Fiscal Deficit and Its Effects on Economic Growth: Empirical Evidence

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Abstract- ***The aim of this article is to show the effect of the budget deficit on the dynamics of middle-income economies. We have applied a dynamic model on panel data with threshold effect estimation. To achieve this, we estimated the said model using the system generalized method of moments (GMM). The results of the linear model reveal that an increase in the budget deficit has a negative impact on economic dynamics, measured by the output gap with a coefficient of 0.2%. On the other hand, the results of the non-linear model enable us to determine the optimal budget deficit threshold, which has a positive impact on economic activity in these economies, at around 3.5% of GDP. These results imply that policy-makers should apply revenue rules that are generally associated with principles for the allocation of unplanned additional tax revenues, known as growth dividends. They are based on the idea that these dividends should not be used to finance additional public spending, but to reduce the budget deficit.***

Indexed Terms- ***Budget Deficit, GMM in System, Non-Linear Model, Growth***

I. INTRODUCTION

The nature of the relationship between budget deficits and economic growth has gained considerable prominence in recent years, both in terms of the number of theoretical and empirical studies to which it has given rise, and the importance of its implications for economic policy. Contradictory arguments concerning the sign of the relationship between budget deficits and economic growth have helped to reopen the debate on the effectiveness of fiscal policy.

Fiscal policy has long been an instrument of economic policy. Keynesian theory states that it can stimulate economic activity and revive a stagnant economy through increased public spending. Classical (neo-liberal) economists, on the other hand, suggest that an expansionary fiscal policy has no positive effect on economic activity. According to the theory of rational expectations, agents anticipate the taxes they will have to pay in the future, leading to a fall in demand and supply, and consequently a slowdown in economic activity.

Today, the evolution of budget deficits and their macroeconomic impact remains a major concern for most developing countries. Recourse to external financing to finance deficits is becoming less and less desirable. This is particularly true given the problems of over-indebtedness and public debt sustainability currently observed in developing countries. It is therefore necessary to reform public finance management by implementing appropriate new development strategies and policies, hence the notion of good governance.

From the 2000s onwards, empirical work began to investigate the existence of a non-linear relationship between budget deficits and economic growth [Adam and Bevan (2005), Minea and Villieu (2008), Tanimoune, Combes and Plane (2008)]. These studies demonstrate the existence of anti-Keynesian effects associated with high budget deficits. Our research converges with these aforementioned works in the non-linearity hypothesis of the relationship studied.

In fact, although the theoretical literature on this subject is well established, the empirical evidence is mixed and does not converge on a consensus on the real effects of deficits on economic performance. With a few notable exceptions, most economists believe that rising deficits hinder economic growth and national welfare. This motivated us to carry out an empirical analysis on a panel of 52 developing countries, including Morocco, to determine the optimal budget

deficit threshold for maintaining economic activity in developing countries. In addition, we propose an analysis of the Moroccan economic context, to then see the position of the deficits recorded in Morocco in relation to this threshold. This analysis can be applied to any country in the sample.

So, first, using a linear specification, we'll investigate the nature of the relationship between budget deficit and economic growth. Then, using a quadratic specification and assuming that the relationship is non-linear, we will test for the existence of an optimal budget deficit threshold. Determining an optimal threshold will enable us to visualize the behavior of Moroccan economic growth in the face of variations in the budget deficit.

In this work, we have adopted a dynamic panel model in which GDP/head growth, an indicator of economic activity, is the endogenous variable, while the general budget deficit, an instrument of fiscal policy, is our key variable. Other indicators will represent control variables: national investment, the inflation rate, trade openness, government expenditure, the logarithm of the initial level of per capita income lagged by one period, and the population growth rate. The study covers the period 1990-2020.

The remainder of this article is organized as follows: the first section will review theoretical and empirical contributions on the subject. While the second section will present the methodology, the estimation results and an analysis of the Moroccan economic context on the basis of the optimal deficit threshold obtained. A third and final section will be devoted to our conclusions**.**

II. LITERATURE REVIEW

The relationship between the budget deficit and macroeconomic variables such as economic growth, inflation, the current account balance, the exchange rate, the interest rate, etc. has deep roots and a long history in economic thought and in debates on the effectiveness of fiscal policy. It represents one of the most widely debated topics among economists and economic policy-makers in both developed and developing countries. The aim of this chapter is to review the abundant literature on the relationship between budget deficits and economic growth, focusing on both theoretical debate and empirical work.

1. Theoretical framework: Budget deficit and economic activity

The aim of this section is to examine some theoretical arguments concerning the link between budget deficits and economic growth. Within the major macroeconomic theories, there are three theories examining this complex relationship. These are Keynesian theory, neo-classical theory and Ricardian equivalence theory.

Keynes advocated state intervention in the economy, which, by increasing public spending, would encourage a return to economic growth. This public stimulus was achieved by implementing an expansionary fiscal policy, which led to the emergence of a public deficit.

Since the 1973 oil crisis, neoclassical theorists have emphasized the limits of fiscal policy and, in particular, the harmful effects of deficits and public debt on economic activity. For them, fiscal policy is never effective, and only leads to higher debt. There are two reasons for this: firstly, future tax increases are expected, so the rise in private savings cancels out the effects of public spending. The second argument is the crowding-out effect: public debt pushes up interest rates, which in turn depresses private investment.

Ricaradian equivalence (1974), challenges the conventional approach to public debt, according to which, when the state cuts taxes and incurs a budget deficit, consumers react to their increased after-tax income by spending more. She considers that consumers are forward-looking and therefore base their spending not only on their current income, but also on their expected future income.

One of the main macroeconomic principles is that fiscal policy can be used to stimulate aggregate demand and revive a stagnant economy. On the other hand, a growing number of studies, mainly focusing on industrialized countries such as the OECD, suggest that an expansionary fiscal policy is not always enough to pull an economy out of recession. In particular, when public indebtedness is already high,

an increase in the budget deficit may lead to a fall in private investment and consumption, thereby cancelling out the effect of higher public spending or tax relief on aggregate demand.

From the point of view of endogenous growth models, according to Barro (1990), increasing productive public spending will increase growth. However, R. Barro's (1974) Ricardian equivalence principle rejected such a proposal outright, arguing that the result is merely a transfer of taxes to the future.

B.Douglas Bernheim, in his article "A Neoclassical Perspective on Budget Deficits" (1989), suggests focusing on the objectives of stimulating savings and capital accumulation, and formulating a policy of gradually reducing permanent deficits. Deficits lead to a long-term reduction in national savings. They therefore tend to lower accumulation and consequently economic growth.

According to Barth et al (1986), as long as the growth rate of output exceeds the interest rate, public debt will be eliminated without any problem. This is because future taxes are not needed to cover debt servicing. Economic growth can accommodate budget deficits without compromising the economy's tax-raising capacity. Furthermore, Aschauer (1985) argues that public spending of all kinds can affect employment, production, consumption and investment by modifying wealth or directly affecting the marginal productivity of labor and private capital. He also pointed out that the negative wealth effect associated with a temporary increase in public spending induces the agent to reduce consumption and increase labor supply.

Research evidence on the relationship between budget deficit and economic growth is in mixed form. The work of Al-Khedar (1996) investigated the relationship between the budget deficit and key macroeconomic variables in major industrialized countries. He found that the deficit negatively affects the trade balance. However, the budget deficit has a positive and significant impact on economic growth. In contrast, Lucas and Sargent (1981) focused on rational expectations and economic practices, the results revealing that massive government budget deficits and high rates of monetary expansion were not accompanied by economic growth.

Other studies have examined the relationship between economic growth and budget deficits. Other works in this field include studies by Adam and Bevan (2004), Fiani (1991), Brauninger (2002), De Castro (2004), Perotti (2004), Easterly and Schmidt-Hebbel (1993), Mountford and Unilg (2005), and Hsieh and Lai (1994). According to these authors, there is a positive relationship between economic growth and budget deficits. On the other hand, the findings of Gemmel (2001), and M'Amanja and Morrissey (2006) reveal the significant negative effect of budget deficits on economic growth.

III. EMPIRICAL WORK

The relationship between budget deficits and macroeconomic variables has been examined in both developed and developing countries. The aim of this section is to review the empirical work that has linked the budget deficit to economic growth.

The effects of budget deficits on economic growth are well documented in the empirical literature on the subject. However, the empirical literature and the conclusions drawn do not converge on a consensus on the effect of budget deficits on economic growth and national well-being.

In general, a one-size-fits-all approach is that all countries must reduce their deficits, whatever the context. But this is not appropriate. In practice, the heterogeneity of national contexts needs to be taken into account. Indeed, most economically developed countries today have very large public deficits. They have embarked on fiscal policies aimed primarily at reducing these deficits. However, some economists believe that reducing public spending or raising taxes can have negative consequences for economic growth. In a study (1992) on fiscal adjustment in the programs it supports, the IMF concludes that while fiscal policy differs in low-income countries and OECD countries, fiscal adjustment can also stimulate growth in the former. He finds that a 1 point reduction in the budget deficit/GDP ratio leads to an average increase in the per capita GDP growth rate of at least 1/4 point in the countries studied, and it is possible that a reduction in

the average deficit in low-income countries from around 4% to 2% of GDP could accelerate growth by 1/2 or 1 point per year in countries with budgetary problems. The results of the study therefore show that fiscal policy needs to be adapted to the context of each country in order to stimulate growth.

Christopher S. Adam and David L. Bevan (2005) examined the relationship between budget deficits and economic growth for a group of 45 developing countries over the period 1979 - 1999. The aim of the work was to study the nature of the relationship between budget deficits and growth, and to determine the effect of the budget deficit threshold on economic activity, using the regime-switching method of Hansen (1999). They confirmed the existence of a non-linear relationship between budget deficit and growth, and determined a threshold effect at a deficit level of 1.5% of GDP.

Yaya Keho (2010) examined the causal link between budget deficits and economic growth in seven West African countries over the period 1980-2005. The empirical data showed mixed results. In three countries, no causal link was found between budget deficits and economic growth. In the remaining four countries, deficits had negative effects on economic growth.

Nelson and Singh (1994) used data on a cross-section of 70 developing countries over two periods, 1970-1979 and 1980-1989, to study the effect of budget deficits on GDP growth rates. This study concludes that budget deficits had little or no significant effect on economic growth in these countries in the 1970s and 1980s.

Jorge C. Avila (2011) analyzed the relationship between Argentina's budget deficit, macroeconomic uncertainty and economic growth for the period 1915-2006, and concluded that the budget deficit hindered per capita income growth in Argentina through relative price volatility. Lance, Taylor et al (2012) studied the interactions between the primary budget deficit, economic growth and debt for the 1961-20 period in the USA. They found a positive effect on growth of a higher primary deficit, even when the possible increase in the interest rate is taken into account.

Niloy Bose, M Emranul Haque, and Denise R Osborn (2007) examined the effects of public spending on economic growth for a group of 31 developing countries over the decades of the 1970s and 1980s, and found that the share of public investment spending in GDP is positive and significantly correlated with economic growth, but current spending is insignificant.

Alfredo Schclarek (2004) has empirically explored the relationship between debt and growth in a number of developing and industrialized countries. For developing countries, the study revealed that lower levels of total public external debt are associated with higher growth rates. For industrialized countries, it found no significant relationship between general government gross debt and economic growth.

Nur Hayati Abd Rahman (2012) studied the relationship between budget deficit and economic growth in the Malaysian economic context, using quarterly data from 2000 to 2011. He found that there is no long-term relationship between budget deficit and economic growth in Malaysia, which is in line with the Ricardian equivalence hypothesis.

The negative impact of budget deficits on long-term growth has been empirically documented in several studies, such as Fischer (1993), Easterly and Rebelo (1993), Bleaney, Gemmell, and Kneller (2001). For example, Brauninger (2002) conducted a study on the interaction of budget deficit, public debt and endogenous growth. The result is that, if the deficit ratio set by the government remains below a critical level, then there are two equilibrium states: capital and public debt grow at the same constant rate, and an increase in the deficit ratio reduces growth rates. Consequently, if the budget deficit ratio exceeds the critical level, then there is no steady state. Capital growth will be reduced to zero over a finite time horizon.

In order to analyze the relationship between fiscal policy and economic growth at TC and LT in a number of MENA countries, namely Morocco, Tunisia and Egypt, Mansouri (2008) uses data covering the period 1970-2002 for Morocco, 1972-2002 for Tunisia and 1975-2002 for Egypt. Using error-correction models, he finds that, in the case of Egypt and Tunisia, public

investment has a positive impact on LT economic growth. In Morocco, the impact is observed at CT. Public current consumption has a negative impact on economic growth in all countries.

Yaya Keho (2010), in their article "spending cuts or tax adjustments: how can UEMOA countries control their budget deficits?", examines the relationship between tax revenue and government spending for seven African countries: Benin, Burkina Faso, Senegal, Nigeria, Cote D'ivoire, Mali and Togo. Specifically, what should be done with spending or tax revenues to achieve permanent reductions in budget deficits, in order to consolidate the budgetary situation in line with the objectives of the convergence pact adopted in 1994. Over the period 1980-2007. Using a 3-stage cointegration approach, the results on the direction of causality support the budgetary synchronization hypothesis for Benin, Burkina Faso, Nigeria and Senegal in the long term. And for Côte d'Ivoire and Mali, in the short and long term. Burkina Faso and Niger are in line with the "tax to spend" hypothesis in the short term, while Senegal and Togo follow a "spend and tax" regime. Burkina Faso, Mali and Niger need to control their budget deficits, and should look for ways to increase their revenues, while economic policymakers in Benin and Senegal should reduce public spending.

Minea and Villieu (2008) with a study covering 19 OECD countries over the period 1978-2005. They propose a theoretical model and an empirical estimate highlighting a non-linear effect between budget deficits and economic growth, depending on the ratio of public debt to GDP. In conclusion, the results confirm that a public deficit would be favorable to economic growth only in low-debt economies, whereas this relationship could be reversed in high-debt economies. Estimation, using Hansen's (1999) method, robustly highlights a threshold exerted by public debt (90%).

Abdullah, H. Habibullah, M.S. and Baharunshah, A.Z. (2009) with a study covering 13 Asian countries over the period 1982-2001. The aim of this study is to examine the effect of fiscal variables on economic growth in Asian economies. Thus, this study aims to fill a gap in research devoted to studying the relationship between fiscal policy and economic growth using dynamic panel data (DPM) methods newly developed by Arellano and Bond (1991) and Blundell and Bond (1998). They found that there is a positive and statistically significant effect of public spending on health and education, total public spending and the sum of other fiscal variables on GDP per capita. As for the other explanatory variables: defense spending, the budget deficit and taxation exert a significant and negative impact on GDP per capita.

The above-mentioned studies present contradictory results, probably due to the rather different data analysis methods used, the generally short observation periods, and the heterogeneous characteristics of each economy.

IV. METHODOLOGY, DATA AND ECONOMETRIC ESTIMATION

After defining the macroeconomic framework of the relationship between the budget deficit and economic growth and situating it in the theoretical and empirical literature, we will present and justify our analytical tools. This will be followed by an explanation of the methodological approach, econometric specifications and estimates, and an interpretation of the results obtained.

1. Methodology

The methodological approach will consist first of all in specifying the model, defining and justifying the variables included in the study, and then explaining the analytical tool used to clarify the relationship between the budget deficit and economic growth from the perspective of the panel under consideration.

a. Model specification:

The aim is to relate the budget deficit to economic growth, as well as to other control variables. Various models have been used in the literature on the impact of the budget deficit on macroeconomic variables, and several model specifications are conceivable. In this research, we are interested in the particular relationship between the independent variable, the general budget deficit, and the dependent variable, GDP/head growth.

The first models of economic growth generated during the neoclassical era incorporated two factors, namely

labor and capital. These models evolved according to the authors, and this gave rise to the debate on the true determinants of economic growth. Short-term economic growth models have moved on since the time of the neoclassicals and Keynes, to long-term models of economic growth by authors such as Barro (1990) (although they had begun with Harrod and Domar).

From the 1980s onwards, a new wave of authors appeared in long-term estimates of economic growth, studying the link between the latter and the budget deficit. It is these authors who will guide us in our choice of econometric model to assess the relationship between budget deficit and economic growth in our sample of developing countries.

Nonetheless, we found a number of works of interest for determining and measuring the link between budget deficits and economic growth. To identify the link between economic growth and the budget deficit, most authors use a model in which economic growth is the dependent variable and the budget deficit is the explanatory variable. Some authors stop their model at this level, while others add certain economic growth control variables (investment, public spending, inflation, labor force, human capital, etc.).

We are inspired by the work of Antonino, Alem H .Y. (2012), Di Andrea F. Presbitero (2006) , Hussin; Muzafar and Ahmad (2009), These authors use the system-GMM estimator and confirm the robustness of the results using other estimators, We formulate in our study, the following dynamic model:

Where:

- Gdpg: is the growth rate of GDP per capita (data in constant 2005 US dollars).
- Lgdp: logarithm of initial GDP/head (data in current U.S. dollars).
- Dcf: government final consumption expenditure/GDP.
- C: degree of openness/GDP.
- Inv: national investment/GDP.
- Defb: budget deficit/GDP ratio.
- Inf: inflation in the economy, calculated on the basis of the consumer price index.
- Popg: is the population growth rate.
- (i, t): the cross-sectional and temporal dimensions of the country panel.
- Ni: country fixed effects.
- Vt: the time effect
- : The term "error".

The expected sign for the various model coefficients :
Gdpg = f (lgdp, do, dcf, inf, inv, defb, popg)
(-) (+/-) (-) (-) (+) (?) (-)

It is assumed that the relationship between budget deficit and economic growth may be non-linear. We estimate a second specification in which the budget deficit square is integrated. The existence of an optimal budget deficit threshold proves this non-linearity. In this case, the model is specified as follows:

With: $Defb^2$ is the ratio of the square budget deficit to GDP.

C. Descriptive statistics and correlations:

Tables (1) and (2) show the descriptive statistics and correlations between the variables and the economic growth rate, respectively. As can be seen, the average economic growth rate of the sample over the study period (1990-2012) is 1.8%; the minimum value of the growth rate is recorded in Hungary (-11.8%, the year 1991), while the maximum is (13%) by St. Vincent and the Grenadines (1997). As far as the budget deficit is concerned, Algeria recorded the lowest value (-13.1%), while the highest value was recorded by Botswana (19.1% in 1990). It can be seen that there is not a great deal of dispersion within the sample, since the standard deviations are generally smaller than their means, except for the inflation rate.

As for the correlation between economic growth and other variables, there is a positive correlation between the growth rate, investment and the degree of openness. Inflation, budget deficit, government spending and population growth, on the other hand, show a negative correlation with the growth rate. The correlation coefficient matrix shows that all variables have a significant correlation coefficient with the GDP/head growth rate, except for the inflation rate.

Table 1: Descriptive statistics for 47 developing countries.

Variables	Obs	average	Standard deviation	Min	Max
Gdpg	1163	0.018	0.034	-0.118	0.133
Inv	1029	0.213	0.068	0.027	0.468
Inf	1053	0.182	1.323	-0.073	29.47
Def	884	0.029	0.034	-0.191	0.131
Do	1057	0.714	0.355	0.106	2.204
Popg	1080	0.016	0.009	-0.016	0.111
Dcf	1012	0.153	0.059	0	0.402
Lgdp	1072	5.194	1.324	2.893	8.672

Source: Authors' calculations based on Stata outputs

Table 2: Correlations between variables.

	gdpg	inv	def	dcf	inf	do	Popg
gdpg	1.000						
Inv	0.328	1.000					
Def	-0.146	-0.007	1.000				
Dcf	-0.159	0.014	0.03	1.000			
Inf	-0.075	0.008	0.091	-0.151	1.000		
Do	0.097	0.327	-0.074	0.268	-0.145	1.000	
popg	-0.166	-0.063	0.004	-0.047	0.172	-0.1961	1.000

Source: Authors' calculations based on Stata outputs

2. Presentation of the econometric method: SYS-GMM

The main motivations behind the dynamic panel GMM methodology can be found in Arellano and Bond (1991), Arellano and Bover (1995) and Bond and Blundell (1997).

Given the simultaneity and endogeneity biases that can result from estimating a dynamic equation using the OLS method, the dynamic equation can be estimated using the dynamic panel generalized method of moments. The dynamic panel Generalized Method of Moments (GMM) provides an efficient estimation of such a model (unlike OLS) by controlling for individual and time-specific effects and compensating for variable endogeneity biases.

One of the most appropriate estimators in finite samples is the system GMM (Sys-GMM) estimator by Blundell and Bond (1998). Their model can be used to generate efficient estimators in dynamic panels for analyses covering short periods (T is small). This model complements Arellano and Bond's (1991) difference GMM model, which suffers from asymptotic weakness and biases in finite samples. Blundell and Bond's estimator is based on the simultaneous estimation of a first-difference equation combined with a level equation. It eliminates individual-specific effects while taking as instruments appropriate levels of lagged values for all potentially endogenous variables.

The effectiveness of the GMM estimator relies on the validity of the following assumptions:

- instruments are well adapted (valid).
- the error terms are not auto-correlated.

The first differences of the model's explanatory variables are instrumented by the lagged values (in level) of these same variables. The aim is to reduce simultaneity bias and the bias introduced by the presence of the lagged dependent variable in difference.

Under the assumption that the error terms are independent and the explanatory variables are weakly exogenous (i.e. the explanatory variables are assumed to be uncorrelated with the future realizations of the error terms), Arellano and Bond (1991) propose the following moment conditions that apply for the first-difference equation:

Using these conditions on moments, Arellano and Bond (1991) propose the two-stage GMM estimator. In the first stage, the error terms are assumed to be independent and homoscedastic over time and across individuals. In a second step, the residuals obtained previously are used to construct an efficient estimator of the variance-covariance matrix by relaxing the assumption of independence and homoscedasticity. The two-stage GMM estimator is more efficient than the first-stage estimator.

The problem with this estimator is that it suffers from the weak correlation of the instruments with the regressors, leading to considerable biases in finite samples, and its accuracy is asymptotically low. More specifically, the lagged values of the explanatory variables are weak instruments of the first-difference equation. Furthermore, the differentiation of the equation into levels eliminates inter-country variations and only takes into account intra-country variations.

The GMM system estimator overcomes these limitations. Blundell and Bond (1998) tested this method using Monte Carlo simulations. They found that the GMM system estimator is more efficient than the GMM difference estimator. The latter produces biased estimators for small samples. The bias is all the greater when the variables are persistent over time, the specific effects are large and the temporal dimension of the panel is small.

To test the validity of lagged variables as instruments, Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998) suggest the Sargan/Hansen over-identification test. To test the hypothesis that the error terms are uncorrelated, these authors suggest a second-order auto-correlation test, since by construction the first-difference error term is correlated at first order, but must not be correlated at second order.

Estimation of the GMM model as a two-stage system (asymptotically more efficient than single-stage estimation) is performed using Stata's xtabond2 command (Roodman, 2006).

V. DYNAMIC PANEL RESULTS USING GMM.

In this section, we analyze the impact of the budget deficit on growth using the two-stage GMM system. In general, the Sargan/Hansen and AR2 tests confirm the validity of the instruments. Table (3) presents the results obtained from the GMM estimation.

We estimate two specifications for our model specified above. The first specification is simple (column 2. Table 3), the second is quadratic in which the budget deficit square term is introduced (column 3 Table 3). The square term is introduced in the model to prove that the budget deficit is not a problem up to a certain threshold (Laffer curve form). The results obtained following estimation using the dynamic panel GMM system methodology are broadly in line with the trend in OLS and fixed effects estimation results.

The Wald test for joint significance of explanatory variables is statistically significant at the 1% level for both models.

The Hansen test fails to reject the hypothesis of validity of the instruments used in the regression for both models (0.910 and 0.139 respectively).

Furthermore, we note that there is no second-order auto-correlation of the errors in the difference equation (AR2), because Arellano and Bond's second-order auto-correlation test fails to reject the hypothesis of no first-order auto-correlation (AR1=0.001 for both specifications, AR2=0.640 for the simple specification and AR2=0.472 for the quadratic specification). The result of our growth model with budget deficit as key variable is reliable, as it passes all diagnostic tests.

The variables have different effects on economic growth, with the results suggesting a greater impact of investment and government spending.

Table (3): Budget deficit and dynamic panel economic growth: GMM system estimator from Blundell and Bond (1998).

Dependent variable: gdpg	SYS-GMM (linear model)	SYS-GMM (non-linear model)
constant	0.034 (0.005)**	0.073 (0.005)**
Lgdp (-1)	-0.001 (0.078)*	-0.006 (0.049)**
Inv	0.303 (0.000)***	0.511 (0.000)***
Inf	-0.045 (0.000)***	-0.086 (0.000)***
Do	0.010 (0.194)	0.033 (0.005)**
Def	-0.210 (0.000)***	0.073 (0.108)
Def^2	-	-1.046 (0.000)***
Popg	-0.426 (0.048)**	-0.087 (0.621)
Dcf	-0.397 (0.000)***	-0.965 (0.000)***
Obs	746	746
Wald test	157.04 (0.000)***	64.44 (0.000)***
AR(1)	0.001	0.001
AR(2)	0.640	0.472
Sargan/Hansen test	0.910	0.139

Notes: values in brackets are p-values. *** significant at 1% level. ** The AR2 statistic represents the second-order auto-correlation test. The values reported in the table are the p-values of the AR2 statistic. These values clearly show the absence of second-order auto-correlation. Although the AR1 statistic validates the hypothesis of auto-correlation at order 1 of the error terms. The values presented in the table represent the p-values of the Hansen test. These values allow us to accept the null hypothesis of instrument validity (at the 5% threshold for both specifications).

It can be seen from the above table that the results of the SYS-GMM estimation for the GDP growth rate equation allow us to observe that :

The budget deficit, which is our key variable here, has a negative effect on economic growth, with a significant impact at the 1% threshold (column 2, table 3). When the budget deficit increases by 1%, economic growth falls by 0.21%.

The negative effect exerted by the budget deficit on economic activity from the perspective of our panel of developing countries is in line with the findings of other studies, which testify that the budget deficit negatively affects economic growth [Barro (1991); Easterly and Rebelo (1992); Fischer (1993); Barro and Sala-i -Martin (1995); Kneller and Gemmell (1999); Bose, et al. (2003); Amanja and Morrissey (2005);...]. The budget deficit coefficient is positive (0.073) when the budget deficit square term is introduced into the model (column 3. Table 3). The squared term with a negative (-1.046) and significant (at the 1% threshold) coefficient indicates an optimal threshold for maintaining economic performance, in particular the GDP growth rate. This phenomenon takes the form of a Laffer curve.

- Determining an optimal budget deficit threshold :

This threshold is obtained by deriving the GDP growth rate in relation to the budget deficit. This gives :
Max gdpg = 0 ----------" 0.073- (2*1.046)*def = 0.
2.092*def = 0.073 ----------" def= (0.073/2.092).
Def*= 0.0348

This shows that the optimal level of budget deficit for performance is 3.5% of GDP. This means that above this threshold, any deficit recorded by the economy of these countries will be an obstacle to good performance. On the other hand, for a threshold below 3.5% of GDP, the budget deficit is not an obstacle to economic growth.

The initial level of GDP is negatively (-0.001) and significantly related to its growth rate. This result validates the conditional convergence hypothesis.

Investment has a significant positive influence on economic growth. When investment increases by 1%, economic growth rises by 0.3%. This result confirms the neo-classical and Keynesian theses. However, the investment variable is important here, as it plays a part in the widening of the budget deficit and the expansion of growth. Investment must therefore be promoted.

The degree of openness has a positive impact on economic growth. An increase of 1% boosts economic growth by 0.01%. The positive effect observed is explained in particular by participation in international trade and the rise in exports, and by the fact that openness allows the entry of FDI, leading to an increase in GDP. The various theoretical studies fail to come up with a clear and definitive answer on the openness-growth relationship, while almost all empirical studies identify a positive effect. This seems to apply equally to the few developing countries with economies strong enough to benefit from the advantages that FDI can bring.

The variable inflation has a negative and significant effect on economic growth. Several studies have estimated this negative relationship between inflation and growth (Fischer (1993), Barro (1995), Bruno and Easterly(1998), Alexander(1977), Khan and Senhadji (2000)). Indicating that a monetary policy that aims to control inflation can increase GDP.

Population growth has a negative impact on economic growth. In the light of the results obtained in the empirical literature, this result is consistent with those obtained. This is due, on the one hand, to the large proportion of the population that is not active, which does not contribute to capital accumulation. On the other hand, strong demographic growth coupled with an inability to develop a level of qualification will lead to weak economic growth.

Government spending has a significant negative impact on economic growth. An increase of 1% is likely to reduce economic growth by 0.4%. This raises the issue of the efficiency of public spending. In other words, spending is not efficiently channeled into productive sectors, and also because of the low level of productive spending. As a result, developing countries must reduce their public final consumption expenditure in favor of investment.

CONCLUSION

The aim of this research is to analyze the relationship between budget deficits and economic growth in developing countries. The aim is to contribute to theory in this field.

The empirical assessment of the relationship between the budget deficit and economic growth has been the subject of numerous studies, as can be seen from the literature review. All in all, despite the tumultuous literature on the subject, the general trend that emerges is a negative relationship between deficit and growth. The results of our estimations are in line with this trend.

Using the SYS-GMM econometric method developed by Blundell and Bond (1998), and on a panel of 52 developing countries over a period from 1990 to 2020. Estimation of the linear model with dependent variable GDP/head growth rate, and explanatory variables: budget deficit, inflation rate, degree of openness, initial GDP/head, investment, government expenditure and population growth, enabled us to identify a negative effect exerted by the budget deficit on economic growth.

Estimation of the non-linear relationship by integrating the squared term of the budget deficit, reveals the existence of an optimal threshold for maintaining economic performance, equal to 3.5% of GDP, conditional on the assumption of the non-linearity of the relationship. Beyond this threshold, the effect of the budget deficit on economic growth becomes negative.

Among the limitations of this work, the Blundell and Bond (1998) estimator we used suffers from the loss of information associated with writing the model in first differences; this loss of information can result in estimates that are not very precise and sometimes erratic. Obtaining good estimates of the coefficients of a dynamic model with fixed effects is therefore not easy in practice, due to the need to eliminate the incidental parameters constituted by these fixed effects and the ensuing loss of information.

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