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An Alternative Approach to Assess the Impacts of Countercyclical Fiscal Policy in Developing Countries

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Abstract In the current literature, theoretical, and empirical studies present varying implications regarding the effectiveness of countercyclical fiscal policy in stabilizing the economy. While most studies suggest that countercyclical fiscal policy stimulates or inhibits economic growth, others document insignificant impact. However, these existing studies solely analyze the impulse of fiscal policy to the economy without distinguishing whether the impulse factor originates from within or outside the economy. Therefore, we aim to explore the effectiveness of countercyclical fiscal policy within an alternative framework that discerns the origin of the impulse factor and revisits the impacts of countercyclical policy in developing countries. Our theoretical framework argues that the countercyclical fiscal policy only makes sense if it is conducted with external debt or other external instruments. Employing the dataset that covers 201 countries over the 1990-2020 periods, we document evidence for the use of countercyclical fiscal policy in developing countries.

Keywords: countercyclical fiscal policy, external debt, fiscal multiplier, developing countries

JEL Classifications: E01, E62, H63, C23

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I. Introduction

The effectiveness of countercyclical fiscal policy, characterized by increases in government spending during economic recessions and reductions during booms, has been a topic of extensive debate. The question of whether countercyclical fiscal policy stimulates or inhibits economic growth has gained more relevance after the global financial crisis of 2008-2009 and, especially, in the wake of the COVID-19 pandemic (Auerbach et al., 2022). As interest rates were lowered so close to zero in many countries, there is limited room for further use of expansionary monetary policy.

Despite the substantial literature on the topic, considerable disagreement persists regarding

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the potential impacts of fiscal policy through the multiplier effects on output. Existing studies often rely on the concept of the fiscal multiplier, which measures increase in output because of a one dollar increase in government spending or a one dollar reduction in taxes, to evaluate the effectiveness of government spending or tax cuts (Tang et al., 2013; Auerbach and Gorodnichenko, 2014; Jalles, 2018). Empirically, a wide range of estimates of the multiplier has been documented, varying from negative to more than one (Cogan et al., 2010; Christiano et al., 2011; Ilzetzki et al., 2013; Ianc and Turcu, 2020). Unfortunately, these varying estimates find support from different and sometimes contrasting schools of economics. For instance, Keynesian theories suggest that higher government spending or lower taxes during a recession could stimulate aggregate demand, aiding economic recovery (Cogan et al., 2010). Following this reasoning, fiscal expansion imposes a multiplier effect on growth. This indicates that a fiscal multiplier should be greater than one. Conversely, the neoclassical school, particularly represented by Baxter and King (1993), argues that the government spending multiplier cannot exceed one. One reason is that government spending affects the long-term income of individuals and households. When the government increases its spending, individuals, and households may reduce their consumption. This, in turn, partially reduces aggregate demand. Government spending multiplier will therefore be pulled down to less than one. Conversely, the fiscal multiplier is zero under Barro's school (1974). This perspective is based on the justification that consumers are forward-looking and consider government's intertemporal budget constraint. Aware that a tax cut today will be compensated by higher future tax rates, consumers may respond by saving current consumption to pay for higher taxes in subsequent years. Similarly, recognizing that an increase in government spending today, funded by more debt, will lead to higher taxes in the future, the private sector may reduce its current consumption level to maintain its permanent income.

Amid these different theoretical schools with the opposing views on the impact of fiscal policy, empirical results also vary, and remain inconclusive. Hence, consensuses seem to have been obtained recently about the evidence of countercyclical policy in developed countries (Amable and Azizi, 2014; Bashar et al., 2017; Combes et al., 2017) and pro-cyclical policy in developing countries (Ilzetzki and Vegh, 2008; Carmignani, 2010; Mpatswe et al., 2011; Maravalle and Claeys, 2012; Gondor and Ozpence, 2014; Carneiro and Hnatkovska, 2016; Temsumrit, 2022). Regardless, the aforementioned theoretical and empirical studies only seek to analyze the impulse to the economy without distinguishing whether the impulse factor originates from within or outside the economy. Therefore, we aim to explore the effectiveness of countercyclical fiscal policy in an alternative framework that discerns the origin of the impulse factor and revisit the impacts of countercyclical policy in developing countries. Particularly, we are interested in the following two questions. First, is it true that fiscal policy in developing countries is pro-cyclical as shown in the literature? Second, in an open economy, how does

external public debt or domestic public debt impact economic growth?

To answer these questions, we employ the dataset of fiscal space by the World Bank that covers 201 countries over the period from 1990-2020. The results from the fixed effects models suggest an inverse simultaneous relationship between public debt and economic growth for the whole sample and for developing countries. Hence, these findings lend support for countercyclical fiscal policy in emerging and developing countries. We further examine the external debt-growth nexus. We found that the negative association is mainly driven by the public component of debt, regardless of whether there is little contribution of the private component of debt. Additional evidence suggests that public borrowings from external sources exhibit larger impacts on economic growth than from domestic sources. Thus, the countercyclical fiscal policy really makes sense if it is conducted with external debt or other external financial instruments. Finally, our results are robust to a number of checks including inclusion of year trends and utilization of alternative specification such as the two-step system generalized method of moments (GMM) estimation.

The remained of this paper is organized as follows. Section 2 introduces the alternative approach to determine the impacts of fiscal policy distinguishing between the origin of the impulse factors. Section 3 describes the econometric model and data employed in the empirical analysis. Section 4 discusses the empirical results. Finally, Section 5 concludes the study.

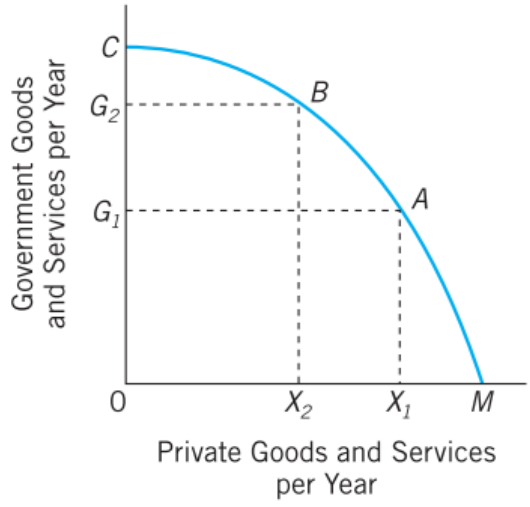
II. Alternative Approach to Evaluate the Impacts of Fiscal Policy

In this section, we adopt an alternative approach to evaluate the impacts of fiscal policy in both closed and open economies. First, in a closed economy, there is no foreign debt, foreign debt repayment, international trade, direct, or indirect foreign investment, offshore investment, or capital withdrawal from abroad. Consequently, the total resources of the economy are essentially fixed.

Figure 1 illustrates the various combinations of options between public and private goods and services (i.e., *production possibility line*). The horizontal axis depicts the quantity of goods and services provided by the private sector. The vertical axis shows the amount of public goods and services. Assuming limited resources and a certain level of technology and efficient resource allocations, if public sector share increases, the share for private sector will narrow accordingly. The production possibility line represents the maximum level of output that both sectors can provide to the economy; this cannot be increased solely by reallocating resources between the private to public sectors, or vice versa. Consequently, if the government increases taxes or reduces its spending during an economic boom, the only effect is a reallocation of resources between the public and private sectors. However, this does not reduce the total output production as the production possibility line remains unchanged (assuming that other factors remain constant).

Essentially, the fiscal impulse in a closed economy is zero, and the aggregate demand of the economy remains unaffected. This argument somewhat aliens with Barro's perspective (1974). However, Barro's explanation primarily relies on the forward-looking behaviors of households in response to increasing public debt or tax cuts during recessions, rather than relying on the economic analysis of the choice between the public and private sectors in a closed economy.

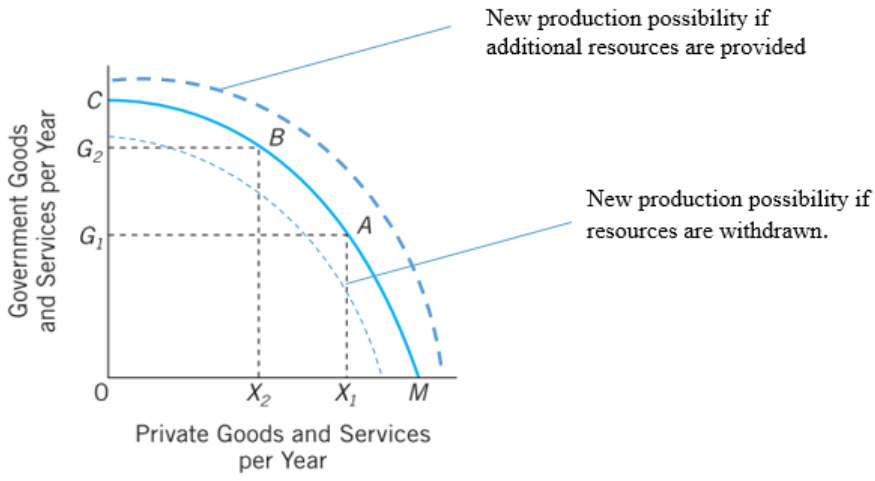
Figure 1. Public and private sector and production possibility



(Source) Hyman, 2014)

In an open economy, resources continuously flow between countries in the form of international trade, foreign investment, and foreign borrowings. Figure 2 shows that if with the addition of external resources, the production possibility line will shift outward, moving further from the origin (the large-dashed line). This results in total output production and consumption. Conversely, if some resources are withdrawn from the economy, the production possibility line shifts inward, moving closer to the origin (the small-dashed line). This leads to a reduction in aggregate demand.

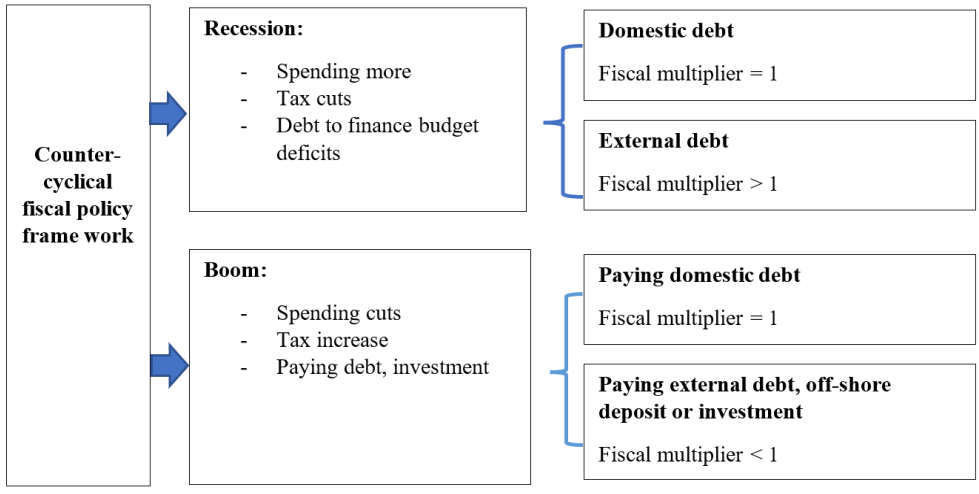
Figure 2. Movement of the production possibility line



(Source) Hyman, 2014)

If the government has control over all resource flows, it can employ macroeconomic policy to smooth the business cycle. However, in an open economy, most capital is free flowing. Many capital flows move in a pro-cyclical direction. For example, during a recession, foreign direct investment, and foreign portfolio investment tend to be withdrawn from the economy, exacerbating cyclicality. In such a scenario, the government can pursue countercyclical fiscal policy. By increasing domestic debt or cutting domestic taxes during the recession, the countercyclical effect will be zero. This only changes the allocation of resources between the public and private sectors. To boost aggregate demand and production capacity, the government must borrow from abroad or withdraw some amount of resources previously invested abroad (e.g., foreign bonds or deposits at foreign banks) to stimulate spending. Similarly, in flourishing economic conditions, the government's anti-cyclical effect occurs only if the surplus resources are used to repay foreign debt or invest abroad. Hence, an amount of resource is actually withdrawn out of the economy. This causes a decrease in aggregate demand and output production. In this case, the fiscal multiplier is said to become smaller than one. However, if the surplus is only deposited in domestic banks or financial institutions, then the effect of fiscal multiplier would remain at zero. This is because no real amount of resources is withdrawn from the economy. Figure 3 shows the above framework.

Figure 3. An alternative framework for evaluating the effectiveness of countercyclical fiscal policy



III. Model Specification and Data

A. Model specification

We employed an empirical growth model derived from the neoclassical growth theory to examine the debt-growth relationship, based on previous studies (e.g., Gomez-Puig, 2017; Sosvilla-Rivero, 2018; Gomez-Puig et al., 2022). We used a Solow model of the growth rate of real GDP per capita augmented with public debt. As these two variables are endogenous, considering them simultaneously in a modeling framework is vital. The simultaneous equations are as follows:

$$g_{it} = \alpha + \psi y_{it-1} + \gamma d_{it-1} + \sum_{j=1}^{n} \delta_{ij} X_{ijt-1} + \mu_{i,t} \quad (1)$$

$$d_{it} = \beta + \tau g_{it-1} + \sum_{j=1}^{n} \theta_{ij} X_{ijt-1} + \epsilon_{i,t}. \quad (2)$$

Here, y_{it-1} is the natural logarithm of initial real GDP per capita (to capture the "catching-up" effect or conditional convergence of national economies to a steady state). d_{it-1} represents the change of public debt-to-GDP ratio in country *i* at year *t-1*. X_{ijt-1} $(j = 1,\ldots,n)$ denotes a set of control variables for country *i* at year *t-1*. Conversely, $\mu_{i,t}$ and $\epsilon_{i,t}$ are the robust standard errors. Regarding X_{ijt-1}, we consider a set of explanatory variables that could be associated with debt or economic growth (Huffman and Huffman, 2021; Marelli et al., 2019; Wamboye and Tochkov, 2015; Villaverde and Maza, 2011). Specifically, we include population growth

rate as a percentage (*POP*), ratio of total government expenditure to GDP (*GE*), ratio of gross fixed capital formation to GDP (*GFC*), ratio of gross domestic savings to GDP (*SAVE*), trade openness (*OPEN*), and annual inflation rate, (*INF*).

Equation (1) suggests that the initial level of GDP per capita (y), public debt (d), population growth (*POP*), government expenditure (*GE*), gross fixed capital formation (*GFC*), gross domestic savings (*SAVE*), trade openness (*OPEN*), and inflation (*INF*) can potentially determine economic growth (Huffman and Huffman, 2021; Marelli et al., 2019; Wamboye and Tochkov, 2015; Villaverde and Maza, 2011). In the economic growth literature, the growth rate of labor used in the production process and accumulation of physical capital (investment) are key determinants of economic growth (Solow, 1956; Frankel, 1962). Thus, we included the growth rate of population (*POP*) and domestic investment (*GFC*) to proxy country size and rate of growth of labor and accumulation of the physical capital stock, respectively. Similarly, we also controlled for domestic savings (*SAVE*) as a rise in aggregate savings would induce innovation and therefore growth (Aghion et al., 2016), and, conversely, create larger investments associated with higher growth rate of GDP (Ribaj and Mexhuani, 2021). Consequently, previous studies have shown that the size and mix of public spending can have a considerable effect on growth (Mo, 2007; Onifade et al., 2020). For instance, too large governments reduce growth, unless the government functions in a highly effective way (Fournier and Johansson, 2016). By considering government expenditure (*GE*), we controlled for this in our model. A country's degree of openness to international trade (*OPEN*) boosts productivity through knowledge and efficiency gains transfers (Seghezza and Baldwin, 2008). Finally, inflation (*INF*) is often-quoted to be a good macroeconomic indicator of how the government manages the economy (e.g., Fischer, 1993; Barro, 2003). Moreover, low inflation is economically efficient as economies can allocate scarce resources to their best economic use (World Bank, 1990).

Equation (2) states that economic growth (g), population growth (*POP*), government expenditure (*GE*), gross fixed capital formation (*GFC*), gross domestic savings (*SAVE*), trade openness (*OPEN*), and inflation (*INF*) can potentially affect public debt (Dawood et al., 2021; Forslund et al., 2011). Favorable economic growth rates increase the probability of a substantial reduction in government debt (Semik and Zimmermann, 2022). In the development literature, population changes affect the global economy; particularly, population aging will likely push public debt (Mason and Lee, 2022). Because of displacement effect, an increase in government expenditure in a developing economy may lead to insufficient existing levels of revenue, causing public debt accumulation. Hence, we control for government expenditure. Next, international openness is associated with reduced public debt (Dong, 2021). Finally, higher inflation reduces the real value of debt, facilitating government public debt payments (Bhattarai et al., 2014).

Regarding Equations (1) and (2), negative values of γ and τ demonstrate evidence of countercyclical fiscal policy (i.e., increases in government borrowings during recessions and

reductions during booms). Conversely, positive values of γ and τ indicate pro-cyclical policy (i.e., increases in government borrowings during booms and reductions during recessions). Next, to distinguish between the impacts of different debt typologies (external versus domestic source, public versus private debt), we replaced public debt-to-GDP ratio (d) in Equations (1) and (2) with the respective type of debt. The corresponding regression equations are as follows:

$$g_{it} = \alpha + \psi y_{it-1} + \gamma ped_{it-1} + \sum_{j=1}^{n} \delta_{ij} X_{ijt-1} + \mu_{i,t} \quad (3)$$

$$ped_{it} = \beta + \tau g_{it-1} + \sum_{j=1}^{n} \theta_{ij} X_{ijt-1} + \epsilon_{i,t} \quad (4)$$

$$g_{it} = \alpha + \psi y_{it-1} + \gamma pred_{it-1} + \sum_{j=1}^{n} \delta_{ij} X_{ijt-1} + \mu_{i,t} \quad (5)$$

$$pred_{it} = \beta + \tau g_{it-1} + \sum_{j=1}^{n} \theta_{ij} X_{ijt-1} + \epsilon_{i,t} \quad (6)$$

Here, ped_{it-1} and $pred_{it-1}$, respectively, denoted public and private external debt (as percentage of total GDP) for country i at year *t-1*. Finally, we incorporated both public (*ped*) and public domestic debt (*pdd*) in the same regression equation to investigate which has a larger impact on economic growth. Specifically, the regression equation is given by the following:

$$g_{it} = \alpha + \psi y_{it-1} + \gamma ped_{it-1} + \gamma' pdd_{it-1} + \sum_{j=1}^{n} \delta_{ij} X_{ijt-1} + \mu_{i,t} \quad (7)$$

Our estimation strategy is to run the regression of 1-year period growth on the beginning of period (1-year lagged) explanatory variables using fixed effects. In this research, we incorporated year and country fixed effects[1] in the model. Country fixed effects controlled for the unobservable time-invariant heterogeneities among different countries. Year fixed effects controlled for potential business cycles[2]. As shown by previous studies, regression models involving economic growth and public debt are subject to simultaneity bias. We address this endogeneity issue by using the initial (pre-determined) values of the right-hand side variables in Equations (1) and (2) (Li et al., 2021; Leszczensky and Wolbring, 2019; Bellemare et al., 2017; Wamboye and Tochkov, 2015). While some prior authors utilize the generalized method of moments (GMM) estimators (Manasseh et al., 2022; Mbate, 2014; Dawood et al., 2021; Checherita-Westphal and Rother, 2012; Kumar and Woo, 2010) in estimating the debt-growth regression equations, this method has been criticized recently (Roodman, 2009a, 2009b). Thus, in the same spirit with Rant et al. (2021), we employ GMM estimators as a robustness check.

1) The fixed effects estimator could potentially cause a Nickel (1981) type bias. Given a reasonably long sample (T= 20) and weak correlations between our lagged independent and dependent variables, the bias should be relatively small.

2) We added year-fixed effects into our models to obtain long-run relationships instead of using the multi-year averaging approach found in previous studies (Calderon and Rodrigo Fuentes, 2013; Afonso and Alves, 2014; Pescatori et al., 2014). Typically, a 5-year averaging method would lead to excessive loss of observations in our data. This complicates making meaningful inferences.

B. Data

In this research, we employ data from two sources. First, information on public debt as well as the sub-components of public debt is collected from a cross-country database of fiscal space by the World Bank's Prospects Group. Second, data on GDP per capita and other macroeconomic variables are gathered from the World Development Indicators (WDI) by the World Bank. Overall, our analysis covers 201 countries over the period from 1990-2020. Table 1 reports the definitions and data sources of these variables.

Table 1. *Variable Definitions*

Variable	Definition	Source
Real growth rate (g)	Growth rate of real GDP per capita (annual %)	WDI
Level of output (y)	Natural logarithm of real GDP per capita	WDI
Public debt-to-GDP (d)	Annual change in the ratio of public debt to GDP	Fiscal Space
External public debt (epd)	Annual change in public external debt (% of GDP)	Fiscal Space
External private debt ($eprd$)	Annual change in private external debt (% of GDP)	Fiscal Space
Domestic public debt (dpd)	Annual change in public domestic debt (% of GDP)	Fiscal Space
Population growth (POP)	Annual growth rate of total population (%)	WDI
Government expenditure (GE)	Ratio of total government expenditure to GDP	WDI
Domestic Investment (GCF)	Ratio of gross capital formation to GDP	WDI
Domestic Savings (SAV)	Ratio of gross domestic savings to GDP	WDI
Openness ($OPEN$)	Sum of total imports plus export divided by GDP	WDI
Inflation (INF)	Annual inflation rate	WDI

IV. Results and Discussion

Table 2 presents descriptive statistics for our variables. On average, countries in our sample experienced an annual growth rate of 1.8% from 1990-2020. Concerning the debt variables, the percentage of public borrowing (relative to a country's GDP) slightly decreased over the years. In contrast, countries in our sample increased their use of public external debt, private external debt, and public domestic debt. However, the level of borrowing varied significantly across countries, particularly from private external sources. As for the control variables, the average annual population growth rate was 1.5%. On average, GEs, domestic savings, and domestic investment accounted for 16%, 19%, and 22% of the total GDP, respectively. Additionally, inflation exhibited the highest volatility, followed by the degree of openness to international trade, as evident from the standard deviation, maximum, and minimum values. We then proceed to report the pairwise correlations among the variables under examination in Table 3. Interestingly, we observe a marginal negative correlation between economic growth

and public debt, as well as between economic growth and various sub-categories of debt (public external debt, private external debt, and public domestic debt). This negative correlation indicates that countries with higher rates of economic growth tend to borrow less. Another intriguing observation from Table 3 is that a country's degree of trade openness is positively correlated with the level of public borrowing and external debt from either public or private sources but negatively correlated with public domestic debt. Overall, the pairwise correlations reported in Table 3 suggest that our variables are not highly correlated, thereby eliminating concerns about multicollinearity in our empirical analysis.[3].

Table 2. *Descriptive Statistics*

Variables	N	Mean	Std. Dev.	min	max
g	5,846	1.779	6.318	-64.992	140.367
y	5,871	8.472	1.469	5.214	12.028
d	4,543	-0.168	12.717	-209.306	136.616
ped	3,089	0.489	10.174	-112.73	164.233
pred	3,089	2.1	47.858	-869.482	1,699.356
pdd	2,650	0.093	10.236	-177.455	92.383
OPEN	4,336	77.775	52.438	0.785	412.155
GE	4,964	16.455	8.508	0.911	147.719
GFC	4,891	22.423	7.862	-2.424	93.547
POP	6,216	1.481	1.515	-10.955	17.512
SAVE	5,022	18.971	17.925	-136.86	87.827
INF	5,200	26.088	380.728	-18.109	23,773.132

Table 3. *Pairwise Correlation Matrix*

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) *g*	1.000											
(2) *y*	-0.016	1.000										
(3) *d*	-0.287	0.116	1.000									
(4) *ped*	-0.340	0.072	0.429	1.000								
(5) *pred*	-0.037	0.058	0.033	0.011	1.000							
(6) *pdd*	-0.061	0.003	0.547	-0.522	0.023	1.000						
(7) *OPEN*	0.051	0.351	0.022	0.054	0.086	-0.053	1.000					
(8) *GE*	-0.089	0.160	0.082	0.084	0.020	0.030	0.094	1.000				
(9) *GFC*	0.167	0.099	0.070	-0.030	0.008	0.041	0.173	0.078	1.000			
(10) *POP*	-0.065	-0.265	-0.079	-0.044	0.005	0.017	-0.073	-0.142	0.002	1.000		
(11) *SAVE*	0.074	0.482	0.008	-0.024	0.031	0.004	0.262	-0.350	0.272	0.097	1.000	
(12) *INF*	-0.066	-0.047	-0.079	0.032	-0.002	-0.168	-0.040	-0.031	-0.041	0.016	-0.011	1.000

3) We also calculated the variance inflation factors (VIF), and the results indicated that our models do not suffer from multicollinearity. These results are available upon request.

Table 4 presents the results of the baseline models exploring the simultaneous relationships between public debt and economic growth. Columns (1-4) display the estimation results for the entire sample, while columns (5-8) present the results for emerging and developing economies (EMDEs). We incorporate country fixed effects in all models and year fixed effects in half of the models.

Table 4. *Nexus between Public Debt and Economic Growth: Sample Period Runs from 1990 to 2020*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	g	*g*	*d*	*d*	*g*	*g*	*d*	*d*
y	-6.645***	-5.616***			-6.283***	-5.774***		
	(0.538)	(0.659)			(0.600)	(0.846)		
d	-0.045***	-0.039***			-0.039***	-0.032***		
	(0.011)	(0.010)			(0.011)	(0.009)		
OPEN	0.019***	0.022***	0.015	-0.045***	0.030***	0.034***	0.021	-0.036
	(0.005)	(0.005)	(0.013)	(0.015)	(0.008)	(0.007)	(0.023)	(0.023)
GE	-0.094**	-0.113***	0.546***	0.453***	-0.067	-0.076*	0.522***	0.406**
	(0.046)	(0.042)	(0.174)	(0.162)	(0.050)	(0.044)	(0.187)	(0.169)
GFC	0.037*	0.040**	0.249***	0.229***	0.034	0.022	0.235***	0.215***
	(0.021)	(0.021)	(0.060)	(0.060)	(0.024)	(0.023)	(0.066)	(0.068)
POP	-0.798***	-0.767***	-0.505	-0.157	-0.682***	-0.658***	-0.554	0.120
	(0.147)	(0.110)	(0.485)	(0.418)	(0.180)	(0.140)	(0.580)	(0.441)
SAVE	0.012	0.013	0.117	0.101	0.011	0.012	0.134*	0.124*
	(0.019)	(0.017)	(0.073)	(0.068)	(0.020)	(0.018)	(0.077)	(0.069)
INF	-0.022*	-0.007	-0.087	-0.081	-0.013	0.000	-0.089	-0.074
	(0.012)	(0.008)	(0.099)	(0.098)	(0.009)	(0.007)	(0.101)	(0.098)
g			-0.340***	-0.230***			-0.303***	-0.159*
			(0.068)	(0.076)			(0.081)	(0.083)
Constant	59.619***	50.574***	-15.863***	-9.477***	50.913***	46.856***	-15.022***	-10.026***
	(4.289)	(5.544)	(3.944)	(3.592)	(4.395)	(6.475)	(3.965)	(3.637)
Country FEs	YES	YES	YES	YES	YES	YES	YES	YES
Year FEs	NO	YES	NO	YES	NO	YES	NO	YES
Observations	3,105	3,105	3,202	3,202	2,169	2,169	2,242	2,242
R-squared	0.275	0.466	0.120	0.207	0.271	0.453	0.113	0.214
Sample	Full	Full	Full	Full	EMDEs	EMDEs	EMDEs	EMDEs

Note. Columns 1-4 display the outcomes for the entire sample, while columns 5-8 present the results specific to EMDEs. All models were estimated using country fixed effects and robust standard errors, with year fixed effects included in models 2, 4, 6, and 8. The regression equations encompass variables like the annual growth rate (log difference) of real GDP per capita (*g*), the natural logarithm of real GDP per capita (*y*), annual change in the ratio of public debt-to-GDP (*d*), annual growth rate (log difference) of total population (*POP*), the ratio of total government expenditure to GDP (*GE*), the ratio of gross capital formation to GDP (*GFC*), the ratio of gross domestic savings to GDP (*SAVE*), the degree of trade openness (*OPEN*) measured by ratio of exports and imports to GDP, and the annual inflation rate (*INF*). All independent variables are expressed at the beginning of the period with a 1-year lag. Refer to Table 1 for the definitions of other variables. The robust standard errors are shown in parentheses, with ***, **, and * indicating statistical significance at the 1%, 5%, and 10% levels, respectively.

As observed in Table 4, the beta coefficient for variable "y" is significantly negative in all models, with estimated values ranging between -6.5 and -6.9. Thus, there is conditional convergence among national incomes, indicating that countries with initially lower levels of GDP per capita tend to experience higher economic growth rates. This conditional convergence phenomenon has also been documented in the studies by Cho (1996), Michelis and Neaime (2004), Wamboye and Tochkov (2015), Munir and Mehmood (2018), Rant et al. (2021), and Le and Trinh Thi Phan (2022).

The main independent variable of interest in Models 1-2 (*d*) is highly significant and negative, pointing to an adverse association between public debt and economic growth. This implies that higher levels of borrowings are associated with slower economic growth, and vice versa. This conclusion holds true even when examining this relationship for developing countries only (Models 5-6). In fact, the beta coefficient of public debt remains significantly negative but of lower magnitude, suggesting a less prominent role of public borrowing in the growth process of developing countries.

In fact, the negative γ can be explained by the "debt overhang" theory (Krugman, 1988). This theory suggests that expected repayments on debt decrease as debt level increases. If a country borrows beyond its means, the incentives for domestic investment will become constrained, as returns are expected to be "taxed away" by creditors (Villieu et al., 2014). This, in turn, will exert negative impact on growth prospect. Additionally, rising debt burden might imply higher default risks, for which creditors might require higher borrowing cost premium. As a result, capital flows were discouraged and economic growth was hindered (Gaies and Nabi, 2021). Another explanation why more debt leads to slower growth was implied by the *crowding-out effect* (Picarell et al., 2019). As governments increase the scale of borrowing, interest rates are likely to increase. This results in a decline in the lending capacity of the economy and crowding out of private businesses by discouraging capital investments.

On the control variables in the growth models (1, 2, 5, 6), the intensity of trade, domestic investments, and domestic savings exhibit positive influence. Conversely, the growth rate of population, the level of GE, and inflation exert negative effects on growth. These results implied that outward-oriented economies grow faster than inward-oriented countries. Increased savings and investments stimulate growth. Conversely, high levels of government spending and high inflation are detrimental to growth. The direction of these impacts were indeed in line with previous studies (Demikha et al., 2021; Rant et al., 2021; Hakimi et al., 2019).

Turning to the impact of economic growth on public debt, the beta coefficients for *g* are statistically negative in models 3-4. This confirms the adverse impacts of growth. Countries experiencing high (low) growth tend to borrow less (more). This pattern also applies for developing countries but to a lesser extent. This is evident from the coefficients for *g* in Models (7) and (8). From the policy perspective, this result implied that the government authority

controls the public debt after observing the economic growth. Regarding the control variables, only the coefficients for trade openness, GE, and domestic investment are statistically significant. The impacts of the latter two were positive, as usually documented in the existing literature (Demikha et al., 2021). While international trade exhibited positive impacts in the short run, its impacts became negligible, and even negative in the long run. At the beginning of the development process, outward-orientedness helps a country succeed in securing foreign loans. However, as the country develops, debt becomes a burden. Being open to the flow of goods and capital could cause public debt instability.

To summarize, Table 4's results indicate an inverse simultaneous relationship between economic growth and public debt among the countries in our sample, including developing economies. Higher levels of public borrowing were observed during economic recessions and vice versa. Lower levels of public debt during booms. Our results can thus act as evidence for the use of countercyclical fiscal policy in the countries under consideration. These findings contrast the pro-cyclicality of fiscal policy in developing countries documented in the previous literature. Fiscal policy is expansionary in good times and contractionary in bad times (e.g., Ilzetzki and Vegh, 2008; Talvi and Vegh, 2005; Strawczynski and Zeira, 2011; Bergman and Hutchison, 2020).

We have explored the relationship between public debt and economic growth; however, governments may opt to borrow in the local or international debt markets. Foreign loans—often in terms of remittance or financial aid—represent an important source of funds, particularly for developing countries with limited financing options (Yusuf and Mohd, 2021). Consequently , we investigated the nexus between external debt and economic growth. Not all external debt is alike; therefore, we examined Equations (3-6), which discern between external debt from public (*ped*) and private sources (*pred*). Again, we also report the estimation results for the whole sample (Columns 1-4) and for developing countries (Columns 5-8). Tables 5 and 6 show the results for public external debt and private external debt, respectively[4].

4) For further robustness, we run a regression model incorporating *ped* and *pred* at time *t* as the dependent variable and the growth rate of GDP per capita at time t as independent variable. We aim to demonstrate that fiscal authorities make policy decisions in response to the current economic conditions. We estimated the regression equations using both fixed effects and two-step system GMM approach. Our results largely corroborated the findings in Tables 5 and 6. Columns (3, 4) for full sample and Columns (7, 8) for EMDEs countries. These results are available from the authors upon request.

Table 5. *Nexus between Public External Debt and Economic Growth: The Sample Period Runs from 1990 to 2020*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	g	*g*	*ped*	*ped*	*g*	*g*	*ped*	*ped*
y	-5.361***	-6.771***			-4.930***	-6.228***		
	(0.558)	(0.723)			(0.577)	(0.880)		
ped	-0.031***	-0.022**			-0.026**	-0.010		
	(0.010)	(0.009)			(0.012)	(0.011)		
OPEN	0.027***	0.039***	0.035**	-0.015	0.045***	0.045***	0.011	-0.023
	(0.009)	(0.008)	(0.017)	(0.018)	(0.012)	(0.010)	(0.018)	(0.018)
GE	-0.057	-0.116**	0.239*	0.237*	-0.038	-0.092*	0.172	0.176
	(0.057)	(0.047)	(0.134)	(0.133)	(0.059)	(0.050)	(0.139)	(0.136)
GFC	0.024	0.036	0.167***	0.121**	0.010	0.010	0.157**	0.099
	(0.027)	(0.022)	(0.060)	(0.060)	(0.030)	(0.024)	(0.065)	(0.065)
POP	-0.841***	-0.503**	-1.190	-1.148	-0.554	-0.359	-2.468	-2.422
	(0.283)	(0.218)	(1.195)	(1.187)	(0.362)	(0.285)	(1.654)	(1.671)
SAVE	-0.009	-0.010	-0.034	-0.029	-0.014	-0.011	-0.020	-0.009
	(0.025)	(0.020)	(0.052)	(0.050)	(0.025)	(0.020)	(0.054)	(0.052)
INF	-0.000	0.000	-0.001	-0.001	-0.000	0.000	-0.001	-0.001
	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)
g			-0.362***	-0.220**			-0.351***	-0.192*
			(0.093)	(0.099)			(0.111)	(0.111)
Constant	47.686***	59.138***	-6.621**	-2.045	39.936***	50.781***	-1.870	1.080
	(4.418)	(6.141)	(3.262)	(3.088)	(4.322)	(6.865)	(3.836)	(3.455)
Country FEs	YES	YES	YES	YES	YES	YES	YES	YES
Year FEs	NO	YES	NO	YES	NO	YES	NO	YES
Observations	2,281	2,281	2,377	2,377	1,681	1,681	1,742	1,742
R-squared	0.239	0.527	0.100	0.198	0.239	0.505	0.108	0.223
Sample	Full	Full	Full	Full	EMDEs	EMDEs	EMDEs	EMDEs

Note. Columns 1-4 display the outcomes for the entire sample, while columns 5-8 present the results specific to EMDEs. All models were estimated using country fixed effects and robust standard errors, with year fixed effects included in models 2, 4, 6, and 8. The regression equations encompass variables like the annual growth rate (log difference) of real GDP per capita (*g*), the natural logarithm of real GDP per capita (*y*), annual change in the ratio of public debt-to-GDP (*d*), annual growth rate (log difference) of total population (*POP*), the ratio of total government expenditure to GDP (*GE*), the ratio of gross capital formation to GDP (*GFC*), the ratio of gross domestic savings to GDP (*SAVE*), the degree of trade openness (*OPEN*) measured by ratio of exports and imports to GDP, and the annual inflation rate (*INF*). All independent variables are expressed at the beginning of the period with a 1-year lag. Refer to Table 1 for the definitions of other variables. The robust standard errors are shown in parentheses, with ***, **, and * indicating statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 6. *Nexus between Private External Debt and Economic Growth: Sample Period Runs from 1990 to 2020*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	g	*g*	*pred*	*pred*	*g*	*g*	*pred*	*pred*
y	-5.422***	-6.764***			-4.989***	-6.189***		
	(0.559)	(0.723)			(0.579)	(0.879)		
pred	0.001	-0.000			-0.001	-0.013		
	(0.001)	(0.001)			(0.021)	(0.017)		
OPEN	0.028***	0.040***	-0.153	-0.147	0.046***	0.045***	-0.010	-0.011
	(0.009)	(0.008)	(0.143)	(0.152)	(0.012)	(0.010)	(0.012)	(0.013)
GE	-0.071	-0.122***	-0.051	0.069	-0.046	-0.094*	-0.020	0.006
	(0.057)	(0.047)	(0.194)	(0.221)	(0.059)	(0.049)	(0.047)	(0.047)
GFC	0.023	0.036	0.750***	0.711***	0.009	0.011	0.139***	0.141***
	(0.027)	(0.022)	(0.158)	(0.152)	(0.030)	(0.024)	(0.028)	(0.028)
POP	-0.855***	-0.506**	1.557	1.773	-0.560	-0.359	-0.954	-0.903
	(0.284)	(0.220)	(2.810)	(2.876)	(0.363)	(0.285)	(0.734)	(0.757)
SAVE	-0.008	-0.010	-0.401***	-0.373***	-0.014	-0.012	-0.064**	-0.062**
	(0.025)	(0.020)	(0.125)	(0.125)	(0.025)	(0.020)	(0.025)	(0.025)
INF	-0.000	0.000	-0.000	-0.000	-0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
g			-0.070	-0.460*			0.002	-0.008
			(0.299)	(0.273)			(0.060)	(0.055)
Constant	48.362***	59.145***	4.818	3.505	40.501***	50.503***	1.121	0.697
	(4.411)	(6.135)	(13.264)	(14.898)	(4.306)	(6.865)	(1.672)	(1.634)
Country FEs	YES	YES	YES	YES	YES	YES	YES	YES
Year FEs	NO	YES	NO	YES	NO	YES	NO	YES
Observations	2,281	2,281	2,377	2,377	1,681	1,681	1,742	1,742
R-squared	0.235	0.525	0.053	0.076	0.237	0.505	0.100	0.143
Sample	Full	Full	Full	Full	EMDEs	EMDEs	EMDEs	EMDEs

Note. Columns 1-4 display the outcomes for the entire sample, while columns 5-8 present the results specific to EMDEs. All models were estimated using country fixed effects and robust standard errors, with year fixed effects included in models 2, 4, 6, and 8. The regression equations encompass variables like the annual growth rate (log difference) of real GDP per capita (*g*), the natural logarithm of real GDP per capita (*y*), annual change in the ratio of public debt-to-GDP (*d*), annual growth rate (log difference) of total population (*POP*), the ratio of total government expenditure to GDP (*GE*), the ratio of gross capital formation to GDP (*GFC*), the ratio of gross domestic savings to GDP (*SAVE*), the degree of trade openness (*OPEN*) measured by ratio of exports and imports to GDP, and the annual inflation rate (*INF*). All independent variables are expressed at the beginning of the period with a 1-year lag. Refer to Table 1 for the definitions of other variables. The robust standard errors are shown in parentheses, with ***, **, and * indicating statistical significance at the 1%, 5%, and 10% levels, respectively.

Overall, we found a negative relationship between external debt from public sources and economic growth. However, there is little evidence for such an association between private external debt and economic growth. These results applied for the entire sample and for developing countries. The inverse association between public external debt and growth is consistent with numerous studies (for instance, Rant et al., 2021; Wang et al., 2021). Conversely,

the result for private external debt is surprising. While coefficients of private debts were not statistically significant, their negative sign aligns with previous findings suggesting that private external debt can restrain private investment and excessive credit growth can harm financial stability and long-term growth (Cecchetti et al., 2011; Schularick and Taylor, 2012; Puente-Ajovin and Sanso-Navarro, 2015). These results imply that the negative external debt-growth relationship is mainly driven by the public component of debt (i.e., public, or publicly guaranteed external debt). On the contrary, the private component of debt (i.e., private or privately nonguaranteed external debt) contributes little. Our findings highlight the importance of government borrowing to financial fragility.

Finally, we estimated Equation (7), which compares the impact of public and public domestic debt on economic growth by incorporating both *ped* and *pdd* in the same growth equation[5]. Table 7 reported the results. Columns (1-2) show the results for the whole sample. Public debt from either external or domestic sources exhibit negative effects on growth. However, the magnitude of the impacts is different. From the size of the coefficients (-0.069 versus -0.059) indicates that the influence of public external debt is larger. This result reinforces our argument in Section 2 that the source of public debt is crucial in assessing the effectiveness of countercyclical fiscal policy. Moreover, this suggests that countercyclical fiscal policy is more effective when implemented with external debt or other external financial instruments.

Finally, we conducted a robustness test to further address the issue of endogeneity. Specifically, we rechecked our main findings using the two-step system GMM estimator to estimate Equations (1-7). The two-step system GMM estimator (Blundell and Bond, 1998) suits dynamic panel datasets characterized by a large number of individuals (countries) relative to time (years) (Roodman, 2009a) and when variables exhibit some persistence over time. Additionally, this estimator is preferred over the Arellano and Bond's (1991) first-difference GMM estimator when the panel dataset is unbalanced (Roodman, 2009b). To determine the suitability of the two-step system GMM estimator, we employed four diagnostics tests: (i) the Arellano-Bond test of the first-order serial correlation in the first-differenced error term - AR(1); (ii) the Arellano-Bond test of the second-order autocorrelation in the first-differenced error term - AR(2); and (iii) the Sargan test of overidentifying restrictions; and (iv) the Hansen test of overidentifying restrictions. The estimation results are reported in Tables A1-4 (Appendix). Overall, the robustness checks using the GMM method largely support our main findings.

5) We also used another specification of regression equation. We incorporated the ratio of *ped* to *pdd* at time *t* and the economic growth at time *t* as dependent and independent variables, respectively. We aim to highlight that fiscal authorities make policy decisions in response to current economic conditions. Results using both fixed effects estimation and two-step system GMM estimation largely show a positive value for beta coefficient. This indicates the increased relative importance of external public debt compared to domestic public debt. However, this beta coefficient is statistically insignificant. These results are available from the authors upon request.

Table 7. *Impact of Public External Debt and Public Domestic Debt on Economic Growth: Sample Period Runs from 1990 to 2020*

	(1)	(2)	(3)	(4)
	g	*g*	*g*	*g*
y	-7.371***	-6.656***	-6.735***	-5.933***
	(0.661)	(0.775)	(0.695)	(0.951)
ped	-0.093***	-0.069***	-0.068***	-0.041**
	(0.015)	(0.015)	(0.017)	(0.016)
pdd	-0.083***	-0.059***	-0.072***	-0.054***
	(0.014)	(0.012)	(0.016)	(0.014)
OPEN	0.018**	0.033***	0.033***	0.039***
	(0.008)	(0.007)	(0.011)	(0.009)
GE	0.006	-0.055	0.031	-0.021
	(0.068)	(0.056)	(0.072)	(0.060)
GFC	0.028	0.042*	0.008	0.004
	(0.029)	(0.024)	(0.033)	(0.026)
POP	-0.803***	-0.754***	-0.582	-0.742**
	(0.307)	(0.228)	(0.431)	(0.323)
SAVE	-0.020	-0.012	-0.019	-0.005
	(0.025)	(0.020)	(0.026)	(0.022)
INF	-0.064***	-0.016	-0.042**	-0.008
	(0.022)	(0.019)	(0.020)	(0.019)
Constant	66.008***	58.626***	54.957***	48.654***
	(5.494)	(6.770)	(5.384)	(7.598)
Country FEs	YES	YES	YES	YES
Year FEs	NO	YES	NO	YES
Observations	2,026	2,026	1,428	1,428
R-squared	0.290	0.574	0.282	0.557
Sample	Full	Full	EMDEs	EMDEs

Note. Columns 1-2 display the outcomes for the entire sample, while columns 3-4 present the results specific to EMDEs. All models were estimated using country fixed effects and robust standard errors, with year fixed effects included in models 2 and 4. The dependent variable is the annual growth rate (log difference) of real GDP per capita (*g*), and the independent variables include the natural logarithm of real GDP per capita (*y*), the annual change in the ratio of private external debt-to-GDP (*pred*), the annual growth rate (log difference) of total population (POP), the ratio of total government expenditure to GDP (*GE*), the ratio of gross capital formation to GDP (*GFC*), the ratio of gross domestic savings to GDP (*SAVE*), the degree of trade openness (*OPEN*) measured by the ratio of exports and imports to GDP, and the annual inflation rate (*INF*). All independent variables are expressed at the beginning of the period with a 1-year lag. For definitions of other variables, please refer to Table 1. The robust standard errors are indicated in parentheses, with ***, **, and * denoting statistical significance at the 1%, 5%, and 10% levels, respectively.

V. Conclusion

Theoretical and empirical studies in the current literature have various implications concerning the effectiveness of countercyclical fiscal policy in stabilizing the economy. While existing studies analyze the impulse of fiscal policy on the economy, they often overlook distinguishing whether the impulse originates from within or outside the economy. Therefore, we aim to explore the effectiveness of countercyclical fiscal policy within an alternative framework that discerns the origin of the impulse factor and to revisit the impacts of countercyclical policy in developing countries.

Drawing on the combination between public and private sectors and production possibility line model, we argue that that distinguishing the effect of fiscal policy using domestic and external resources is essential. If the government only relies on internal resources, the effect of fiscal countercyclical policy may be neutral (implying fiscal multiplier equal to one). In fact, if the government utilizes domestic debts for public spending, the fiscal multiplier might remain higher than one (because of the increase of the capital life cycle) but not always. Conversely, if the government utilizes external resources through debts, debt repayment, or foreign investment, then the effect is other than zero. This implies a fiscal multiplier greater than one if the government borrows from abroad and smaller than one if the government pays down external debt).

We employed the fiscal space dataset by the World Bank, which covers 201 countries over the period from 1990-2020. We found an inverse simultaneous relationship between public debt and economic growth for the entire sample and for developing countries. Therefore, our results can support the use of countercyclical fiscal policy in developing countries. This result is inconsistent with the pro-cyclical fiscal policy often documented for most developing countries in the literature. Further analysis suggests that the countercyclical fiscal policy is only practical if conducted with external debt or others external instruments. Our findings thus provide an important piece of evidence on how countercyclical fiscal policy impacts developing countries and have clear implications on the effective use of debt instruments.

However, our paper contains limitations. First, data on external debt used in this study includes both governmental external debt and nongovernment external debt which cannot be separated because of data limitation. This could have introduced some bias to our results. Second, to counter the economic cyclicality, governments may employ other tools like monetary policy, exchange rate policy, interest rate, or capital account control (Kaminsky et al., 2004; Davig and Leeper, 2011). Therefore, identifying the impact of fiscal policy in isolation from these policy tools is not easy. Future study could utilize more complicated econometric models that consider the cofounding effects of other macroeconomic policy tools to further confirm the results presented in this paper.

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Appendix

Table A1. *Nexus between Public Debt and Economic Growth: Results from Two-step System GMM Estimator. Sample Period Runs from 1990 to 2020*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	g	*g*	*d*	*d*	*g*	*g*	*d*	*d*
y	-6.241***	-2.513***			-14.891***	-6.182***		
	(2.346)	(0.775)			(2.238)	(1.865)		
d	-0.187***	-0.219***			-0.226**	-0.165**		
	(0.059)	(0.061)			(0.093)	(0.066)		
OPEN	0.014	0.010*	0.012*	0.003	0.062**	0.029*	0.025*	0.005
	(0.012)	(0.005)	(0.007)	(0.006)	(0.026)	(0.015)	(0.014)	(0.013)
GE	0.436**	0.118*	-0.291***	-0.179**	0.540***	0.177**	-0.233**	-0.039
	(0.203)	(0.068)	(0.095)	(0.085)	(0.126)	(0.081)	(0.095)	(0.074)
GFC	-0.115	0.005	0.362***	0.318***	-0.155**	-0.037	0.370***	0.032
	(0.083)	(0.037)	(0.113)	(0.111)	(0.069)	(0.051)	(0.112)	(0.047)
POP	-2.935***	-1.479***	-2.118***	-1.500***	-3.877***	-1.949***	-2.248***	0.014
	(0.900)	(0.358)	(0.578)	(0.489)	(0.991)	(0.554)	(0.613)	(0.193)
SAVE	0.305**	0.108**	-0.042	-0.028	0.508***	0.205***	-0.014	-0.012
	(0.122)	(0.045)	(0.029)	(0.028)	(0.088)	(0.069)	(0.037)	(0.023)
INF	-0.034	-0.033	-0.142	-0.133	-0.063	-0.025	-0.143	-0.021
	(0.026)	(0.027)	(0.138)	(0.106)	(0.045)	(0.018)	(0.118)	(0.178)
g			-2.403***	-1.857***			-2.485***	-0.164*
			(0.662)	(0.569)			(0.615)	(0.090)
Constant	48.136***	21.664***	5.656**	3.426	108.827***	48.390***	3.914	3.122
	(17.112)	(5.544)	(2.642)	(2.079)	(16.434)	(13.766)	(2.531)	(1.917)
Year dummies	NO	YES	NO	YES	NO	YES	NO	YES
Observations	3,112	3,112	3,209	3,209	2,176	2,176	2,249	2,249
Number of countries	159	159	159	159	123	123	123	123
AR1 (p-value)	0.000	0.001	0.008	0.019	0.038	0.001	0.011	0.076
AR2 (p-value)	0.930	0.899	0.846	0.613	0.521	0.935	0.711	0.394
Sargan test (p-value)	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
Hansen test (p-value)	0.000	0.124	0.393	0.330	0.147	0.512	0.200	0.014
Sample	Full	Full	Full	Full	EMDEs	EMDEs	EMDEs	EMDEs

Note. Columns 1-4 present the results for the full sample, while columns 5-8 provide the results exclusively for EMDEs. The regression equations include the following variables: the annual growth rate (log difference) of real GDP per capita (*g*), the natural logarithm of real GDP per capita (*y*), the annual change in the ratio of public debt-to-GDP (*d*), the annual growth rate (log difference) of total population (*POP*), the ratio of total government expenditure to GDP (*GE*), the ratio of gross capital formation to GDP (*GFC*), the ratio of gross domestic savings to GDP (SAVE), the degree of trade openness (*OPEN*) measured by the ratio of exports and imports to GDP, and the annual inflation rate (*INF*). All independent variables are expressed at the beginning of the period with a 1-year lag. Definitions of all other variables can be found in Table 1. The robust standard errors are indicated in parentheses, with ***, **, and * denoting significance at the 1%, 5%, and 10% levels, respectively.

Table A2. *Nexus between Public External Debt and Economic Growth: Results from Two-step System GMM Estimator. Sample Period Runs from 1990 to 2020.*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	g	*g*	*d*	*d*	*g*	*g*	*d*	*d*
y	-21.009***	-1.400**			-12.145***	-21.225***		
	(3.719)	(0.698)			(3.435)	(4.997)		
ped	-0.000	-0.342***			-0.065	-0.018		
	(0.127)	(0.104)			(0.239)	(0.029)		
OPEN	0.099***	0.010**	0.009	-0.004	0.048*	0.059	0.018*	0.002
	(0.031)	(0.005)	(0.008)	(0.008)	(0.026)	(0.057)	(0.010)	(0.009)
GE	1.667***	0.039	-0.074	0.063	0.181	0.655*	-0.101*	0.038
	(0.407)	(0.068)	(0.049)	(0.044)	(0.136)	(0.343)	(0.058)	(0.086)
GFC	-0.454***	0.026	0.201***	0.132***	-0.054	-0.418**	0.190***	0.148*
	(0.126)	(0.036)	(0.047)	(0.049)	(0.101)	(0.166)	(0.051)	(0.083)
POP	-7.018***	-1.248***	-0.821***	-0.682**	-4.391***	-6.044***	-1.198***	-0.703*
	(1.436)	(0.203)	(0.288)	(0.276)	(1.391)	(2.285)	(0.396)	(0.364)
SAVE	0.875***	0.042	-0.069**	-0.043	0.315***	0.484***	-0.062*	-0.025
	(0.179)	(0.040)	(0.027)	(0.027)	(0.108)	(0.162)	(0.032)	(0.022)
INF	-0.000	0.000**	0.000	-0.000	-0.002	0.000	-0.000	-0.000
	(0.001)	(0.000)	(0.000)	(0.000)	(0.004)	(0.004)	(0.000)	(0.001)
g			-0.733***	-0.204**			-1.064***	-0.608
			(0.255)	(0.094)			(0.310)	(0.590)
Constant	151.264***	13.816***	0.528	-1.029	95.853***	173.681***	1.688	-0.432
	(26.011)	(5.067)	(1.376)	(1.442)	(26.991)	(40.940)	(1.622)	(1.464)
Year dummies	NO	YES	NO	YES	NO	YES	NO	YES
Observations	2,287	2,287	2,384	2,384	1,671	1,671	1,749	1,749
Number of countries	127	127	129	129	87	87	94	94
AR1 (p-value)	0.002	0.000	0.000	0.001	0.041	0.001	0.000	0.002
AR2 (p-value)	0.153	0.110	0.088	0.203	0.239	0.861	0.117	0.357
Sargan test (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.032	0.083
Hansen test (p-value)	0.059	0.050	0.091	0.007	0.032	0.036	0.177	0.188
Sample	Full	Full	Full	Full	EMDEs	EMDEs	EMDEs	EMDEs

Note. Columns 1-4 present the results for the full sample, while columns 5-8 provide the results exclusively for EMDEs. The regression equations include the following variables: the annual growth rate (log difference) of real GDP per capita (*g*), the natural logarithm of real GDP per capita (*y*), the annual change in the ratio of public debt-to-GDP (*d*), the annual growth rate (log difference) of total population (*POP*), the ratio of total government expenditure to GDP (*GE*), the ratio of gross capital formation to GDP (*GFC*), the ratio of gross domestic savings to GDP (*SAVE*), the degree of trade openness (*OPEN*) measured by the ratio of exports and imports to GDP, and the annual inflation rate (*INF*). All independent variables are expressed at the beginning of the period with a 1-year lag. Definitions of all other variables can be found in Table 1. The robust standard errors are indicated in parentheses, with ***, **, and * denoting significance at the 1%, 5%, and 10% levels, respectively.

Table A3. *Nexus between Private External Debt and Economic Growth: Results from Two-step System GMM Estimator. Sample Period Runs from 1990 to 2020*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	g	*g*	*pred*	*pred*	*g*	*g*	*pred*	*pred*
y	-21.840***	-0.844**			-3.864***	-18.987***		
	(3.796)	(0.381)			(1.091)	(6.812)		
pred	0.001	-0.000			-0.032	0.045**		
	(0.006)	(0.001)			(0.059)	(0.019)		
OPEN	0.110***	0.007***	0.033	0.029	0.013	0.039	0.006	0.004
	(0.030)	(0.003)	(0.029)	(0.032)	(0.011)	(0.049)	(0.005)	(0.006)
GE	1.783***	-0.090*	0.034	0.079	-0.016	0.605	-0.021	-0.007
	(0.456)	(0.049)	(0.083)	(0.084)	(0.067)	(0.401)	(0.031)	(0.048)
GFC	-0.448***	0.055**	0.101	0.107	0.013	-0.343*	0.077**	0.059*
	(0.133)	(0.025)	(0.072)	(0.064)	(0.038)	(0.187)	(0.032)	(0.035)
POP	-7.298***	-0.916***	-0.356	0.190	-1.831***	-5.481***	-0.441*	-0.213
	(1.627)	(0.149)	(0.592)	(0.704)	(0.417)	(2.053)	(0.258)	(0.245)
SAVE	0.908***	0.019	-0.012	-0.033	0.078**	0.429**	-0.030**	-0.021
	(0.196)	(0.022)	(0.049)	(0.040)	(0.034)	(0.176)	(0.011)	(0.013)
INF	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
g			-0.311*	-0.305*			-0.136	-0.005
			(0.163)	(0.182)			(0.269)	(0.325)
Constant	155.426***	9.779***	-2.224	-7.192**	33.325***	155.344***	0.310	-0.777
	(25.796)	(2.809)	(2.899)	(3.478)	(8.546)	(54.976)	(1.155)	(1.193)
Year dummies	NO	YES	NO	YES	NO	YES	NO	YES
Observations	2,287	2,287	2,384	2,384	1,687	1,687	1,749	1,749
Number of countries	127	127	129	129	92	92	94	94
AR1 (p-value)	0.001	0.000	0.259	0.263	0.000	0.001	0.001	0.001
AR2 (p-value)	0.137	0.069	0.306	0.307	0.245	0.839	0.901	0.586
Sargan test (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hansen test (p-value)	0.176	0.296	0.115	0.463	0.454	0.009	0.359	0.096
Sample	Full	Full	Full	Full	EMDEs	EMDEs	EMDEs	EMDEs

Note. Columns 1-4 present the results for the full sample, while columns 5-8 provide the results exclusively for EMDEs. The regression equations include the following variables: the annual growth rate (log difference) of real GDP per capita (*g*), the natural logarithm of real GDP per capita (*y*), the annual change in the ratio of public debt-to-GDP (*d*), the annual growth rate (log difference) of total population (*POP*), the ratio of total government expenditure to GDP (*GE*), the ratio of gross capital formation to GDP (*GFC*), the ratio of gross domestic savings to GDP (*SAVE*), the degree of trade openness (*OPEN*) measured by the ratio of exports and imports to GDP, and the annual inflation rate (*INF*). All independent variables are expressed at the beginning of the period with a 1-year lag. Definitions of all other variables can be found in Table 1. The robust standard errors are indicated in parentheses, with ***, **, and * denoting significance at the 1%, 5%, and 10% levels, respectively.

Table A4. *Impact of Public External Debt and Public Domestic Debt on Economic Growth: Results from Two-step System GMM Estimator. Sample period runs from 1990 to 2020*

	(1)	(2)
	g	*g*
y	-1.806***	-5.104***
	(0.547)	(1.728)
ped	-0.239***	-0.190***
	(0.035)	(0.056)
pdd	-0.209***	-0.161**
	(0.071)	(0.066)
OPEN	0.007**	0.007
	(0.003)	(0.012)
GE	0.076	0.105
	(0.063)	(0.074)
GFC	0.003	-0.047
	(0.026)	(0.048)
POP	-1.001***	-1.851***
	(0.197)	(0.455)
SAVE	0.071**	0.115**
	(0.031)	(0.051)
INF	-0.016	-0.011
	(0.023)	(0.026)
Constant	16.665***	44.391***
	(3.893)	(13.289)
Year dummies	YES	YES
Observations	2,033	1,435
Number of countries	126	91
AR1 (p-value)	0.000	0.000
AR2 (p-value)	0.297	0.776
Sargan test (p-value)	0.001	0.000
Hansen test (p-value)	0.221	0.314
Sample	Full	EMDEs

Note. Column 1 presents the results for the full sample, while column 2 provides the results exclusively for EMDEs. The dependent variable is the annual growth rate (log difference) of real GDP per capita (*g*). Independent variables include the beginning of the period with a 1-year lag: the natural logarithm of real GDP per capita (*y*), the annual change in the ratio of private external debt-to-GDP (*pred*), the annual growth rate (log difference) of total population (*POP*), the ratio of total government expenditure to GDP (*GE*), the ratio of gross capital formation to GDP (*GFC*), the ratio of gross domestic savings to GDP (*SAVE*), the degree of trade openness (*OPEN*) measured by the ratio of exports and imports to GDP, and the annual inflation rate (*INF*). Definitions of all other variables can be found in Table 1. Robust standard errors are reported in parentheses, with ***, **, and * denoting statistical significance at the 1%, 5%, and 10% levels, respectively.