South African Journal of Economics

ORIGINAL ARTICLE

Does Fiscal Policy Boost Economic Growth in the LDCs? The Role of Fiscal Ratings and Key Fiscal Variables

António Afonso[1,2,3] | M. Carmen Blanco-Arana[4]

[1]ISEG – Lisbon School of Economics and Management, Universidade de Lisboa, Lisbon, Portugal | [2]REM – Research in Economics and Mathematics, UECE – Complexity and Economics Research Unit, Lisbon, Portugal | [3]CESifo (Center for Economic Studies and Ifo Institute), Munich, Germany | [4]Faculty of Economics and Business Studies, Department of Applied Economics (Public Finance, Economic Policy and Political Economy), University of Málaga, Málaga, Spain

Correspondence: M. Carmen Blanco-Arana (c.blancoarana@uma.es)

Received: 11 August 2024 | **Revised:** 7 March 2025 | **Accepted:** 13 March 2025

Funding: This work was supported by the Fundação para a Ciência e a Tecnologia (UIDB/05069/2020) and the Spanish Ministry of Science and Innovation (PID2020-115429 GB-I00).

Keywords: economic growth | fiscal policy rating | fiscal policy variables | fixed effects model | LDCs

ABSTRACT

Fiscal policy is an important tool for stimulating economic growth. Thus, in this paper, we assess empirically the role of the World Bank's Country Policy so-called fiscal policy rating variables (fiscal rating, debt rating and revenue rating) on economic growth in the poorest countries of the world, the Least Developed Countries (LDCs), during the period of 1990–2022. We also investigate the role of key fiscal variables on economic growth (government debt, expenditure and tax revenue). We find that most of fiscal policy rating variables strongly and positively enhance economic growth in the LDCs. In addition, we find that government debt and tax revenues significantly influence economic growth, and government effectiveness positively influences economic growth. The results are robust by applying a fixed effects model and a GMM model.

JEL Classification: C23, G10, O10, O43

1 | Introduction

Fiscal policy, encompassing government spending and tax policies, influences economic conditions such as aggregate demand, employment, inflation and economic growth. It helps stabilize and stimulate the economy, especially in resource-limited countries, by adjusting revenues and expenditures, and fulfils the need for a welfare state as well. Hence, since Adam Smith, the impact of government activities on economic growth has been a significant subject of study. In this sense, government activities may be a necessary condition for stabilization and adjustment in the presence, for instance of a large external debt or imbalances, being a quite topical issue in developed and, particularly, in many developing countries (Martin and Fardmanesh 1990).

The relevance of the impact on economic growth of a large public sector in general and of budget deficits in particular, in developed and developing countries alike, has been a recurrent research topic (see, e.g., for developed countries, Afonso and Alves 2015; Korinek and Stiglitz 2022, and, for developing countries, Chugunov et al. 2021, Botta et al. 2023, among others). Empirical studies on the relationship between fiscal policy and economic growth are primarily focussed on providing evidence about the impact of government spending and the tax level on economic growth, as well as on studying the impact of the tax structure on growth.

Hence, fiscal policy can foster economic growth through a number of different channels, including macroeconomic factors, such as taxes, expenditures or deficits (key fiscal

variables). According to Afonso and Alves (2015), economic theory tells us that government debt could be an important vehicle for inducing economic growth, and they report a negative effect on economic growth, both in the short and long terms. On the other hand, Clements et al. (2004) mention that one of the central insights from past research on developing countries is that prudent fiscal policy—that is to say, low budget deficits and low levels of public debt—is a key factor for economic growth, which in turn is essential for reducing poverty and improving social outcomes. In this vein, Afonso and Jalles (2012) assess how fiscal policy volatility affects growth. They find that economic growth is lower in the presence of volatile fiscal policy, suggesting that the implementation of smoother fiscal policies helps creating a friendlier and stable growth environment.

In this context, the least developed countries (LDCs) are low-income countries facing severe structural impediments to sustainable development. They are highly vulnerable to economic and environmental shocks and have low levels of human assets. Therefore, research on economic growth in these countries seems to be crucial, as it can highlight the aspects of growth that best help improve the standard of living, reduce poverty and achieve sustainable development.

Therefore, the issue of formulation and implementation of 'good' fiscal policy is quite common in research. Keynes (1936) already placed an emphasis on the potential for government spending and taxation to influence aggregate demand. Later, Samuelson (1942) and more recently with Korinek and Stiglitz (2022) advocate that fiscal policy can go beyond demand stabilization and account for the pervasive macroeconomic externalities that generate economic inefficiencies and hold the economy back from reaching its full potential to generate broadly shared prosperity. Hence, the purpose of this research is to assess the relevance of fiscal policy as a driver of economic development, particularly in the case of LDCs.

Thus, it should be possible to establish optimal fiscal policies that support the growth of the least-developed countries, taking into account that optimal fiscal policy and debt management should be jointly determined. In this context, the World Bank's Country Policy and Institutional Assessment (CPIA) assesses the conduciveness of a country's policy and institutional framework to sustainable growth in helping the world's low-income countries. The CPIA evaluates how a country's policy and institutional framework supports sustainable growth, poverty reduction and effective development assistance. Among their fiscal ratings indices, three key variables are analysed for their impact on growth: CPIA fiscal policy, CPIA debt policy and CPIA revenue mobilization efficiency. Fiscal policy assesses sustainability and its effects on growth, debt policy evaluates risk-minimizing debt management and revenue mobilization efficiency examines the overall revenue collection system, including tax structures and other sources.

In this study, we analyse the effects of fiscal policy rating variables on economic growth in the LDCs using CPIA ratings, covering the period 1990–2022 and employing a panel data methodology. Specifically, we examine how CPIA fiscal policy, debt policy and revenue mobilization ratings influence economic growth, hypothesizing that higher ratings contribute positively to growth. Additionally, we assess the impact of key fiscal variables—central government debt, gross national expenditure and tax revenue—on economic growth to determine whether their relationship is positive, negative or neutral in the case of the LDCs.

The remainder of this paper is as follows. Section 2 reviews the literature. Section 3 describes the data and estimation strategy. Section 4 explains empirical results and discussion. Finally, Section 5 presents some conclusions.

2 | Literature and Background

In recent decades, numerous authors have examined this relationship, contributing theoretical and empirical arguments (see, e.g., Martin and Fardmanesh 1990; Christie 2014; Fincke and Greiner 2015; Gemmell et al. 2016; Oyinlola et al. 2020; Afonso and Alves 2023). Thus, the validity of the implementation of so-called 'good' fiscal policy is an important condition for achieving national socioeconomic interests and stimulating investment processes in the economy.

At the same time, the basis of the quality of fiscal policy implementation is its coherence with the strategic priorities of the country's socioeconomic development. Some studies (Christie 2014; Gemmell et al. 2016; Chu et al. 2020; Oyinlola et al. 2020) have assessed the relationship between the level of public spending or the tax burden and economic growth, using cross-country growth regression techniques covering different periods and different country samples.

However, there is no consensus regarding the significance of public spending or of the tax burden on economic growth. This controversy stems from the fact that the overall size of the public sector has two opposite effects: On the one hand, higher taxes produce higher distortions and affect negatively economic activity and growth, and, on the other hand, higher taxes result in higher levels of public expenditure, some of which may foster economic growth. Thus, this deep-seeded belief that taxation, public investment and other aspects of fiscal policy can contribute to growth miracles, as well as to enduring stagnation, has been articulated in the context of growth models during past decades (Easterly and Rebelo 1993). Therefore, it appears that there is no consensus regarding the connection between fiscal policy and economic growth. Indeed, several papers report a negative relationship between fiscal policy and economic growth, whereas others suggest that the relationship may be positive. Finally, there are studies that support the neutrality of fiscal policy and economic growth.

Hence, the nature of the relationship may be positive, negative or neutral, demonstrating that the effect of fiscal policy on economic growth is not constant and is more diverse. Behind such differences, there are several heterogeneous factors, such as the research methodology used, the level of development of the sampled countries, the relative size of the public sector, institutional quality, the composition and the selected control variables, among others.

In the context of developing countries, for example, Pugu et al. (2024) demonstrate that fiscal policy has a strong positive influence on economic development in border regions. Fiscal incentives, including tax reductions and accelerated infrastructure investment, have successfully boosted economic growth by creating more jobs and increasing competitiveness. Fiscal austerity in developing economies, supposedly taming external imbalances, exacerbates such instability. More diversified productive structures and stronger nonprice competitiveness open more space for expansionary fiscal policies, making the economy more resilient to finance-led macroeconomic cycles and making external debt more sustainable (Botta et al. 2023). Nevertheless, Chugunov et al. (2021) report no positive effects of general government expenditures on the growth of per capita GDP in 19 emerging economies from 1995 to 2018. The influence of public spending on economic growth depends on institutions quality, the composition of expenditures and fiscal architecture. They also support the expediency of increasing the share of productive expenditures that positively stimulate the economy.

Therefore, fiscal policies have strong links to and impacts on the most important issues in development, including long-term fiscal sustainability, contribution to short-term macroeconomic stabilization and economic growth. Indeed, raising tax revenue is crucial to countries' ability to fund their development needs and to foster economic growth. Consequently, adequate tax systems can play an important role in addressing equity and supporting sustainable growth objectives. Governments' taxes and expenditures can also correct market failures and enhance economic efficiency and welfare.

Therefore, in the aforementioned context, the LDCs need to pay attention to improving fiscal policies and to achieve this purpose should lean on tools like the World Bank's CPIA. Consequently, a lengthy discussion has taken place among academics regarding this topic, albeit this is not the case for the fiscal policy rating variables, and its impact on growth in the LDCs by using CPIA measures elaborated by the World Bank.

To the best of our knowledge, this is the first contribution to the literature that analyses the effects of fiscal policy rating variables ratings on economic growth, by using the CPIA in the whole of LDCs during a large period of time (1990–2022). Accordingly, whereas the literature on developing countries mostly focuses on country-specific studies or on groups of countries from different income categories, this study takes into account a large group of the countries with the lowest development levels in the world. Furthermore, we also examine the impact of key fiscal variables studied in the literature—central government debt, gross national expenditure and tax revenue—on economic growth to assess the nature of the relationship (positive, negative or neutral) in the LDCs.

Therefore, based on the previous findings and theoretical underpinnings that emerge from the literature review, we formulate the following hypotheses for this group of countries:

Hypothesis 1. *'Good' fiscal policies, in terms of CPIA ratings, positively influence economic growth in LDCs.*

Hypothesis 2. *Key fiscal variables are expected to be connected to economic growth in the LDCs.*

3 | Data and Estimation Strategy

This section describes the database and discusses the estimation strategy proposed to analyse the connection between fiscal policy and economic growth in LDCs, which in 2023 comprised 46[1] countries. The United Nations defines LDCs as countries that have low levels of income and face severe structural impediments to sustainable development, using three criteria[2] to identify the LDCs: income human assets and economic and environmental vulnerability.

In this study, we use as relevant variables CPIA indices from the World Development Indicators (World Bank 2024). To carry out our analysis, we work with an unbalanced panel for LDCs for the period of 1990–2022, using the statistical information available. As noted by Beck et al. (2007), many countries do not have data for every year and therefore lack sufficient observations.

In general, the rate of growth of the GDP per capita or GDP per capita is often used as an indicator of economic growth (see, e.g., Levine et al. 2000; Levine 2003; Afonso and Blanco-Arana 2022, among others). Therefore, as dependent variable, we use the growth of GDP per capita, which corresponds to annual percentage growth rate of GDP per capita based on constant local currency. GDP per capita is the gross domestic product divided by midyear population. GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products (not considering deductions for depreciation of fabricated assets or for depletion and degradation of natural resources).

Regarding fiscal policy ratings,[3] we first estimate our specification by using these three main explanatory variables:

- CPIA fiscal policy rating (1 = *low* to 6 = *high*): Fiscal policy assesses the short- and medium-term sustainability of fiscal policy (taking into account monetary and exchange rate policy and the sustainability of the public debt), as well as its impact on growth.
- CPIA debt policy rating (1 = *low* to 6 = *high*): Debt policy assesses whether the debt management strategy is conducive to minimizing budgetary risks and to ensuring long-term debt sustainability.
- CPIA efficiency of revenue mobilization rating (1 = *low* to 6 = *high*): Efficiency of revenue mobilization assesses the overall pattern of revenue mobilization—not only the de facto tax structure but also revenue from all sources as actually collected.

The main objective is to understand which of these variables has more impact on economic growth in LDCs and then go further into our analysis by using a dummy variable in order to assess if a high rating in the CPIA variables favours economic growth in these countries.

The more recent literature relies heavily on various sets of (country) fixed effects to deal with causal inference. Acemoglu et al. (2019) is a good example on how to set up an empirical framework to analyse the impact of a measure of institutional quality on growth. Thus, one of their approaches is to use a dynamic panel model for GDP, which includes both country fixed effects and autoregressive dynamics. The underlying economic assumption here is that, conditional on the lags of GDP and country fixed effects, countries that could change their status are not on a differential GDP trend. This strategy leads to robust and precise estimates. Following this approach, we estimate a fixed effects model[4] with panel data, where the fixed effects' estimator ensures that differences between states are a constant correlation.

Accordingly, to examine the impact of fiscal policy on economic growth in LDCs, the baseline model is as follows:

$$Growth_{it} = \beta_0 + \beta_1 Growth_{it-1} + \beta_2 FR_{it} + \zeta_i + \omega_{it}, \quad (1)$$

where $Growth_{it}$ refers to economic growth, FR_{it} denotes the respective fiscal policy rating variable of the CPIA rating, ζ_i is the intercept for each country and ω_{it} are the individual level residuals. In addition, in order to account for persistence, we also consider the lagged GDP per capita growth as a potential determinant[5].

Additionally, we introduce a dummy[6] variable in order to interact with the fiscal policy CPIA rating variable, which takes a value of 1 if the CPIA is above 3 (i.e., countries with high or medium-high value of the CPIA rating), and 0 otherwise, as illustrated in the following specification:

$$Growth_{it} = \beta_0 + \beta_1 FR_{it} + \beta_2 FR_{it} * DUMMY_{it} + \zeta_i + \omega_{it}. \quad (2)$$

Different dimensions of fiscal policy can influence economic growth. Empirical studies of the relationship between fiscal policy and economic growth are focused primarily on providing evidence on the impact of government spending and tax level on growth and, second, on the impact of the tax structure on growth (see, e.g., Tamoya 2012; Gemmell et al. 2016; Oyinlola et al. 2020; Afonso and Alves 2023, among others). In this context, Fincke and Greiner (2015) report a statistically significant positive correlation between public debt and the subsequent growth rate of GDP per capita. Similarly, there are differing perspectives on the most appropriate economic dimension to define fiscal policy. Based on the literature review, we use the following three key fiscal variables:

- Central government debt, total (% of GDP): Debt is the entire stock of direct government fixed-term contractual obligations to others outstanding on a particular date. It includes domestic and foreign liabilities, such as currency and money deposits, securities other than shares and loans. It is the gross amount of government liabilities reduced by the amount of equity and financial derivatives held by the government. Because debt is a stock rather than a flow, this variable is measured as of a given date, usually the last day of the fiscal year.
- Gross national expenditure (% of GDP): Gross national expenditure (formerly domestic absorption) is the sum of household final consumption expenditure (formerly private consumption), general government final consumption expenditure (formerly general government consumption) and gross capital formation (formerly gross domestic investment).
- Tax revenue (% of GDP): Tax revenue refers to compulsory transfers to the central government for public purposes. Certain compulsory transfers such as fines, penalties and most social security contributions are excluded. Refunds and corrections of erroneously collected tax revenue are treated as negative revenue.

As a deeper analysis, and in order to investigate the impact of key fiscal variables on economic growth in LDCs, our model is as follows:

$$Growth_{it} = \beta_0 + \beta_1 Growth_{it-1} + \beta_2 FV_{it} + \zeta_i + \omega_{it}, \quad (3)$$

where $Growth_{it}$ refers to economic growth, FV_{it} denotes the respective key fiscal variables, ζ_i is the intercept for each country and ω_{it} are the individual level residuals. As previously done in the model with fiscal policy ratings, in order to account for persistence, we also consider the lagged GDP per capita growth as a potential determinant.

Additional details on fiscal policy ratings and key fiscal variables are provided in Table A1, whereas Table A2 presents summary statistics for all variables. Both tables can be found in the appendix.

4 | Empirical Results and Discussion

4.1 | Baseline Results

The empirical evidence suggests that the CPIA fiscal policy rating strongly and positively relates to economic growth. However, when we take into account the three fiscal policy rating dimensions at the same time, only fiscal policy rating (that assesses the short- and medium-term fiscal sustainability) positively affects economic growth significantly. Fiscal rating is the most relevant variable in determining the economic growth of LDCs, showing that countries that make greater efforts to improve their fiscal (position) rating show progress in the country's economic growth (see Table 1). In this sense, the establishment of 'good' fiscal policy measures seems to be a necessary condition for stabilization and growth mainly in developing countries. This is also the arguing point by Martin and Fardmanesh (1990), especially in the presence of a large external debt.[7]

In this context, Korinek and Stiglitz (2022) conclude that fiscal policy can go beyond demand stabilization and foster economic prosperity through state intervention. Therefore, we conclude fiscal policy has a strong positive influence on economic development in the LDCs in line with Botta et al. (2023) and Pugu et al. (2024). Obviously, optimum design of a fiscal system will depend on numerous factors and differ from country to country.

In fact, when discriminating between countries, which are below and above the rating of 3 (see Tables A3 and A4, respectively), we find that those countries with better scores of fiscal ratings (better fiscal sustainability prospects) have better economic growth prospects. On the other hand, when the fiscal rating indicator is below 3, there is no statistically significant effect of those fiscal ratings on economic growth.

TABLE 1 | Fixed effects models.

(A) Fiscal ratings				
Variables	**(1)**	**(2)**	**(3)**	**(4)**
$Growth_{it-1}$	0.071*	0.097**	0.100***	0.068*
	[0.038]	[0.038]	[0.038]	[0.038]
Fiscal rating	2.020***			1.856***
	[0.438]			[0.466]
Debt rating		0.721*		0.252
		[0.386]		[0.396]
Revenue rating			1.340*	0.628
			[0.725]	[0.735]
Constant	−4.822***	−0.723	−2.766	−7.151***
	[1.402]	[1.250]	[2.365]	[2.633]
Observations	743	743	743	743
Number of countries	46	46	46	46
R squared	0.40	0.16	0.16	0.42
(B) With dummies				
Variables	**(1)**	**(2)**	**(3)**	**(4)**
Fiscal rating	1.960***			1.731**
	[0.699]			[0.730]
Fiscal rating*dummy	0.085			0.117
	[0.214]			[0.217]
Debt rating		0.422		−0.364
		[0.565]		[0.581]
Debt rating*dummy		0.244		0.377*
		[0.242]		[0.243]
Revenue rating			1.366	0.699
			[1.079]	[1.092]
Revenue rating*dummy			0.038	0.038
			[0.266]	[0.267]
Constant	−4.636**	−0.052	−2.729	−5.892*
	[1.968]	[1.513]	[3.150]	[3.541]
Observations	744	744	744	744
Number of countries	46	46	46	46
R squared	0.36	0.08	0.06	0.41

Note: Standard errors are in brackets. Level of significance: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

In Table 1B, we include dummies in order to assess if a high rating in the CPIA variables favours economic growth in the LDCs. By interacting the dummies with the fiscal policy CPIA rating, we find that a 'good' fiscal rating (i.e., high or medium-high scores of fiscal rating) has a significantly more pronounced effect on growth. In addition, with regard to the debt rating, we find that countries with higher levels of fiscal rating also have a greater probability of improving their growth.

Furthermore, our analysis of key fiscal variables reveals that tax revenues and gross national expenditure has a negative and significant impact on economic growth in LDCs (see Table 2). Thus, in the framework of our current results, on the one hand, with regarding tax revenue, one can question its respective efficient functioning. In line with Martin and Fardmanesh (1990) who argue that tax revenues are associated with a higher economic growth rates when their benefits in terms of reducing deficits are taken into account, in addition, central government debt does not appear to affect growth, albeit it is true that there is a great heterogeneity in terms of the debt burden in LDCs. In this sense, according to Afonso and Alves (2015), government debt could be an important vehicle for inducing economic growth in the short and long terms. Indeed, in the LDCs, the debt ratio ranges from 2.90% of GDP to 289.84% of GDP. Moreover, there are issues related to lack of information, and when we only include this variable in the model, the sample reduces to only 16 countries.

4.2 | Reverse Causality and Unobserved Heterogeneity

4.2.1 | Reverse Causality

It is plausible that although better fiscal policy ratings (e.g., fiscal sustainability or efficient revenue mobilization) may lead to higher economic growth, economic growth itself could

TABLE 2 | Fixed effects models (key fiscal variables estimation).

Variables	**(1)**	**(2)**	**(3)**
$Growth_{it-1}$	0.221**	0.003	0.201***
	[0.085]	[0.030]	[0.042]
Debt (% GDP)	−0.011		
	[0.010]		
Gross expenditure (% GDP)		−0.020*	
		[0.015]	
Tax (% GDP)			−0.037*
			[0.022]
Constant	1.611**	3.774**	2.594***
	[0.755]	[1.774]	[0.372]
Observations	161	1036	468
Number of countries	16	39	30
R squared	0.60	0.02	0.57

Note: Standard errors are in brackets. Level of significance: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

influence the fiscal policy rating. Countries experiencing high growth might have more resources and fiscal flexibility, which could improve their fiscal ratings (see in the Tables A5 and A6). Our evidence also suggests that GDP improves fiscal capacity in line with Acemoglu et al. (2019), perhaps by inducing greater investment and lower social unrest.

4.2.2 | Unobserved Heterogeneity

As we explained in the methodology section, in order to analyse the unobserved effects presented in Equation (1), it is possible to apply a fixed effects or a random effects model. Thus, we apply the Hausman test to choose the best methodology for solving the problem of unobserved effects. The basic idea of this test is to examine whether we can accept the null hypothesis, which means that random effects are the best solution, and if we reject it, one should use a fixed effects estimation. Because the Hausman rejects the null hypothesis, we then we opt to use the fixed effects estimation. According to Afonso and Alves (2015), the endogeneity issue is one of the main questions that arises from panel data analysis. Should it be present in regressors, then one of the main objectives is to solve this problem, in order to obtain unbiased estimators. Endogeneity can emerge from omitted variables, measurement errors or simultaneity. Country-specific properties may be responsible for some unobserved omitted variables.

Within this context, few studies include a variable that captures the quality of government decisions. For instance, Kilic Celik et al. (2023) advocate the necessity of creating the environment that generates productivity-driven growth supported by measures to improve governance. Therefore, we include also the effect of government effectiveness, which captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Additionally, we take into account the global economic and financial crisis (GFC), in line with Afonso and Jalles (2012), because financial crises are detrimental for growth. Hence, we use a dummy variable called *crisis*, which takes the value 1 in the period 2008–2011 and 0 otherwise. It could be also desirable to include some mechanism

TABLE 3 | More control variables I′. Fixed effects models.

Variables	(1)	(2)	(3)	(4)
$Growth_{it-1}$	0.057	0.067*	0.065*	0.060
	[0.042]	[0.042]	[0.042]	[0.042]
Government effectiveness	1.143	1.879*	1.526	1.150
	[1.105]	[1.094]	[1.129]	[1.155]
Crisis	0.065	0.231	0.261	−0.028
	[0.473]	[0.472]	[0.467]	[0.482]
Labour force	0.154	0.182*	0.190*	0.167*
	[0.105]	[0.105]	[0.105]	[0.106]
Unemployment	−0.353*	−0.294	−0.300	−0.353*
	[0.201]	[0.201]	[0.200]	[0.201]
Fixed capital	0.102***	0.099***	0.093***	0.112***
	[0.035]	[0.036]	[0.035]	[0.036]
Fiscal rating	1.282**			1.417**
	[0.566]			[0.594]
Debt rating		−0.212		−0.601
		[0.523]		[0.544]
Revenue rating			0.637	0.413
			[0.853]	[0.864]
Constant	−11.432*	−8.030	−11.390	−12.246
	[7.300]	[7.314]	[8.181]	[8.199]
Observations	603	603	603	603
Number of countries	39	39	39	39
R squared	0.54	0.45	0.46	0.56

Note: Standard errors are in brackets. Level of significance: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

to control for economic development, but this feature intrinsically belongs to this group of countries, which presents the lowest human development index ratings of all the countries in the world.

Our results (see Tables 3 and 4) show that the impact of the GFC, especially virulent for developed countries, was not so acute for countries with lower levels of development of the world, as Afonso and Blanco-Arana (2024a) assert. We also find that there is a positive impact of Government Effectiveness on economic growth in Model (2) in Table 3. In this line, government effectiveness has a positive impact on growth in most models in Tables B7 and B8 with less control variables (see the appendix). Thus, our results are in line with Alam et al. (2017) and Afonso et al. (2024), who find a significant positive effect of government effectiveness on economic growth.

Regarding fiscal rating variables, results are similar to those in the baseline models highlighting the importance of having 'good' fiscal ratings to boost economic growth in the LDCs. Nevertheless, with regard to key fiscal variables, by considering other variables, the results show that contrary to the baseline specification, central government debt is now negative and statistically significant in line with Eberhardt and Presbitero (2015) who find some support for a negative relationship between public debt and long-run growth across countries. Hence, our results suggest that government effectiveness modulates the effect of central government debt on economic growth. Additionally, total gross national government expenditure might link to a lack of efficacy and even to an unexpected effect. This is in line with Chugunov et al. (2021), who show no positive effects of general government expenditures on economic growth in a group of developing countries.

Furthermore, in line with growth literature, we incorporate additional variables in our analyses to assess their relevance. For example, according to Afonso and Blanco-Arana (2024b), there is a statistically and significant link between per capita GDP growth and the evolution of the unemployment rate. Hence, we also include the unemployment rate in our analysis, which refers to the share of the labour force that is without work but available for and seeking employment. Additionally, the growth of world economies comprising of both advanced and developing economies depends on the active participation of labour force. Hence, we also have included the variable labour force, which refers to

TABLE 4 | More control variables II′. Fixed effects models.

Variables	(1)	(2)	(3)
$Growth_{it-1}$	0.095	0.033	0.156***
	[0.140]	[0.034]	[0.050]
Government effectiveness	1.695	0.527	1.294
	[2.362]	[0.779]	[1.359]
Crisis	2.737**	0.580*	0.636
	[1.232]	[0.443]	[0.571]
Labour force	−0.181	0.120*	0.012
	[0.261]	[0.079]	[0.137]
Unemployment	−0.630*	−0.144	−0.473*
	[0.410]	[0.183]	[0.273]
Fixed capital	0.046	0.111***	−0.042
	[0.058]	[0.031]	[0.046]
Debt (% GDP)	−0.063**		
	[0.025]		
Gross expenditure (% GDP)		−0.046***	
		[0.018]	
Tax (% GDP)			−0.017
			[0.026]
Constant	20.090	−2.110	6.506
	[18.823]	[5.651]	[9.889]
Observations	92	749	298
Number of countries	12	36	23
R squared	0.22	0.3	0.75

Note: Standard errors are in brackets. Level of significance: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

TABLE 5 | Fixed effects models (fiscal rating and fiscal policy variables).

Variables	(1)	(2)	(3)	(4)
$Growth_{it-1}$	0.058	0.045	0.168***	−0.025
	[0.042]	[0.134]	[0.050]	[0.155]
Fiscal rating	1.517***			1.934*
	[0.493]			[1.132]
Gross expenditure (% GDP)	−0.013			−0.047
	[0.019]			[0.067]
Debt rating		0.828		0.730
		[1.585]		[1.862]
Debt (% GDP)		−0.100***		−0.081**
		[0.028]		[0.035]
Revenue rating			1.895*	1.150
			[1.145]	[2.936]
Tax (% GDP)			−0.044**	−0.009
			[0.021]	[0.173]
Constant	−1.732	3.644	−3.444	−1.067
	[2.550]	[6.272]	[3.887]	[13.774]
Observations	610	93	328	78
Number of countries	39	11	28	9
R squared	0.24	0.21	0.59	0.25

Note: Standard errors are in brackets. Level of significance: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

the labour force participation rate and is the proportion of the population ages 15 and older that is economically active during a specified period.

In addition, Rahman and Velayutham (2020) reported that a 1% increase in fixed capital formation increases economic growth by 0.58% for a panel of five South Asian countries over the period of 1990–2014. Therefore, we also have included fixed capital formation as a potential growth driver, which is the gross fixed capital formation as a percentage of GDP (formerly gross domestic fixed investment).

Regarding the fiscal rating variables and the key fiscal variables, our results emphasize the importance of having 'good' fiscal policies to boosted economic growth in the LDCs. Moreover, by including new control variables related to growth (see Tables 3 and 4), the results also show the importance on labour market on growth in the LDCs according to Afonso and Blanco-Arana (2024b). On the one hand, this is measured by unemployment rate, which is negative and statically significant in the mostly models, and, on the other hand, the effect is captured by the labour force as a key element in understanding and measuring economic productivity. Furthermore, and in line with Rahman and Velayutham (2020), the fixed capital formation positively increases economic growth.

4.3 | Additional Analysis

As an additional analysis, we estimate the specifications using jointly the fiscal rating variables and the fiscal policy variables (see Table 5). This might better identify if it is the rating index as a summary of indicators that drives growth or if it is just the particular fiscal indicator that matters.

Hence, we conclude that establishment of 'good' fiscal policy measures seems to be a necessary condition for economic and growth in the LDCs. Obviously, optimum design of a fiscal system depends on numerous factors such a high quality of fiscal factors, measured by ratings and other fiscal measures implemented by governments.

4.4 | Robustness Analysis

The critical threats to the validity of the estimates reported so far come from the presence of time-varying economic and institutional factors that impact GDP growth (country fixed effects absorb the time-invariant factors). So, in line with Afonso and Jalles (2012), one needs to address the potential endogeneity problem of right-hand side regressors, and although country-specific fixed effects might capture some of the omitted variables, it does not solve the problem, and we may get biassed coefficient estimates.

Therefore, as an additional robustness test, we introduce a dynamic variant of the baseline model. We apply in Equation (1) the system-generalized method of moments (GMM) estimator that was developed by Arellano and Bover (1995) and Blundell and Bond (1998). This method estimates a system of equations in both first differences and levels, where the instruments in the level equations are the lagged first differences of the variables.

TABLE 6 | GMM models.

(A) With one lag				
Variables	**(1)**	**(2)**	**(3)**	**(4)**
$Growth_{it-1}$	0.086**	0.124***	0.121***	0.086**
	[0.039]	[0.039]	[0.039]	[0.039]
Fiscal rating	2.426***			2.590***
	[0.518]			[0.561]
Debt rating		0.112		−0.731
		[0.496]		[0.515]
Revenue rating			1.491*	0.584
			[0.888]	[0.904]
Constant	−6.152***	1.191	−3.299	−6.219**
	[1.653]	[1.607]	[2.895]	[3.121]
Observations	696	696	696	696
Number of countries	46	46	46	46
Sargan test	0.0066	0.0094	0.0097	0.0085
Arellano–Bond test	0.1915	0.3095	0.3080	0.1855
(B) With two lags				
Variables	**(1)**	**(2)**	**(3)**	**(4)**
$Growth_{it-1}$	0.083**	0.124***	0.122***	0.083**
	[0.039]	[0.039]	[0.039]	[0.039]
$Growth_{it-2}$	−0.121***	−0.094**	−0.096**	−0.121***
	[0.038]	[0.039]	[0.039]	[0.038]
Fiscal rating	2.666***			2.811***
	[0.522]			[0.563]
Debt rating		0.198		−0.690
		[0.498]		[0.514]
Revenue rating			1.600*	0.613
			[0.888]	[0.901]
Constant	−6.675***	1.101	−3.466	−6.907**
	[1.657]	[1.607]	[2.894]	[3.119]
Observations	695	695	695	695
Number of countries	46	46	46	46
Sargan test	0.0113	0.0135	0.0142	0.0139
Arellano–Bond test	0.4443	0.6063	0.5791	0.4735

Note: Standard errors are in brackets. Level of significance: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

This dynamic approach enables the inclusion of lagged values of growth as an explanatory variable, which controls for omitted variables that change over time, in contrast with fixed effects estimations, which control for country characteristics.

The results turn out to be similar. Indeed, by applying a dynamic panel data approach with one and two lags of the dependent variable, fiscal rating is always the most relevant variable in determining the economic growth of LDCs. In addition, revenue rating also has an impact. Indeed, tax revenue and gross national expenditure negatively and significantly affect economic growth in LDCs, questioning the efficient functioning of both in the scantly developed economies.[8] Moreover, we can see that the growth rate is fairly autoregressive (see Table 6A,B).

We checked also for overidentifying restrictions with the Sargan test (with the joint null hypothesis that the instruments are valid instruments, i.e., uncorrelated with the error term). The result suggests that the instruments are indeed valid by using two lags, whereas the Arellano–Bond test for second-order autocorrelation reveals that there is no significant serial correlation, and thus, the estimator should be consistent. For this reason, we have applied one and two lags on economic growth obtaining similar conclusions for fiscal policy ratings and key fiscal variables.

5 | Conclusions

This paper examines the impact of fiscal policy on economic growth in the LDCs. Specifically, we analyse the role of fiscal policy ratings (fiscal, debt and revenue ratings) using CPIA measures from the World Bank across 46 LDCs during the period of 1990–2022. Additionally, we compare these results with an alternative model that assesses the influence of key fiscal variables (government debt, expenditure and tax revenue), identified in the literature, on the economic growth within same group of countries and period.

This issue has been widely studied, and our research explored the role of fiscal policy in economic development, with a particular focus on LDCs. Previous reasoning suggests that when the state becomes to implement 'good' fiscal policies, achieves greater capacity and has access to a larger set of fiscal instruments, which there will be less need for such inefficient, indirect methods of redistribution and the allocation of resources will improve (see, e.g., Acemoglu 2006 and Besley and Persson 2010).

Our findings show that higher 'fiscal policy ratings' are linked to stronger economic growth. Improved performance in areas such as government debt, budget balance and tax revenue can significantly contribute to enhancing economic growth, whereas government effectiveness positively affects economic growth. These conclusions suggest that well-targeted gross national expenditure may foster economic growth for those countries analysed in this study, notably by directly fostering growth and indirectly by reducing the costs of sovereign funding in capital markets.

Therefore, we conclude that applying 'good' fiscal policies is critical for maintaining economic stability and fostering sustainable growth. In this context, the application of good fiscal policies is not just economic necessity, but it is multifaceted and plays a central role in shaping a country's overall economic health: It is fundamental to creating a robust, resilient and inclusive economy. Properly designed fiscal policies can mitigate economic volatility, support sustainable growth, reduce poverty and inequality and ensure the efficient use of public resources.

Additionally, an often-overlooked aspect such as the impact of government effectiveness is positive on fiscal policy outcomes in line with Kilic Celik et al. (2023). Thus, our conclusion provides valuable insights into the complexities of fiscal policy's effects on economic growth in the way that government could give precise and reliable information to its firms and people develops a trustworthy relationship with them, which leads to better decisions by these agents regarding their financial and economic choices and investments (Afonso et al. 2024). We also conclude that the labour market plays a crucial role on economic growth in the LDCs, on the one hand, measured by unemployment rate and, on the other hand, captured by the labour force, as two key elements in of growth in these countries. Furthermore, we highlight also the importance of fixed capital formation on growth.

Moreover, fiscal ratings are the most significant factors in determining the economic growth of LDCs, suggesting that prioritizing the improvement of their fiscal sustainability ratings is more likely to lead to more efficient economic progress.

Acknowledgements

We thank the editor and two anonymous referees for very useful comments and suggestions, which certainly helped improve the overall quality of our paper. Funding for open access charge: Universidad de Málaga/CBUA.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

Data are available from World Bank website. They are free access.

Endnotes

[1] The list of the LDCs in 2023 is as follows: Afghanistan, Angola, Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Comoros, Congo, Dem. Rep., Djibouti, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Haiti, Kiribati, Lao PDR, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Myanmar, Nepal, Niger, Rwanda, S. Tome and Principe, Senegal, Sierra Leone, Solomon Islands, Somalia, South Sudan, Sudan, Tanzania, Timor-Leste, Togo, Tuvalu, Uganda, Yemen and Zambia.

[2] LDC criteria: (i) income: Countries must have an average per capita income below USD$1018 for inclusion, and above USD$1222 for graduation; (ii) human assets: Countries must also have a low score on the Human Assets Index, a tool that measures health and education outcomes, including under-five mortality rate, maternal mortality, adult literacy rate and gender parity for secondary school enrolment; (iii) economic and environmental vulnerability: Countries must score high on the Economic and Environmental Vulnerability Index, which measures factors like remoteness, dependence on agriculture and vulnerability to natural disasters.

[3] The CPIA elaborated by the World Bank consists of 16 criteria grouped in four equally weighted clusters: Economic Management, Structural Policies, Policies for Social Inclusion and Equity, and Public Sector Management and Institutions. For each of the 16 criteria, countries are rated on a scale of 1 (*low*) to 6 (*high*). The scores depend on the level of performance in a given year assessed against the criteria rather than on changes in performance compared to the previous year. The ratings depend on actual policies and performance rather than on promises or intentions. Each of the four clusters has a 25% weight in the overall

rating. Within each cluster, all criteria receive equal weight, although components within a criterion may be weighted differently.

[4] Anyway, the random effect model is rejected by the standard Hausman (1978) test in favour of the fixed effects model, which supports the choice of assuming a fixed effects regression method. The fixed effects estimator allows for the correlation of individual effects with the explanatory variables of the model, assuming that the differences between countries (in this case) are constant. Thus, we estimate the panel data model conventionally with country fixed effects.

[5] Most likely, the growth rate is quite autoregressive; hence, we should do include it as well.

[6] Including a dummy variable for countries with a CPIA rating above 3 enhances the empirical analysis by capturing policy-relevant distinctions. Because many policy frameworks classify countries based on CPIA scores, a threshold above 3 signifies stronger institutions and governance, making the dummy variable more interpretable.

[7] See Tables B1–B4 for some additional tests.

[8] See Tables B9 and B10 for additional information.

References

Acemoglu, D. 2006. "Modeling Inefficient Institutions." NBER Working Papers 11940, National Bureau of Economic Research, Inc.

Acemoglu, D., S. Naidu, P. Restrepo, and J. A. Robinson. 2019. "Democracy Does Cause Growth." *Journal of Political Economy* 127, no. 1: 47–100.

Afonso, A., and J. Alves. 2015. "The Role of Government Debt in Economic Growth." *Review of Public Economics* 215: 9–26.

Afonso, A., and J. Alves. 2023. "Does Government Spending Efficiency Improve Fiscal Sustainability?" *European Journal of Political Economy*: 102403. https://doi.org/10.1016/j.ejpoleco.2023.102403.

Afonso, A., and M. C. Blanco-Arana. 2022. "Financial and Economic Development in the Context of the Global 2008–09 Financial Crisis." *International Economics* 169: 30–42.

Afonso, A., and M. C. Blanco-Arana. 2024a. "The Nexus Between Economic Freedom and Economic Growth in the Least Developed Countries. An Empirical Analysis for the Period of 2000–2021." *Finance a úvěr-Czech Journal of Economics and Finance* 74, no. 2: 191–220.

Afonso, A., and M. C. Blanco-Arana. 2024b. "Unemployment and Financial Development: Evidence for OECD Countries." *Comparative Economic Studies* 66: 661–683.

Afonso, A., and J. T. Jalles. 2012. "Fiscal Volatility, Financial Crises and Growth." *Applied Economics Letters* 19, no. 18: 1821–1826.

Afonso, O., P. Alves, and N. Fortuna. 2024. "The Impact of Fiscal Policy on the Economic Growth of OECD Members Between 1985 and 2015." *Panoeconomicus*: 1–21. https://doi.org/10.2298/PAN210423014A.

Alam, M. R., E. Kitenge, and B. Bedane. 2017. "Government Effectiveness and Economic Growth." *Economics Bulletin* 37, no. 1: 222–227.

Arellano, M., and O. Bover. 1995. "Another Look at the Instrumental Variable Estimation of Error-Components Models." *Journal of Econometrics* 68: 29–51.

Beck, T., A. Demirgüç-Kunt, and R. Levine. 2007. "Finance, Inequality and the Poor." *Journal of Economic Growth* 12, no. 1: 27–49.

Besley, T. J., and Y. Persson. 2010. "State Capacity, Conflict, and Development." *Econometrica* 78, no. 1: 1–34.

Blundell, R., and S. Bond. 1998. "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models." *Journal of Econometrics* 87: 115–143.

Botta, A., G. Porcile, D. Spinola, and G. T. Yajima. 2023. "Financial Integration, Productive Development and Fiscal Policy Space in Developing Countries." *Structural Change and Economic Dynamics* 66: 175–188.

Breusch, T., and A. Pagan. 1980. "The Lagrange Multiplier Test and Its Applications to Model Specification in Econometrics." *Review of Economic Studies* 47: 239–253.

Christie, T. 2014. "The Effect of Government Spending on Economic Growth: Testing the Non-Linear Hypothesis." *Bulletin of Economic Research* 66, no. 2: 183–204.

Chu, T. T., J. Hölscher, and D. McCarthy. 2020. "The Impact of Productive and Non-Productive Government Expenditure on Economic Growth: An Empirical Analysis in High-Income Versus Low- To Middle-Income Economies." *Empirical Economics* 58: 2403–2430.

Chudik, A., and M. H. Pesaran. 2015. "Common Correlated Effects Estimation of Heterogeneous Dynamic Panel Data Models With Weakly Exogenous Regressors." *Journal of Econometrics* 188, no. 2: 393–420.

Chugunov, I., M. Pasichnyi, V. Koroviy, T. Kaneva, and A. Nikitishin. 2021. "Fiscal and Monetary Policy of Economic Development." *European Journal of Sustainable Development* 10, no. 1: 42.

Clements, B. J., S. Gupta, and G. Inchauste. 2004. *Helping Countries Develop*. International Monetary Fund.

Dickey, D. A., and W. A. Fuller. 1979. "Distribution of the Estimators for Autoregressive Time Series With a Unit Root." *Journal of the American Statistical Association* 74: 427–431.

Easterly, W., and S. Rebelo. 1993. "Fiscal Policy and Economic Growth." *Journal of Monetary Economics* 32, no. 3: 417–458.

Eberhardt, M., and A. F. Presbitero. 2015. "Public Debt and Growth: Heterogeneity and Non-Linearity." *Journal of International Economics* 97, no. 1: 45–58.

Fincke, B., and A. Greiner. 2015. "Public Debt and Economic Growth in Emerging Market Economies." *South African Journal of Economics* 83, no. 3: 317–474.

Gemmell, N., R. Kneller, and I. Sanz. 2016. "Does the Composition of Government Expenditure Matter for Long-Run GDP Levels?" *Oxford Bulletin of Economics and Statistics* 78, no. 4: 522–547.

Hausman, J. 1978. "Specification Test in Econometrics." *Econometrica* 46, no. 6: 1251–1272.

Keynes, J. M. 1936. *The General Theory of Employment, Interest, and Money*. Macmillan.

Kilic Celik, S., M. A. Kose, F. Ohnsorge, and F. U. Ruch. 2023. "Potential Growth: A Global Database." In *Falling Long-Term Growth Prospects: Trends, Expectations, and Policies*, edited by M. A. Kose and F. Ohnsorge, 386–437. World Bank.

Korinek, A., and J. Stiglitz. 2022. *Macroeconomic Stabilization for a Post-Pandemic World, Revising the Fiscal-Monetary Policy Mix and Correcting Macroeconomic Externalities*. Brookings Institution.

Levine, R. 2003. "Stock Market Liquidity and Economic Growth: Theory and Evidence." In *Finance, Research, and Education, and Growth*. Palgrave MacMillan.

Levine, R., N. Loayza, and T. Beck. 2000. "Financial Intermediation and Growth: Causality and Causes." *Journal of Monetary Economics* 46, no. 1: 31–77.

Martin, R., and M. Fardmanesh. 1990. "Fiscal Variables and Growth: A Cross-Sectional Analysis." *Public Choice* 64: 239–251.

Nelson, C. R., and C. R. Plosser. 1982. "Trends and Random Walks in Macroeconomic Time Series." *Journal of Monterey Economics* 10: 139–162.

Oyinlola, M. A., A. A. Adedeji, M. O. Bolarinwa, and N. Olabisi. 2020. "Governance, Domestic Resource Mobilization, and Inclusive Growth in Sub-Saharan Africa." *Economic Analysis and Policy* 65: 68–88.

Pesaran, M. H. 2006. "Estimation and Inference in Large Heterogeneous Panels With a Multifactor Error Structure." *Econometrica* 74, no. 4: 967–1012.

Pesaran, M. H. 2021. "General Diagnostic Tests for Cross-Sectional Dependence in Panels." *Empirical Economics* 60: 13–50.

Pugu, M. R., A. Rizani, and J. Yumame. 2024. "Fiscal Policy and Its Impact on Economic Development in Border Areas." *Journal of Social and Education* 1, no. 1: 193–205.

Rahman, M. M., and E. Velayutham. 2020. "Renewable and Non-Renewable Energy Consumption-Economic Growth Nexus: New Evidence From South Asia." *Renewable Energy* 147, no. 1: 399–408.

Samuelson, P. A. 1942. "Fiscal Policy and Income Determination." *Quarterly Journal of Economics* 56, no. 4: 575–605.

Tamoya, C. 2012. "The Effect of Government Spending on Economic Growth: Testing the Non-Linear Hypothesis." *Bulletin of Economic Research* 66, no. 2: 183–204.

World Bank. 2024. *World Development Indicators 2024*. World Bank.

Appendix

TABLE A1 | Fiscal policy ratings and key fiscal variables.

Acronym	Indicator name
Debt rating	CPIA debt policy rating (1 = *low* to 6 = *high*)
Fiscal rating	CPIA fiscal policy rating (1 = *low* to 6 = *high*)
Revenue rating	CPIA efficiency of revenue mobilization rating (1 = *low* to 6 = *high*)
Debt (% GDP)	Central government debt, total (% of GDP)
Gross expenditure (% GDP)	Gross national expenditure (% of GDP)
Tax (% GDP)	Tax revenue (% of GDP)

Sources: World Development Indicators (World Bank, 2024).

TABLE A2 | Summary statistics.

Variables	Obs.	Mean	Std. Dev.	Min.	Max.
Growth	1372	1.428839	5.727725	−48.39246	60.09054
Fiscal rating	777	3.148005	0.6657871	1	4.5
Debt rating	777	3.166023	0.894631	1	5
Revenue rating	777	3.24453	0.5115159	2	4.5
Debt (% GDP)	167	66.12303	51.8997	2.902222	289.8447
Gross expenditure (% GDP)	1073	114.8224	19.81398	61.06148	264.766
Tax (% GDP)	477	14.0742	12.52528	0.0000787	147.6612
Government Effectiveness	992	20.08396	15.33274	0	74.28571
Labour force	1408	64.26376	14.03495	31.402	89.587
Unemployment	1408	6.718111	5.950531	0.12	27.645
Fixed capital	1059	20.89927	10.67328	−2.424358	93.54746

Sources: World Development Indicators (World Bank, 2024).

TABLE A3 | Fixed effects models (CPIA rating ≤ 3).

Variables	(1)	(2)	(3)	(4)
$Growth_{it-1}$	−0.069	−0.061	−0.062	−0.070
	[0.053]	[0.053]	[0.053]	[0.054]
Fiscal rating	1.898			1.843
	[1.358]			[1.471]
Debt rating		0.257		−0.127
		[0.968]		[1.023]
Revenue rating			1.304	0.792
			[1.909]	[1.960]
Constant	−4.881	−0.343	−3.290	−6.590
	[3.685]	[2.265]	[5.195]	[6.113]
Observations	162	162	162	162
Number of countries	22	22	22	22

Note: Standard errors are in brackets. Level of significance: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

TABLE A4 | Fixed effects models (CPIA rating > 3).

Variables	(1)	(2)	(3)	(4)
$Growth_{it-1}$	−0.015	−0.003	0.003	−0.020
	[0.077]	[0.077]	[0.077]	[0.077]
Fiscal rating	1.695**			1.375*
	[0.791]			[0.822]
Debt rating		1.443*		1.081
		[0.772]		[0.797]
Revenue rating			1.184	0.514
			[1.081]	[1.106]
Constant	−3.273	−2.618	−1.184	−8.280*
	[3.022]	[3.115]	[3.992]	[4.960]
Observations	190	190	190	190
Number of countries	18	18	18	18

Note: Standard errors are in brackets. Level of significance: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

TABLE A5 | Fixed effects models (fiscal ratings).

Variables	Fiscal rating	Debt rating	Revenue rating
Growth	0.016***	0.008**	0.004**
	[0.003]	[0.004]	[0.002]
Constant	3.177***	3.213***	3.252***
	[0.015]	[0.018]	[0.009]
Observations	744	744	744
Number of countries	46	46	46

Note: standard errors are in brackets. Level of significance: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

TABLE A6 | Fixed effects models (key fiscal variables estimation).

Variables	Debt (% GDP)	Gross expenditure (% GDP)	Tax (% GDP)
$Growth_{it-1}$	−1.235*	−0.065	−0.179*
	[0.719]	[0.064]	[0.101]
Constant	67.559***	114.793***	14.530***
	[2.848]	[0.350]	[0.461]
Observations	167	1068	477
Number of countries	16	40	31

Note: Standard errors are in brackets. Level of significance: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

TABLE B1 | *p* values for Fixed effects models (fiscal ratings).

Variables	(1)	(2)	(3)	(4)
Breush–Pagan test	0.000	0.000	0.000	0.000
Hausman test	0.000	0.000	0.000	0.000

TABLE B2 | *p* values for Fixed effects models (key fiscal variables estimation).

Variables	(1)	(2)	(3)
Breush–Pagan test	0.000	0.000	0.000
Hausman test	0.000	0.000	0.000

- Additional tests

At the first stage, we could consider the basic approach to regression analysis with panel data such as pooled regression. The advantage of estimation through ordinary least squares (OLS) lies in the simplification that results from being able to determine the value of a certain endogenous variable through a linear relationship with all the exogenous variables that participate in the system. In contrast, the main drawback of this method lies precisely in the simplification of the model, where the correlation of individual errors with observations is not corrected and, therefore, the resulting estimates will be biassed.

Thus, for the situation presented, the Breusch and Pagan test leads us to reject the null hypothesis of 'no country effects'; that is, it is not feasible to carry out an estimation through ordinary least squares regression as estimates made with pooled OLS would be biassed (Breusch and Pagan 1980). Hence, it is necessary to use another structure, in particular, panel data (see Tables B1 and B2).

Second, through the Hausman test (see Hausman 1978), we have proceeded to contrast which of the nested models is appropriate by comparing their estimates, that is, to choose between the fixed effects model or random effects. Given the results (see Tables B1 and B2), we reject de null hypothesis that the random effects estimator is consistent and efficient. Thus, we apply the fixed effects model, which is conducted to determine the appropriate method for the model.

Moreover, Nelson and Plosser (1982) argue that almost all macroeconomic time series one typically uses have a unit root. The presence or absence of unit roots helps to identify some features of the underlying data generating process of a series. In the absence of unit root (stationary), the series fluctuates around a constant long-run mean and implies that the series has a finite variance, which does not depend on time. On the other hand, nonstationary series have no tendency to return to long-run deterministic path, and the variance of the series is time dependent. Nonstationary series suffer permanent effects from random shocks, and thus, the series follow a random walk. In this study, results show that all variables are stationary at levels. We have applied a unit root test to check the robustness of the analysis (see Table B3). In particular, we have used the Dickey and Fuller (1979) unit-root test for unbalanced panel, showing that all variables are stationary at levels.

Likewise, we also carried out cross-section dependence (CD) tests following Pesaran (2021) to test for cross-sectional dependence in panel data models. Cross-sectional dependence can arise when there is unobserved common factors or spill over effects across cross-sections. Results are provided in Table B4, indicating that the levels variable series are integrated of order 1 and do not subject to cross-section dependence.

Anyway, according to Chudik and Pesaran (2015), we also estimate the baselines models with Common Correlated Effects (CCEs), and results are similar to those obtained in the text, highlighting that better so-called 'fiscal policy ratings' are associated with greater economic growth (see Table B5). In addition, in Table B6, we corroborate that estimating by CCE, the central government debt is now negative and statically significant in line with Eberhardt and Presbitero (2015).

TABLE B3 | Unit root test for panel data.

	Dickey–Fuller test (one lag)
Growth	309.3893***
Fiscal rating	115.9716 ***
Debt rating	80.8915*
Revenue rating	64.8409*
Debt (% GDP)	19.4626*
Gross expenditure (% GDP)	155.4865***
Tax (% GDP)	84.8175***
Government effectiveness	271.5847***

*Signifies $p < 0.01$, $p < 0.05$, $p < 0.1$.

TABLE B4 | Cross sectional dependence (CD).

	CD Pesaran test
Growth	11.44
Fiscal rating	−1.25
Debt rating	−1.20
Revenue rating	−1.01
Debt (% GDP)	−2.64
Gross expenditure (% GDP)	−2.20
Tax (% GDP)	−2.49
Government effectiveness	−3.61

*Signifies $p < 0.01$, $p < 0.05$, $p < 0.1$.

Moreover, we study the problem of endogeneity in Section 4.2 with regard to key fiscal variables (see Table 4). We introduce government effectiveness and the global economic crisis results show that, contrary than in the baseline models, central government debt is now negative and statically significant in line with Eberhardt and Presbitero (2015), who find some support for a negative relationship between public debt and long-run growth across countries. So we mention this in the text.

TABLE B5 | Estimated by Pesaran (2006) common correlated effect (CCE) estimator (fiscal ratings).

Variables	(1)	(2)	(3)	(4)
$Growth_{it-1}$	0.029	0.068	0.111**	−0.027
	[0.054]	[0.048]	[0.051]	[0.048]
Fiscal rating	2.095**			2.553**
	[0.825]			[1.204]
Debt rating		1.998*		2.420
		[1.247]		[1.908]
Revenue rating			1.594	0.352
			[1.175]	[1.923]
Constant	−5.701**	−6.575	−3.894	−16.790**
	[2.236]	[4.691]	[3.555]	[7.971]
Observations	743	743	743	734
Number of countries	46	46	46	44

Note: Standard errors are in brackets. Level of significance: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

TABLE B6 | estimated by Pesaran (2006) common correlated effect (CCE) estimator (key fiscal variables estimation).

Variables	(1)	(2)	(3)
$Growth_{it-1}$	0.036	0.147**	0.022
	[0.143]	[0.062]	[0.068]
Debt (% GDP)	−0.141***		
	[0.050]		
Gross expenditure (% GDP)		0.028	
		[0.032]	
Tax (% GDP)			1629.481
			[1629.563]
Constant	8.171***	−2.430	3.110*
	[2.481]	[3.695]	[1.704]
Observations	95	689	365
Number of countries	10	39	27

Note: Standard errors are in brackets. Level of significance: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

TABLE B7 | More control variables I. Fixed effects models.

Variables	(1)	(2)	(3)	(4)
$Growth_{it-1}$	0.067*	0.083**	0.087**	0.065*
	[0.038]	[0.038]	[0.038]	[0.038]
Government Effectiveness	0.030	0.057*	0.053*	0.024
	[0.030]	[0.030]	[0.030]	[0.031]
Crisis	0.350	0.719*	0.727*	0.384
	[0.413]	[0.405]	[0.405]	[0.415]
Fiscal rating	1.796***			1.663***
	[0.472]			[0.493]
Debt rating		0.598*		0.250
		[0.389]		[0.399]
Revenue rating			1.002*	0.550
			[0.750]	[0.754]
Constant	−4.792***	−1.625	−2.903	−6.836**
	[1.436]	[1.309]	[2.360]	[2.656]
Observations	743	743	743	743
Number of countries	46	46	46	46
R squared	0.43	0.26	0.25	0.44

Note: Standard errors are in brackets. Level of significance: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

TABLE B8 | More control variables II. Fixed effects models.

Variables	(1)	(2)	(3)
$Growth_{it-1}$	−0.066	0.115***	0.160***
	[0.129]	[0.039]	[0.047]
Government Effectiveness	0.101*	0.067**	0.059*
	[0.056]	[0.028]	[0.031]
Crisis	1.303*	0.585*	0.610
	[0.994]	[0.420]	[0.500]
Debt (% GDP)	−0.088***		
	[0.025]		
Gross expenditure (% GDP)		−0.011	
		[0.018]	
Tax (% GDP)			−0.034*
			[0.021]
Constant	2.994*	1.430	1.381*
	[2.160]	[2.125]	[0.834]
Observations	98	687	367
Number of countries	12	39	28
R squared	0.26	0.29	0.66

Note: Standard errors are in brackets. Level of significance: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

TABLE B9 | GMM models with one lag (key fiscal variables estimation).

Variables	(1)	(2)	(3)
$Growth_{it-1}$	0.161*	−0.039	0.146***
	[0.086]	[0.031]	[0.042]
Debt (% GDP)	−0.001		
	[0.016]		
Gross expenditure (% GDP)		−0.045**	
		[0.019]	
Tax (% GDP)			−0.040**
			[0.020]
Constant	1.083	6.714***	2.770***
	[1.079]	[2.191]	[0.347]
Observations	141	996	427
Number of countries	16	39	29
Sargan test	0.5797	0.0639	0.0618
Arellano–Bond test	0.1704	0.1853	0.2237

Note: Standard errors are in brackets. Level of significance: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

TABLE B10 | GMM models with two lags (key fiscal variables estimation).

Variables	(1)	(2)	(3)
$Growth_{it-1}$	0.137*	−0.028	0.145***
	[0.084]	[0.033]	[0.042]
$Growth_{it-2}$	−0.073	−0.046	0.005
	[0.091]	[0.032]	[0.042]
Debt (% GDP)	0.003		
	[0.017]		
Gross expenditure (% GDP)		−0.036*	
		[0.020]	
Tax (% GDP)			−0.040**
			[0.020]
Constant	1.205	5.744**	2.859***
	[1.127]	[2.293]	[0.357]
Observations	134	964	417
Number of countries	15	39	28
Sargan test	0.1468	0.0448	0.0396
Arellano–Bond test	0.2674	0.4717	0.0368

Note: Standard errors are in brackets. Level of significance: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.