explained insofar as the transition from a standard of 3% of GDP to 10.92% of GDP seems too great and could have serious economic and political implications. Furthermore, in the event of an adjustment, it is desirable for this new standard to reflect the current economic realities and challenges of the SADC countries. To this end, an estimate highlighting the recent period is necessary. Such an exercise is justified by the change in budget balance behaviour (between 2000-2005 and 2006-2019.

Table 2. Linearity test.

Number	Threshold	RSS	MSE	F-Stat	Prob
1	−10.92	4891.45	24.560	11.45	0.039

Bootstrap = 400; RSS: Residual Sum of Squares; MSE: Mean Square Error; F-stat: Fisher statistic.

Table 3. Result of the non-linear impact of the budget balance on economic activity.

Variables	Coefficients
TO	0.0169***
	(2.91)
FCBCF	0.9805***
	(5.33)
POP	1.5699***
	(00.67)
Dummy	0.7889***
	(4.65)
SB ≥ δ	0.119**
	(1.94)
Constant	−2.2059**
	(−2.23)
Threshold	δ*** = −10.92
CI (δ)	[−10.98; −10.89]
R^2	0.7880
F−stat	14.98
Number of countries	12
Obs.	120

Values in brackets (.) represent t-statistics. ***, ** and * indicate rejection of the null hypothesis of non-significance of coefficient at the 1%, 5% and 10% thresholds.CI: confidence interval.

Table 4. Synchronization of economic cycles/Whether or not the estimated threshold is met.

Variables	Compliance with estimated threshold SB ≥ −10.92% of GDP		Non-compliance with estimated threshold SB < −10.92% of GDP	
	Estimator within	Estimator GMM in system	Estimator within	Estimator GMM in system
$DDB_{i,t}$	**4.23*****	**11.5*****	**0.65**	**99.19**
	(0.76)	(6.08)	(0.76)	(89.43)
$IC_{ij,t}$	28.34***	14.12	26.88**	−14.88
	(5.79)	(40.54)	(6.57)	(30.07)
$CF_{ij,t-1}$	12.89*	−2.67	17.45**	−21.71
	(5.67)	(25.98)	(9.34)	(13.61)
$S_{ij,t-1}$		0.01		0.08
		(0.06)		(0.05)
Observations	285	285	285	283
Country peers	16	16	16	17
R^2 (within)	0.3468		0.2965	
Estimation using the instrumental variables method				
Exogenous variables	$IC_{ij,t}$		$IC_{ij,t}$	
ξ_{ijt}	16.34***		16.33***	
	(0.87)		(0.65)	
$DDB_{i,t}$	−0.0007		0.005***	
	(0.004)		(0.002)	
$CF_{ij,t-1}$	−0.03		−0.03	
	(0.01)		(0.01)	
Generalized Method of Moments (GMM)				
AR (2)	0.08		−074	
	[0.77]		[0.301]	
Hansen Test (exogenous instruments)	21		9.02	
	[0.13]		[0.12]	
Number of instruments	34		18	
F-stat	26.32		33.67	

ξ_{ijt}: represents the costs of bilateral trade [.] p value; (.) robust standard deviation; ***$p <$ 0.01;**$p <$ 0.05; *$p <$ 0.1.

The result in Table 5 confirms the existence of a non-linear relationship between the overall budget balance and economic growth, characterized by a threshold that varies according to the sub-sample. The estimated threshold is 10.92% of GDP for the 2000-2005 sub-sample and 5.58% of GDP for the 2006-2019 sub-period. Furthermore, the result shown in Table 6 indicates that regardless of the sub-sample, when the position of the overall budget deficit is less than or equal to the estimated threshold, fiscal policy has a positive effect on economic growth within the zone. However, when the position of the overall budget deficit is above the estimated threshold, fiscal policy has a negative effect on economic growth in the first sub-period, but no effect in the more recent period.

Table 5. Linearity test.

	Number	Threshold	RSS	MSE	F-Stat	Prob
2000-2005	1	−10.92	4383.45	26.560	9.45	0.042
2006-2019	1	−5.58	349.19	4.891	11.02	0.030

Bootstrap = 400; RSS: Residual Sum of Squares; MSE: Mean Square Error; F-stat: Fisher statistic.

Table 6. Result of the non-linear effect of the budget balance on economic growth.

	2000-2005	2006-2019
Variables	Coefficients	Coefficients
TO	0.123***	0.006
	(2.61)	(0.16)
FBCF	0.114*	0.241***
	(1.86)	(4.80)
POP	2.23	2.569
	(1.67)	(1.78)
Dummy	2.7569*	0.104*
	(1.65)	(1.23)
$SB \geq \delta$	0.096**	0.121**
	(1.94)	(2.41)
Constant	−13.205**	−8.221
	(−2.23)	(−1.98)
Threshold	$\delta^{***} = -10.32$	$\delta^{***} = -5.58$
IC (δ)	[−10.98; −10.89]	[−5.48; −5.98]
R^2	0.6880	0.5725
F-stat	4.98	5.34
Number of countries	15	15
Observations	75	195

Values in brackets (.) represent t-statistics. ***, ** and * indicate rejection of the null hypothesis of non-significance of coefficient at the 1%, 5% and 10% thresholds. CI: confidence interval.

6. Conclusion

In the context of the introduction of the future SADC single currency, this study tests the validity of the current budget deficit threshold (3% of GDP) and estimates, using Hansen's (1999) non-linear approach, the budget deficit threshold that maximizes economic growth and whose observance by countries makes it possible to strengthen the synchronization of economic cycles. The results of this analysis reveal that the budget deficit threshold that should not be exceeded to support growth and whose observance is favorable to the synchronization of cycles is 10.92% of GDP, within a range from 10.89 to 10.98, over the entire estimation period. Furthermore, the results show that the estimated threshold of 10.92% of GDP over the whole period was more influenced by the dynamics of the relationship between the budget balance and economic growth before the

start of debt relief, through the Heavily Indebted Poor Countries initiative, in 2006. To do this, by dividing the sample from 2006, the period of substantial debt reduction for countries in the SADC zone, the budget deficit threshold not to be exceeded is 5.58% of GDP (budget deficit ≤5.58% of GDP). The current convergence criterion (3% of GDP) therefore seems rigorous and restrictive in terms of budgetary discipline, and could therefore be adjusted to 5.58% of GDP.

The study therefore recommends that the countries in the region exploit the additional margin of 2.58% of GDP to finance the challenges they face, in particular: the fight against terrorism, economic transformation, the fight against Covid-19 and human capital. In addition, this analysis also suggests that most of the countries in the zone will have to make enormous efforts to consolidate their budgets if they want to join the future monetary union and adopt the future single currency.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Appendix

Table A1. Descriptive statistics.

Variables	Obs	Mean	Std. Dev	Min	Max
GDP	208	7391.669	7375.45	817.334	29736.37
SB	208	−3.071558	3.895892	−16.544	10.488
POP	208	19.96375	22.80729	0.087	93.751
TO	208	10.90954	11.3961	0.0805	53.2525
FCBF	208	846.0745	2269.261	−7397	9282