IS FISCAL COUNTERCYCLICALITY GROWTH ENHANCING? EVIDENCE FROM DEVELOPING COUNTRIES OVER THE PERIOD 1990–2019

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Is fiscal countercyclicality growth enhancing? Evidence from developing countries over the period 1990–2019

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ABSTRACT

The objective of this paper is to analyze the time-varying effect of improving fiscal countercyclicality on growth for a sample of 35 developing countries over the period 1990–2019. By estimating a time-varying coefficient for fiscal countercyclicality, incorporated as a variable in a panel model, we first examine how the public debt ratio and electoral motivations influence the ability to adopt countercyclical policies. Secondly, we show that greater countercyclicality positively affects economic growth and contributes to reducing the output gap, particularly during recessions, by channeling production towards its potential path. Finally, our findings are confirmed across two sub-samples, demonstrating a positive effect on growth before the 2008 crisis and a reduction in the output gap both before and after the crisis. The effect is stronger in the sub-sample characterized by high income, low debt, and strong control of corruption, suggesting that the effectiveness of countercyclical policies depends on macroeconomic and institutional factors.

Countercyclical fiscal management should therefore be given greater consideration by fiscal policymakers in developing countries, both upstream and downstream.

1. Introduction

Despite controversies over the effectiveness of fiscal policy in stabilizing the economy, since the 2008 crisis we have been witnessing massive budgetary interventionism aimed at stemming the recessionary path. In the literature, the cyclical behavior of fiscal policy is supposed to be countercyclical or neutral, but in fact procyclical behavior has been observed, particularly in developing countries. Several authors have tried to identify explanations such as credit constraints, interest groups and electoral motivations. This literature is quite abundant, but analysis of the impact of fiscal countercyclicality on growth is rarely addressed.

Woo (2009) was the first to empirically measure the effect of fiscal procyclicality on growth, for a sample of 96 developed and developing countries over the period 1960–2003. He first estimated a parameter β_i , which measures fiscal countercyclicality via a country-specific regression of the variation in real government expenditure on the variation in real GDP, and then introduced this parameter into a cross-sectional growth regression. He found evidence that procyclicality weakens growth.

(Aghion et al., 2006) have shown that countercyclicality is conducive to growth in a framework of weak financial development. Indeed, the idea presented by these authors is that, during a recession, the fall in expected revenues leads to a credit constraint that discourages companies and workers from investing in research and development (R&D) and human capital. Government intervention

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relaxes this credit constraint, and thus supports investment and the improvement of productivity. Empirically, these authors found that structural investment is more procyclical when financial development is weak.

(Aghion & Marinescu, 2007), inspired by the work of (Aghion et al., 2006), have shown empirically for a sample of OECD countries that the impact of respectively the fiscal countercyclicality (the interaction between countercyclicality and the degree of financial development) on the growth of real GDP per capita is positive (negative), thus corroborating their theoretical intuition.

(Brueckner & Carneiro, 2017) investigated for a sample of 175 countries over the period 1980–2010 the effect of volatility on growth, for instance the impact of terms-of-trade volatility, considering the intermediate role that the cyclicality of public spending can play. They found that when public spending is procyclical, the impact of terms-of-trade volatility on growth is negative, whereas when the fiscal stance is countercyclical this negative effect tends to become insignificant.

(Svec et al., 2012) analyzed the fiscal cyclicality impact on geographic data relating to the states of the US over the period 1977–1997. They showed that each state's fiscal cyclicality depends on the level of fiscal rules included in its constitution. They revealed that stricter budgetary balance rules lead to a more procyclical fiscal stance. Thus, by applying the two-stage least-squares regression using these rules as an instrument of fiscal cyclicality in a cross-sectional growth regression, they found that improving countercyclicality through more flexible fiscal rules is growth enhancing.

While these studies have focused on developed countries, with an emphasis on analyzing the relationship between countercyclical fiscal behavior and growth over the cycle, in this article, we aim to contribute to the literature by verifying this relationship for a sample of developing countries during the two phases of the cycle using panel data estimates based on the variables measuring countercyclical behavior determined through time-varying regressions.

Our contribution is threefold. First, we analyze the effect of fiscal countercyclicality on a sample of developing countries. Second, we calculate for each country a time-varying parameter measuring this fiscal behavior and highlight based in a panel data model its main explanatory variables. Third, our results show that the debt ratio and electoral motivations are the main factors affecting the ability to improve the countercyclical behavior. Moreover, we provide evidence for an asymmetric effect of fiscal countercyclicality on the economic growth: a positive effect on the recession phase and neutral effect in the expansion phase but a symmetric effect to reducing the output-gap. Finally, the effectiveness of fiscal countercyclicality could depend on macroeconomic and institutional factors. The rest of the article is organized as follows: Section 2 presents the methodology used to calculate the time-varying parameter measuring fiscal countercyclicality, and the main growth model to be estimated. Section 3 provides the estimation results for the two stages, explains the countercyclical fiscal behavior and its effect on growth and the output-gap. Section 4 conducts a robustness check. The conclusion draws some policy implications.

2. Methodology

In order to assess the effect of fiscal countercyclicality on growth, we follow (Aghion and Marinescu, 2007). In fact, the key point is to determine the variable that measures fiscal countercyclicality and that varies both across country i and time t. We therefore prefer to estimate the reaction of the structural primary surplus to the output gap (Huart, 2013; Aghion and Marinescu, 2007) where a positive (negative) and statistically significant reaction indicates a countercyclical (procyclical) behavior. The equation to be estimated is as follows:

$$SS_{it} = \alpha_{it} + \beta_{it} OG_{it} + \varepsilon_{it} \tag{1}$$

$$\text{with, } \alpha_{it} = \alpha_{it-1} + \mu_{it}, \mu_{it} \sim N\left(0, \sigma^2_{i\alpha}\right) \tag{2}$$

$$\text{and } \beta_{it} = \beta_{it-1} + \vartheta_{it}, \vartheta_{it} \sim N\left(0, \sigma^2_{i\beta}\right) \tag{3}$$

where, $\mathbf{SS_{it}}$ is the structural surplus ratio, $\mathbf{OG_{it}}$ represents the fiscal variable (the output gap),[1] $\boldsymbol{\varepsilon_{it}}$ is an i. i.d disturbance term satisfying standard assumption with zero mean and constant variance $\boldsymbol{\sigma^2}$. $\boldsymbol{\beta_{it}}$ denotes a country–specific time-varying fiscal cyclicality coefficient. This latter coefficient is assumed to evolve slowly, and follow a random walk ($\boldsymbol{\beta_{it} = \beta_{it-1} + \vartheta_{it}}$). The variances ($\boldsymbol{\sigma^2}, \boldsymbol{\sigma^2_{i\alpha}}, \boldsymbol{\sigma^2_{i\beta}}, i = 1 \ldots n$) are estimated by the method of moments estimator. (1), (2) and (3) can be estimated jointly using the varying-coefficient model proposed by Schlicht (2021).

The variable $\mathbf{SS_{it}}$ is calculated as the difference between total expenditure and structural revenues: R^s. The latter is calculated following this formula: $R^s = R\left(\frac{Y^*}{Y}\right)^{\gamma_1}$ (Alberola et al, 2006), where R denotes the real revenue, Y is the GDP at constant prices; Y^* is the potential real GDP estimated by the Hamilton filter (Hamilton, 2018); α_1 measures the elasticity of revenues to GDP, estimated through the following equation: $\mathbf{log}(\mathbf{R_t}) = \gamma_0 + \gamma_1 \mathbf{log}(\mathbf{Y_t}) + \boldsymbol{\varepsilon_t}$ **(4)** using the DOLS (Dynamic ordinary least square) method.

To specify the cycle phase of the parameter β_{it}, we first multiply it by $\mathbf{D_{1t}}$ and then by $\mathbf{D_{2t}}$, where respectively $\mathbf{D_{1t}}$ $\mathbf{(D_{12})}$ is a dummy variable which takes 1 if $\mathbf{OG > 0}$ $\mathbf{(OG<0)}$ and 0 otherwise, thus giving two parameters respectively $\boldsymbol{\theta_{it} = D_{1t} \times \beta_{it}}$ $(\boldsymbol{\vartheta_{it} = D_{2t} \times \beta_{it}})$ measuring fiscal countercyclicality during expansion (recession) phases.

Finally, we introduce the lag of these three parameters into a growth model (Brueckner & Carneiro, 2017; Aghion and Marinescu,

[1] The output gap is calculated as: $\frac{Y - Y^*}{Y^*}$

2007).

Hence, the models to estimate are presented through Eqs. (5) and (6) which assess respectively the countercyclicality effect over the cycle (in the two phases of the cycle).

$$\Delta \mathbf{y}_{it} = \gamma_i + \alpha_0 + \alpha_1 \mathbf{y}_{it-1} + \alpha_2\, \beta_{it-1} + \alpha_4 \overline{\mathbf{CT}} + \mathbf{e}_{it} \tag{5}$$

$$\Delta \mathbf{y}_{it} = \gamma_i + \alpha_0 + \alpha_1 \mathbf{y}_{it-1} + \alpha_2 \theta_{it-1} + \alpha_3 \vartheta_{it-1} + \alpha_4 \overline{\mathbf{CT}} + \mathbf{e}_{it} \tag{6}$$

where, γ_i is a country fixed effect, Δy_{it} denotes the first difference of the log of real GDP per capita; $\overline{CT}$ represents the control variables chosen with reference to the literature (Barro, 1991,1995; Fischer, 1993; Mankiw et al., 1992) and the correlation matrix (in order to address the multicollinearity problem) that is the logarithm of capital stock, the ratio of government expenditure (government share of GDP) and the inflation rate; e_{it}: the error term.

Eqs. (5) and (6) can be estimated using the least squares dummy variable (LSDV) estimator with Driscoll-Kraay standard errors so as to consider account the problems of autocorrelation and heteroscedasticity of errors, and cross-section dependence (Hoechle, 2007).

3. Estimation and the empirical results

3.1. The first stage

3.1.1. Estimation of the fiscal time-varying reaction

The purpose of the first step is to estimate the parameter $\boldsymbol{\beta}_{it}$. First, we estimate the parameter γ_1, which measures the elasticity of government revenues to GDP. These elasticity coefficients (see Appendix table A1) give an average value of 1.20 in line with the literature and are then used to calculate the structural income following the above formula in order to deduce the value of the structural surplus. We have therefore estimated the β_{it} parameter according Eq. (1), using the Ketvals package applied under the Gretl software (Lucchetti & Valentini, 2023).

The results obtained for each country are illustrated in Fig. 1. The main points to be highlighted from Fig. 1 are as follows: The countries showing the most counter-cyclical behavior are Bahrain, Chile,Costa Rica,Honduras and Kuwait. Moreover, other countries, such as Bolivia, Kenya, Jordan, Morocco and Sri Lanka, have seen improvements characterized by periods of pronounced counter-cyclicality. It should also be noted that several periods of recession triggered an improvement in the degree of countercyclicality.

3.1.2. The explanatory factors of fiscal countercyclicality

Since we have an estimate of the parameter measuring the time-varying countercyclical behavior for each country, we try to check the main factors that can affect this behavior, in particular the role of the public debt ratio and the presence of the election year (Afonso & Hauptmeier, 2009; Kallal & Guetat, 2020).

Thus, we estimate the following two equations:

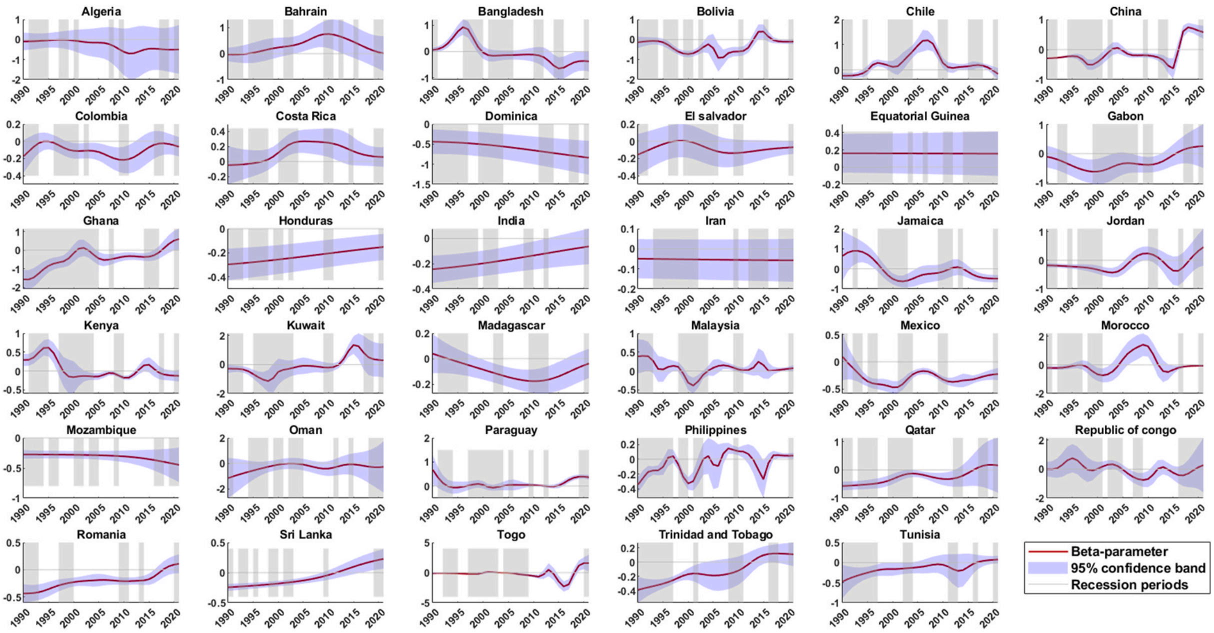

Fig. 1. The countercyclicality time-varying parameter for the sample countries.

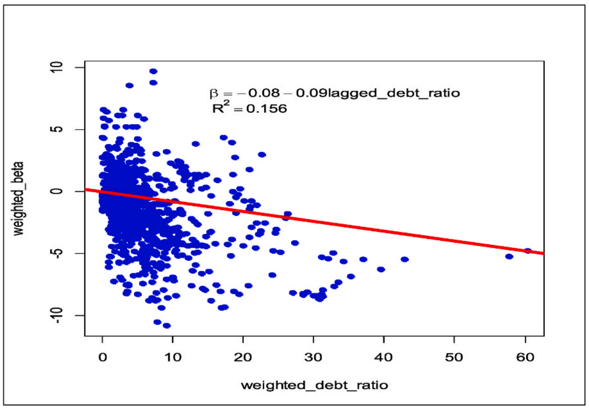

Fig. 2. The scatter plot of the beta parameter of the countercyclicality and the debt ratio.

$$\boldsymbol{\beta_{it}} = \boldsymbol{\alpha_0} + \boldsymbol{\alpha_1}\mathbf{Debt_{it-1}} + \boldsymbol{\alpha_2}\overline{\mathbf{CT}} + \mathbf{e_{it}} \tag{7}$$

$$\boldsymbol{\beta_{it}} = \boldsymbol{\alpha_0} + \boldsymbol{\alpha_1}\mathbf{Debt_{it-1}} + \boldsymbol{\alpha_2}(\mathbf{D_{3t}}\times\mathbf{Debt_{it-1}}) + \boldsymbol{\alpha_3}\overline{\mathbf{CT}} + \mathbf{e_{it}} \tag{8}$$

with Debt_{it-1} is the lagged ratio of public debt, D_{3t}: dummy variable which takes 1 in the presence of an election year (presidential or legislative election) and 0 otherwise, $\overline{\text{CT}}$ represents other explanatory variables used in the literature: the private credit, the current account ratio, openness, government share of GDP, the logarithm of GDP per capita and the inflation rate. All these variables are lagged by one year.

Since the estimated parameter β_{it} varies little over time, the application of a fixed-effects model does not seem relevant (Afonso & Coelho, 2024). We therefore estimate Eqs. (7) and (8) using the weighted ordinary least squares estimator.

First, we can check in Fig. 2 that there is a negative relationship between the level of countercyclicality and the lagged debt ratio.

The estimation of different specifications is reported in Table 1 with all control variables (columns 1 and 2), with the main control variables (columns 3 and 4) and with only significant control variables (columns 5 and 6)which shows that the statistically significant variables are the debt ratio, the private credit ratio and the current account ratio. These results can be interpreted as the fact that the debt ratio has a negative effect on countercyclical behavior in terms of reducing budgetary room to maneuver, while the development of the financial sector favors government borrowing, and the improvement in the current account balance contributes to countercyclical behavior in terms of the availability of more financial resources and the easing of the external credit constraint.

In addition, columns 2, 4 and 6 show that the absence of a public debt effect during the election year implies the existence of electoral motivations which may weaken cyclical budget management in general.

3.2. *The second stage*

3.2.1. *Fiscal countercyclicality and growth*

Eqs. (5) and (6) are dynamic models that econometrically imply the correlation between the lagged variable and the error term. However, as the number of years in our case is quite large, the use of the LSDV estimator remains valid (Roodman, 2009). In addition, the application of the Hausman test for Eq. (1) showed the superiority of the fixed-effect model compared to the pooled model. Also, the tests (not reported) of heteroskedasticity, autocorrelation and cross-sectional dependence respectively Wald test (Greene, 2008),

Table 1
Estimates based on Eqs. (7) and (8), pooled OLS.

$\boldsymbol{\beta_{it}}$	(1)	(2)	(3)	(4)	(5)	(6)
Debt$_{it-1}$	−0.068 (0.027)**	−0.072 (0.027)***	−0.074 (0.020)**	−0.078 (0.021)***	−0.061 (0.021)***	−0.065 (0.022)***
Election$_{it}$ × Debt$_{it-1}$		0.012 (0.011)		0.013 (0.011)		0.014 (0.011)
Credit$_{it-1}$	**0.139(0.053)****	**0.138(0.053)****	**0.141(0.054)****	**0.140(0.054)****	**0.125(0.042)*****	**0.124(0.042)*****
Current account$_{it-1}$	0.186 (0.078)**	0.185 (0.078)**	0.200 (0.083)**	0.199 (0.084)**	0.174 (0.084)**	0.173 (0.085)*
ln (GDP per capita$_{it-1}$	−0.009 (0.015)	0.009 (0.015)	−0.012 (0.011)	−0.012 (0.011)		
Openness $_{it-1}$	−0.007 (0.036)	−0.006 (0.036)	−0.003 (0.037)	−0.003 (0.037)		
Government share of GDP$_{it-1}$ (%)	−0.030 (0.083)	−0.030 (0.083)				
Inflation$_{it-1}$	−0.028 (0.072)	−0.027 (0.073)				
Observations	883	883	883	883	883	883
R-squared	0.250	0.250	0.249	0.249	0.175	0.175

Notes: ***,**,* denote significance at the 1 %, 5 % and 10 % levels.( ): Driscoll-Kraay standard errors.

Wooldridge test (Wooldridge, 2000) and the Pesaran test (Pesaran, 2004) showed the presence of these estimation problems. Hence, we adopt the LSDV estimator with Driscoll-Kraay standard errors (Hoechle, 2007) and we weight the model variables by the inverse of the variance of the parameter $\boldsymbol{\beta}_{\mathbf{it-1}}$ (with the aweight option in the stata software) since this estimated parameter is used as a variable of interest.

We then estimated this model using two specifications: the first with lagged log (GDP per capita) and the capital stock as the main explanatory variables, and the second with more explanatory variables: the expenditure ratio and the inflation rate. In addition, both specifications are estimated with and without the time fixed effect. In fact, including the time fixed effect has the advantage of accounting for shocks that are invariant to individuals, but it may interfere with our variable of interest, which is a time-varying parameter.

Furthermore, to address the potential endogeneity problem with respect to the presence of the lagged dependent variable and the capital stock as explanatory variables, we apply the GMM-IV estimator using the second and the third lags of the dependent variable and the second lag of the capital stock as instruments (Baum et al., 2010). The parameter $\boldsymbol{\beta}_{\mathbf{it-1}}$ can be considered as exogenous, since it is lagged and the relationship between countercyclicality and growth is assumed to be only in the forward direction, and not in the reverse (Aghion and Marinescu, 2007).

The results of estimating Eq. (1) are shown in Table 2. The columns 1–4 show a positive impact of countercyclicality on growth, statistically significant at least at the 10 % level. When all control variables are included as indicated in column 3, the impact is significant at the 5 % level, indicating that an improvement in countercyclicality of 1 percentage point leads to an improvement in growth of 0.05 percentage points. The magnitude of this impact may appear small but can have a non negligible effect in terms of purchasing power and consumption and can create some dynamics. Particularly if the increase in countercyclicality is greater than 1 %, the dynamic impact on GDP per capita will be more significant.

It should be noted that the addition of the time effect leads to a reduction in the value of the countercyclicality parameter and an improvement in its significance. Turning to the consideration of the endogeneity, the Hansen test validates the instruments used and the Wu-Hausman test rejects the hypothesis of exogeneity of the variables considered. According to column 5, the coefficient relating to the parameter $\boldsymbol{\beta}_{\mathbf{it-1}}$ is significant at the 5 % level, and according to column 6 the addition of the time effect preserves significance at the 10 % level.

It is therefore possible to deduce a positive effect on growth from the improvement in fiscal countercyclicality over the cycle.

We also verified the asymmetry of this impact by estimating Eq. (2). According to the results reported in columns 1–4 of Table 3, we find an asymmetrical effect: a positive and statistically significant impact at least at the 5 % level during the recession phase, whereas during the expansion phase, this effect is neutral. Adding the time effect in the presence of all explanatory variables gives a significant impact at the 1 % level, with a confidence interval in the range [0.019; 0.103]. Taking account of the endogeneity, this impact remains significant at least at the 10 % level according to columns 5 and 6.

Therefore, it is possible to deduce that improving countercyclicality during the recession phase stimulates growth and supports economic recovery.

3.2.2. Fiscal countercyclicality and the output-gap

To further evaluate the impact of an improvement in fiscal countercyclicality over the cycle, we assess whether this enhanced behavior reduces the output-gap and thus moves output back towards its potential level.

We estimate then the following equations:

$$\mathbf{gap_{it}} = \boldsymbol{\alpha}_0 + \boldsymbol{\alpha}_1 \boldsymbol{\theta}_{\mathbf{it-1}} + \boldsymbol{\alpha}_2 \boldsymbol{\vartheta}_{\mathbf{it-1}} + \boldsymbol{\alpha}_4 \overline{\mathbf{CT}} + \mathbf{e_{it}} \tag{9}$$

Table 2
Estimates based on Eq. (5), LSDV.

Δ (ln((GDP per capita$_{it}$))	(1)	(2)	(3)	(4)	(5)	(6)
ln (GDP per capita$_{it-1}$)	−0.194 (0.038)***	−0.179 (0.039)***	−0.202 (0.041)***	−0.186 (0.041)***	−0.176 (0.034)***	−0.163 (0.030)***
$\boldsymbol{\beta}_{\mathbf{it-1}}$	**0.055(0.028)***	**0.039(0.018)****	**0.058(0.026)****	**0.041(0.018)****	**0.065(0.029)****	**0.037(0.021)***
ln (Capital stock$_{it}$)	0.102 (0.025)***	0.083 (0.027)***	0.100 (0.026)***	0.077 (0.025)***	0.078 (0.018)**	0.044 (0.020)**
Government share of GDP$_{it}$ (%)			−0.084 (0.026)***	−0.086 (0.027)***	−0.129 (0.016)***	−0.142 (0.034)***
Inflation$_{it}$			−0.061 (0.023)**	−0.055 (0.018)***	−0.071 (0.026)**	−0.052 (0.034)**
Individual fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	No	Yes	No	Yes	No	Yes
Observations	1015	1015	1015	1015	945	945
R-squared	0.237	0.358	0.252	0.373	0.3345	0.441
Hanses J statistic (p-value)					0.447	0.445
Wu hausman endogeneity test					0.000	0.010

Notes: ***,**,* denote significance at the 1 %, 5 % and 10 % levels. ():Driscoll-Kraay standard errors.

Table 3
Estimates based on Eq. (6), LSDV.

Δ (ln((GDP per capita$_{it}$))	(1)	(2)	(3)	(4)	(5)	(6)
ln (GDP per capita$_{it-1}$)	−0.193 (0.039)***	−0.177 (0.039)***	−0.200 (0.041)***	−0.184 (0.041)***	−0.172 (0.041)***	−0.160 (0.030)***
θ_{it-1} (Recession)	**0.075(0.036)****	**0.057(0.021)****	**0.080(0.035)****	**0.061(0.020)*****	**0.080(0.035)****	**0.048(0.028)***
ϑ_{it-1} (Expansion)	**0.037(0.026)**	**0.024(0.026)**	**0.038(0.025)**	**0.024(0.026)**	0.052 (0.027)*	**0.028(0.024)**
ln (Capital stock$_{it}$)	0.100 (0.025)***	0.082 (0.027)***	0.098 (0.026)***	0.075 (0.026)***	0.075 (0.018)***	0.043 (0.020)**
Government share of GDP$_{it}$ (%)			−0.085 (0.026)***	−0.087 (0.027)***	−0.130 (0.016)***	−0.142 (0.017)***
Inflation$_{it}$			−0.061 (0.022)**	−0.055 (0.018)***	−0.069 (0.027)**	−0.052 (0.025)**
Individual fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	No	Yes	No	Yes	No	Yes
Observations	1015	1015	1015	1015	945	945
R-squared	0.239	0.360	0.254	0.375	0.334	0.441
Hansen J statistics (p-value)					0.495	0.484
Wu-Hausman endogeneity test					0.000	0.010

Notes: ***,**,* denote significance at the 1 %, 5 % and 10 % levels. (): Driscoll-Kraay standard errors.

Table 4
Estimates based on Eqs. (9) and (10), LSDV.

Gap	(1)	(2)
θ_{it-1} (Recession)	**0.014(0.014)**	
ϑ_{it-1} (Expansion)	**−0.031(0.015)****	
θ_{it-2} (Recession)		**−0.067(0.015)*****
ϑ_{it-2} (Expansion)		**0.043(0.035)**
Investment share of GDP$_{it}$ (%)	0.242 (0.068)***	0.244 (0.066)***
Government share of GDP$_{it}$ (%)	−0.186 (0.025)***	−0.165 (0.019)
Inflation$_{it}$	−0.037 (0.027)	−0.033 (0.025)
Openness$_{it}$	0.026 (0.026)	0.026 (0.028)
Individual fixed effect	Yes	Yes
Time fixed effects	Yes	Yes
Observations	980	980
R-squared	0.282	0.282

Notes: ***,**,* denote significance at the 1 %, 5 % and 10 % levels. (): Driscoll-Kraay standard errors.

$$\mathbf{gap_{it}} = \boldsymbol{\alpha_0} + \boldsymbol{\alpha_1\theta_{it-2}} + \boldsymbol{\alpha_2\vartheta_{it-2}} + \boldsymbol{\alpha_4\overline{CT}} + \mathbf{e_{it}} \quad (10)$$

where we use the output-gap as the dependent variable, and separately the lagged one-and two-year of the parameter $\boldsymbol{\beta_{it}}$ as the variables of interest for each phase of the cycle respectively $\boldsymbol{\theta_{it-1}}$ and $\boldsymbol{\vartheta_{it-1}}$, $\boldsymbol{\theta_{it-2}}$ and $\boldsymbol{\vartheta_{it-2}}$, also $\overline{CT}$ represents a control variables inspired from (Aghion & Marinescu, 2007) which include investment share of GDP, government share of GDP, inflation and openness.

The results reported in Table 4 indicate that during the expansion phase, improved countercyclicality reduces economic overheating after one year, while during recessions, it helps to close the output gap and fosters recovery after two years.[2]

4. Robustness check

4.1. Alternative measure of countercyclicality

To test the robustness of our finding, we use an alternative measure of countercyclicality: the countercyclicality of public spending rather than the overall fiscal balance. We re-estimate equation (1), replacing the structural surplus ratio with the expenditure ratio, and introduce the parameter derived into equation (6). The results, reported in Table 5, reveal a significant effect at least at the 10 % level, suggesting that improvements in the countercyclicality of public spending, reflected in a more negative time-varying coefficient, lead to higher economic growth.

[2] The effect of improving countercyclicality on the output-gap vanishes after three years.

Table 5
Robustness Check. Estimates based on Eq. (6), LSDV.

Δ (ln((GDP per capita$_{it}$))	(1)	(2)	(3)	(4)
ln (GDP per capita$_{it-1}$)	−0.229 (0.047)***	−0.198 (0.038)***	−0.176 (0.043)***	−0.165 (0.035)***
θ_{it-1} (Recession)	**−0.058(0.023)****	**−0.039(0.018)****	**−0.051(0.028)***	**−0.045(0.023)***
ϑ_{it-1} (Expansion)	**0.001(0.025)**	0.002 (0.016)	−0.013 (0.019)	−0.000 (0.018)
ln (Capital stock$_{it}$)	0.114 (0.031)***	0.065 (0.029)***	0.148 (0.015)***	0.033 (0.023)***
Government share of GDP$_{it}$ (%)	−0.095 (0.027)***	−0.103 (0.028)***	−0.130 (0.016)***	−0.172 (0.014)
Inflation$_{it}$	−0.050 (0.018)**	−0.038 (0.018)*	−0.042 (0.021)*	−0.034 (0.024)
Individual fixed effect	Yes	Yes	Yes	Yes
Time fixed effects	No	Yes	No	Yes
Observations	1015	1015	1015	945
R-squared	0.203	0.387	0.296	0.484
Hansen J statistics (p-value)			0.245	0.060
Wu-Hausman endogeneity test			0.010	0.070

Notes: ***,**,* denote significance at the 1 %, 5 % and 10 % levels. (): Driscoll-Kraay standard errors.

4.2. Heterogeneity within the sample

Although the individual fixed effects in the model account for heterogeneity, this issue can still be addressed further by dividing the sample into more homogeneous sub-samples. One approach is to apply the k-means clustering method, considering institutional and macroeconomic dimensions relevant to fiscal policy implementation in developing countries (Frankel et al., 2013). We use variables such as the debt-to-GDP ratio, control of corruption, private credit-to-GDP ratio, and GDP per capita as proxies for debt levels, governance quality, financial development, and income level, respectively.

The optimal number of sub-samples, according to the Calinski-Harabasz pseudo-F criterion, is two. The first group is characterized by high debt, low control of corruption, and low income, whereas the second group comprising Bahrain, Chile, Costa Rica, Dominican Republic, Kuwait, Malaysia, Mexico, Oman, Qatar, Romania, and Trinidad and Tobago exhibits the opposite pattern, with lower debt, stronger control of corruption, and higher income. This classification is justified not only by differences in debt levels and governance but also by the distinction between high and low-income countries. By considering these factors together, it allows for a more homogeneous sample, which is essential for studying how governance, debt, and income interact with countercyclicality and influence its effectiveness on growth.

Next, for each sub-sample, we create an interaction variable with the countercyclicality parameter for each phase of the business cycle. We focus specifically on the downturn phase, modifying equation (6) as follows:

$$\Delta \mathbf{y}_{it} = \boldsymbol{\gamma}_i + \boldsymbol{\alpha}_0 + \boldsymbol{\alpha}_1 \boldsymbol{y}_{it-1} + \boldsymbol{\alpha}_2 \boldsymbol{\theta}_{it-1} \times (\text{sub}.\textbf{sample}_1) + \boldsymbol{\alpha}_3 \boldsymbol{\theta}_{it-1} \times (\text{sub}.\textbf{sample}_2) + \boldsymbol{\alpha}_4 \boldsymbol{\vartheta}_{it-1} + \boldsymbol{\alpha}_4 \overline{\mathbf{CT}} + \mathbf{e}_{it} \tag{11}$$

where sub. sample$_i$: is a dummy variable that takes 1 if the country is included in sub-sample i, and 0 otherwise.

The results, presented in Table 6, confirm that countercyclical policies have a positive and statistically significant effect on growth during recessions in both sub-samples. The effect is significant at the 1 % level in sub-sample 2 and at the 10 % level in sub-sample 1, with a greater magnitude in sub-sample 2. This highlights the consistent role of countercyclical measures in supporting economic growth, though their effectiveness varies across groups.

Table 6
Robustness Check. Estimates based on Eq. (6), LSDV.

Δ (ln((GDP per capita$_{it}$))	(1)	(2)	(3)	(4)
ln (GDP per capita$_{it-1}$)	−0.201 (0.041)***	−0.186 (0.041)***	−0.173 (0.033)***	−0.161 (0.030)***
θ_{it-1} (Recession) (Sub-sample 1)	**0.072(0.039)***	**0.042(0.025)**	**0.072(0.040)***	**0.028(0.031)**
θ_{it-1} (Recession) (Sub-sample 2)	**0.096(0.037)****	**0.100(0.026)*****	**0.096(0.043)****	**0.089(0.040)****
ϑ_{it-1} (Expansion)	**0.038(0.025)**	**0.022(0.025)**	**0.051(0.027)***	**0.027(0.024)**
ln (Capital stock$_{it}$)	0.098 (0.026)***	0.076 (0.025)***	0.075 (0.018)***	0.043 (0.020)**
Government share of GDP$_{it}$ (%)	−0.084 (0.025)***	−0.085 (0.027)***	−0.129 (0.016)***	−0.141 (0.017)***
Inflation$_{it}$	−0.059 (0.023)**	−0.051 (0.020)**	−0.068 (0.027)**	−0.050 (0.026)*
Individual fixed effect	Yes	Yes	Yes	Yes
Time fixed effects	No	Yes	No	Yes
Observations	1015	1015	1015	1015
R-squared	0.254	0.376	0.335	0.307
Hansen J statistics (p-value)			0.503	0.506
Wu-Hausman endogeneity test			0.000	0.008

Notes: ***,**,* denote significance at the 1 %, 5 % and 10 % levels. (): Driscoll-Kraay standard errors.

Table 7
Robustness Check.Estimates based on Eqs. (9) and (10), LSDV.

Gap	(1)	(2)	(3)	(4)
θ_{it-1} (Recession)	**0.027(0.019)**	**0.003(0.014)**		
ϑ_{it-1} (Expansion) (Sub-sample 1)	**−0.008(0.022)**	**−0.016(0.021)**		
ϑ_{it-1} (Expansion) (Sub-sample 2)	**−0.100(0.020)*****	**−0.112(0.024)*****		
θ_{it-2} (Recession) (Sub-sample 1)			**−0.059(0.019)*****	**−0.095(0.024)*****
θ_{it-2} (Recession) (Sub-sample 2)			**−0.084(0.031)****	**−0.100(0.033)*****
ϑ_{it-2} (Expansion)			**0.028(0.027)**	0.016 (0.024)
Investment share of GDP$_{it}$ (%)	0.087 (0.063)*	0.087 (0.063)*	0.134 (0.055)	0.097 (0.066)
Government share of GDP$_{it}$ (%)	−0.171 (0.017)***	−0.171 (0.016)***	−0.145 (0.020)***	−0.147 (0.019)***
Inflation$_{it}$	−0.037 (0.018)*	−0.036 (0.021)*	−0.046 (0.022)**	−0.034 (0.025)
Openness$_{it}$	0.030 (0.007)***	0.020 (0.006)***	0.025 (0.007)***	0.014 (0.006)**
Individual fixed effect	Non	Non	Non	Non
Time fixed effects	Non	Yes	Non	Yes
Observations	980	1015	980	980
R-squared	0.175	0.256	0.150	0.232
Hausman test (p.value)	0.398			

Notes: ***,**,* denote significance at the 1 %, 5 % and 10 % levels. (): Driscoll-Kraay standard errors.

4.3. Output gap analysis

We re-estimate the equations from Table 4, using the output gap as the dependent variable. The results reported in Table 7 show that the countercyclical effect with a one-period lag is significant only during expansions for the second sub-sample. However, with a two-period lag, the effect is confirmed for both sub-samples during recessions, with a stronger magnitude in the second. These results suggest that during expansions, a fiscal environment characterized by low debt and sound governance helps to prevent overheating and promotes the accumulation of surpluses. During recessions, enhancing countercyclicality, regardless of fiscal position, helps prevent a deeper downturn and supports recovery towards potential GDP.

4.4. Period effect: before and after the crisis

To further investigate the impact of the period, we re-estimate the equations in Table 7 by adding additional interaction terms for each sub-sample, in the form of dummy variables for the periods before and after the 2008 crisis. The results, shown in Table 8, indicate that, for the second sub-sample, the effect before the crisis is highly significant across all specifications. After the crisis, the effect remains significant only in the specification presented in column 2. For the first sub-sample, the results prior to the 2008 crisis show a positive effect of countercyclical measures on growth, with the coefficient staying positive and statistically significant at the 10 % level in columns (1), (2), and (3). However, no such effect is observed after the crisis, likely due to an increase in risk-averse behavior and heightened uncertainty following the economic downturn. These factors may have reduced the effectiveness of countercyclical policies in fostering growth post-crisis.

Additionally, we explore the period effect using the output gap as the dependent variable. The estimation results, presented in Table 9, show that, during the expansion phase, the effect of enhanced countercyclicality in reducing the output gap is mainly observed in the second sub-sample, both before and after the crisis.

Table 8
Robustness Check. Estimates based on Eq. (11), LSDV.

Δ (ln((GDP per capita$_{it}$))	(1)	(2)	(3)	(4)
ln (GDP per capita$_{it-1}$)	−0.199 (0.041)***	−0.185 (0.042)***	−0.171 (0.033)***	−0.160 (0.030)***
θ_{it-1} (Recession) (Sub-sample 1) (before 2008)	**0.081(0.040)***	**0.049(0.025)***	**0.085(0.043)***	**0.034(0.034)**
θ_{it-1} (Recession) (Sub-sample 1)(after 2008)	**0.025(0.066)**	**0.006(0.041)**	**0.013(0.061)**	**0.003(0.049)**
θ_{it-1} (Recession) (Sub-sample 2) (before 2008)	**0.119(0.030)*****	**0.110(0.027)*****	**0.121(0.044)*****	**0.098(0.048)****
θ_{it-1} (Recession) (Sub-sample 2) (after 2008)	**0.037(0.041)**	**0.070(0.020)**	**0.039(0.069)**	**0.070(0.053)**
ϑ_{it-1} (Expansion)	**0.037(0.025)**	**0.022(0.025)**	**0.051(0.027)***	**0.027(0.023)**
ln (Capital stock$_{it}$)	0.096 (0.027)***	0.075 (0.025)***	0.072 (0.018)***	0.043 (0.020)**
Government share of GDP$_{it}$ (%)	−0.086 (0.025)***	−0.086 (0.027)***	−0.133 (0.015)***	−0.142 (0.017)***
Inflation$_{it}$	−0.056 (0.025)**	−0.050 (0.021)**	−0.065 (0.027)**	−0.049 (0.026)*
Individual fixed effect	Yes	Yes	Yes	Yes
Time fixed effects	No	Yes	No	Yes
Observations	1015	1015	945	945
R-squared	0.255	0.377	0.336	0.308
Hansen J statistics (p-value)			0.522	0.506
Wu-Hausman endogeneity test			0.000	0.008

Notes: ***,**,* denote significance at the 1 %, 5 % and 10 % levels. (): Driscoll-Kraay standard errors.

Table 9
Robustness Check. Estimates based on Eqs. (9) and (10), LSDV.

Gap	(1)	(2)	(3)	(4)
θ_{it-1} (Recession)	**0.027(0.019)**	**0.002(0.014)**		
ϑ_{it-1} (Expansion) (Sub-sample 1) (before 2008)	**0.004(0.037)**	**−0.025(0.035)**		
ϑ_{it-1} (Expansion) (Sub-sample 1) (after 2008)	**−0.027(0.013)***	**−0.013(0.08)**		
ϑ_{it-1} (Expansion) (Sub-sample 2) (before 2008)	**−0.136(0.022)*****	**−0.167(0.020)*****		
ϑ_{it-1} (Expansion) (Sub-sample 2) (after 2008)	**−0.060(0.020)*****	**−0.052(0.017)*****		
θ_{it-2} (Recession) (Sub-sample 1) (before 2008)			**−0.061(0.019)*****	**−0.117(0.027)*****
θ_{it-2} (Recession) (Sub-sample 1) (after 2008)			**−0.039(0.020)***	**0.001(0.021)**
θ_{it-2} (Recession) (Sub-sample 2) (before 2008)			**−0.072(0.039)***	**−0.106(0.043)****
θ_{it-2} (Recession) (Sub-sample 2) (after 2008)			**0.124(0.027)*****	**−0.092(0.021)*****
ϑ_{it-2} (Expansion)			**0.028(0.027)**	0.015 (0.024)
Investment share of GDP_{it} (%)	0.120 (0.057)**	0.095 (0.064)	0.115 (0.054)**	0.081 (0.063)
Government share of GDP_{it} (%)	−0.171 (0.017)***	−0.171 (0.016)***	−0.145 (0.020)***	−0.145 (0.019)***
$Inflation_{it}$	−0.039 (0.018)*	−0.036 (0.021)*	−0.045 (0.022)*	−0.034 (0.025)
$Openness_{it}$	0.029 (0.007)***	0.020 (0.006)***	0.026 (0.007)***	0.014 (0.006)**
Individual fixed effect	Non	Non	Non	Non
Time fixed effects	Non	Yes	Non	Yes
Observations	980 1015	1015	980	980
R-squared	0.175 0.177	0.245	0.153	0.234
Hausman test (p.value)	0.398			

Notes: ***,**,* denote significance at the 1 %, 5 % and 10 % levels. (): Driscoll-Kraay standard errors.

During the recession phase, this effect is observed in both sub-samples, both before and after the crisis. In other words, the countercyclical effect in terms of accelerating recovery during a downturn is confirmed.

5. Conclusion

The use of expansionary fiscal policy has become recurrent, particularly during recent economic crises to mitigate deep recessions and preserve social peace. In this study, we have attempted to analyze the impact of applying a countercyclical fiscal policy on growth in a sample of 35 developing countries, using a time-varying estimation of this behavior. First, we confirmed the positive trend in this cyclical behavior, for which the main constraints (stimulants) identified are the public debt ratio and electoral motivations (the development of the financial sector and the current account ratio). Then, through the estimation of a growth model, we obtained a positive impact over the cycle, indicating a growth improvement of around 0.041 % for a 1 % improvement in countercyclicality. Considering each phase of the cycle, this impact became asymmetrical: positive and significant during the recession phase at around 0.061 %, and neutral during the expansion phase. In the same way, we found that improving countercyclicality during the recession phase can reduce the output gap, i.e., accelerate production toward its potential level, and thus support the recovery.

To check the robustness of the baseline results, we tested two more homogeneous sub-samples based on macroeconomic and institutional conditions, both before and after the crises. The findings confirmed that improving counter-cyclicality supports growth in both sub-samples, particularly during the recession before the crises, with a greater impact in the second sub-sample (characterized by low debt, strong control of corruption, and high income) showing an increase of around 0.11 % for every 1 % improvement in countercyclicality. It also helped reduce the output gap during the recession before and after the crises. However, its effect during the expansion was mainly observed in the second sub-sample before and after the crises.

These results suggest that fiscal countercyclicality has a positive impact in developing countries by reducing business cycle fluctuations and sustaining potential growth. However, its effectiveness and magnitude may depend on institutions and macroeconomic factors, such as governance quality and debt sustainability. Future research could further explore the role of these factors.

Declaration of competing interest

The author declares that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix

Table A1
Data sources.

Variables	Sources
Gross domestic product, constant prices	WEO Data: October 2023
General government revenue	WEO Data: October 2023
General government total expenditure	WEO Data: October 2023
Real GDP per capita (rgdpo)	Penn World Table version 10.01
Inflation rate	WEO Data: October 2023
Current account	WEO Data: October 2023
Capital stock (cn)	Penn World Table version 10.01
Openness ((q_x + q_m)/q_gdp)	Penn World Table version 10.01
Election year (election): Legislative Election Held (legelec) or Presidential Election Held (exelec)	Database of Political Institutions (DPI 2020)
Private Credit by Deposit Money Banks to GDP	World Bank
Public debt ratio	WEO Data: October 2023
Control of corruption	Worldwide Governance Indicators World Bank. (2021).

Table A2
The elasticity of government revenues to GDP is calculated from Eq. (3).

Country	Elasticity	Sub-sample
Algeria	1.133	1
Bahrain	0.900	2
Bangladesh	1.026	1
Bolivia	1.423	1
Chile	1.132	2
China	1.527	1
Colombia	1.403	1
Congo	1.726	1
Costa Rica	1.081	2
Dominica	2.154	2
El Salvador	1.951	1
Equatorial Guinea	0.976	1
Gabon	0.304	1
Ghana	1.535	1
Honduras	1.322	1
India	1.083	1
Iran	0.310	1
Jamaica	2.353	1
Jordan	0.780	1
Kenya	1.127	1
Kuwait	1.138	2
Madagascar	1.087	1
Malaysia	0.871	2
Mexico	1.578	2
Morocco	1.302	1
Mozambique	1.250	1
Oman	0.918	2
Paraguay	1.000	1
Philippines	0.984	1
Qatar	0.943	2
Romania	0.984	2
Sri Lanka	0.729	1
Togo	1.903	1
Trinidad and Tobago	1.109	2
Tunisia	0.984	1

Note: 1: Sub-sample 1, 2: Sub-sample 2.

Table A3
Economic and Institutional Characteristics of Subsamples

	Log GDP per capita	Debt ratio	Control of corruption	Private credit ratio
Sub-sample 1	Mean: 8.51	Mean: 0.53	Mean: 0.47	Mean: 0.376
	Std. dev. : 0.81	Std. dev. : 0.29	Std. dev. : 0.44	Std. dev.: 0.25
Sub-sample 2	Mean: 9.86	Mean: 0.39	Mean: 0.15	Mean: 0.495
	Std. dev. : 0.89	Std. dev. : 0.37	Std. dev. : 0.63	Std. dev. : 0.30

Table A4
Correlation Matrix for Eq. (1).

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Δ (ln((GDP per capita$_{it}$))	1.00						
(2) ln (GDP per capita$_{it-1}$)	−0.04	1.00					
(3) θ_{it-1} (Recession)	0.03	0.04	1.00				
(4) ϑ_{it-1} (Expansion)	−0.01	0.09	−0.06	1.00			
(5) ln (Capital stock$_{it}$)	0.01	0.23	0.08	0.06	1.00		
Government share of GDP$_{it}$ (%)	−0.13	0.10	0.02	−0.02	−0.11	1.00	
Inflation$_{it}$	−0.04	−0.14	−0.09	0.03	0.01	−0.02	1.00

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jeca.2025.e00416.

Data availability

Data will be made available on request.

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