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THE IMPACT OF PUBLIC DEBT ON ECONOMIC GROWTH: DETERMINING OF FACTORS AND THEIR INTERACTIONS

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Abstract. This article suggests that the expenditure multiplier and the interactions among its key components can help explain whether increasing public debt encourages or inhibits economic growth. As per the theoretical underpinnings of the effect of debt on growth, its influence is observable in regard to private consumption, import and investment. The size of the expenditure multiplier depends on factors like the tax rate and the marginal propensities to consume, import, and invest – each influencing the multiplier differently. Specifically, the effect is positive in relation to marginal propensities to consume and invest and negative in relation to the tax rate and marginal propensity to import. Our findings show that in countries with relatively lower government effectiveness, debt has a greater impact on growth, mainly due to higher tax rates rather than high import levels. Conversely, in countries with higher government effectiveness, the influence of debt on growth remains similar regardless of tax rates, if the propensity to import is low. In cases where the public sector dominates the economy, the impact of debt on economic growth is determined by factors other than the multiplier effect.

Keywords: economic growth, public debt, tax rate, expenditure multiplier, propensity to import, propensity to spend, propensity to invest.

JEL Classification: E43, H63, H68, O40.

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1. Introduction

As per the theoretical underpinnings, the impact of public debt on economic growth is explained by its crowding-out or crowding-in effect on the expenditures of the private sector. Economic growth stagnates if the motivation of the private sector to consume and invest dwindles as indebtedness of the public sector increases. As such, one may expect that courtiers with a higher propensity to spend will be inclined to borrow more, avoiding adverse effects on growth.

Empirical findings in regard to the impact of public debt on investment, interest rates and private consumption demonstrate differing dynamics. According to a large body of literature, increasing public debt ratio has a significant negative effect on private investments (Chiu & Lee, 2017; Huang et al., 2018, 2020; de Mendonça & Brito, 2021; Puonti, 2022; Islam

& Nguyen, 2024). de Mendonça and Brito (2021) further assert that the adverse effect of a higher public debt ratio on investment increased substantially after the financial crash of 2008/2009. Findings indicate that a shock of 10 per cent in the public debt-to-GDP ratio triggers a reduction of approximately two per cent in private sector investment. According to Huang and his colleagues (Huang et al., 2018), the relationship between public debt and investment is likely to be causal, with public debt crowding out corporate investment by tightening credit constraints. Moreover, it is demonstrated that private investments are lower in countries with higher public debt levels (Huang et al., 2020). A study, conducted by Alshammary and his colleagues (Alshammary et al., 2020), shows that government expenditure hinders economic growth at 58 per cent of the debt-to-GDP ratio. It is plausible to assume that ineffective governments in the states analysed depress private investment so that public investment may provide a replacement. As Abbas and his colleagues (Abbas et al., 2021) assert, the macroeconomic effect of the financed debt forces out private investment by raising interest rates.

A number of empirical studies confirm the positive impact of public debt on the interest rate (Engen & Hubbard, 2004; Kinoshita, 2006; Laubach, 2009; Baldacci & Kumar, 2010; Kameda, 2014; Perović, 2018; Mondal & Maitra, 2022; Christopher & Skaperdas, 2024). According to Laubach's study (2009), the impact of government debt on interest rates is statistically significant. Perović (2018) finds that public debt has a significant positive effect on long-term interest rates in eleven Eastern and Central European countries, with the estimated effect larger in the evaluated countries, compared to the one observed in developed economies. As per the study of Malešević-Perović (2016), over time, increasing government debt influences interest rates. Results, obtained by Kinoshita (2006) and Kameda (2014), demonstrate that even a small increase in government debt increases long-term interest rates. Claeys and his colleagues (Claeys et al., 2012) find a small crowding-out effect of public debt on long-term domestic interest rates, with a more substantial effect observed in emerging economies. According to Turner and Spinell (2013), the impact of the marginal external debt or government debt increase on the interest rate is non-linear and dependent upon the initial debt level. As Mondal and Maitra (2022) elucidate, external debt only pushes up interest rates in the long run, whilst domestic debt lowers them both long-and short-term.

Based on the body of literature to date, it can be summarised that the rising public debt level has a significant negative effect on private investments, whilst its impact on the interest rate is positive. An increase in the interest rate decreases the volume of private investments, thereby leading to a crowding-out effect of investments.

In this article, we assume that there is a greater likelihood of positive impact of debt on economic growth if debt increase occurs in a context with favourable conditions for a higher expenditure multiplier. Specifically, we envisage a state where propensities to consume and invest are high, whilst tax rate and propensity to import remain low. Our study aims to assess whether the aforementioned factors and their interactions determine the impact of public debt on economic growth.

The remainder of the article is organised, as follows. Section 2 offers an overview of the literature on the role of the expenditure multiplier and its influence on the public debt-growth nexus. Section 3 provides insights regarding the model utilised, estimations strategy and data. The main estimation results are introduced in Section 4. Lastly, Section 5 provides conclusion and a brief discussion regarding the policy implications of our research.

2. The role of the expenditure multiplier and its components on the public debt-growth nexus: Theoretical background

According to Keynesian economists, debt-financed public expenditures positively affect aggregated demand and economic growth through the mechanism of expenditure multiplier. As such, countries with higher expenditure multipliers benefit from expansionary fiscal policy and may expect accelerated economic growth to follow the public debt increase. However, Butkus and his colleagues (Butkus et al., 2021a) argue that higher debt levels lead to a lower expenditure multiplier, a decrease in the effect of public consumption on aggregated demand and a less positive, or even negative, impact on growth.

There is a higher likelihood of a growth-inhibiting effect if the value of the expenditure multiplier is low. In addition, higher debt tends to lower its value (see Butkus et al., 2021b for literature review). There is a positive relationship between the expenditure multiplier and marginal propensities to consume and invest, whilst the relationship with the marginal propensity to import and the tax rate is negative. Theoretical explanations of the effect of debt on growth indicate its influence on private consumption, imports and investment. As such, an impact on the expenditure multiplier can be anticipated.

According to the neoclassical school of thought, public deficit leads to elevated government borrowing, causing an increase in the demand for money and a higher interest rate if the money supply remains constant. In addition to the increased demand for money channel, public debt may impact interest rates through the risk premium channel. High public debt levels may be considered a sign of unstable public finances and increase the risk of default for the country, leading to higher borrowing costs as investors require a risk premium. Investments and consumption of the private sector are negatively related interest rate changes. Higher interest rates may decrease investment incentives, leading to a decline of the marginal propensity to invest. Conversely, savings incentives increase, leading to a lower marginal propensity to consume. In addition to the interest rate channel, a crowding-out effect of public debt on private consumption may occur due to expectations of higher taxes in the future.

Ricardian equivalence hypothesis suggests that high debt repayment will require increasing government revenue. Consequently, households prepare for higher taxation in the future and save more, thereby the marginal propensity to consume declines. The negative impact of higher debt on private investment may also be explained by debt overhang. Specifically, a certain level of debt dissuades investment, based upon investors' expectation that their profits will be taxed to service the debt.

The effect of public finances on private consumption may be both positive (Keynesian) and negative (Ricardian). Studies suggest that the Keynesian response of private consumption to government expenditure shocks depends upon the level of public debt. Giavazzi and Pagano (1990) analyse budget consolidations in Ireland and Denmark during the 1980s and conclude that the effects of consolidation contradict the standard Keynesian view. Elucidating further, Blanchard (1990) presents a model, explaining how a decrease in public spending or increased taxes stimulate private consumption and output. The model suggests that public debt determines private consumption and output reaction to fiscal policy shocks, with Keynesian effects more likely at low debt levels. Empirical findings (Johansson & Jönsson, 2003; Nickel & Tudyka, 2014; Huidrom et al., 2020) indicate that the response of private consumption to public spending becomes less Keynesian as the level of public debt increases. As Morina and his colleagues (Morina et al., 2024) elucidate, variations in growth of private consumption, stimulated by public debt in the Eurozone states, can be explained

by variations in their policies. Additionally, specific economic conditions help account for the differences between Eurozone countries that enforce stricter policies and those that adopt a laxer approach. The findings indicate that public debt positively influences private consumption, suggesting it is effectively used to fund initiatives that stimulate economic activity and employment. Studies by Berben and Brosens (2007) and Cho and Rhee (2013) confirm this conclusion. Results suggest that the impact of debt on private consumption is non-linear. Specifically, the negative effect occurs or becomes stronger at higher debt levels.

It should be emphasised that the literature on the impact of public debt on private consumption does not offer a unified stance. Gogas and his colleagues (Gogas et al., 2014) use a dataset of fifteen OECD countries and reject the hypothesis that public debt growth causes a decline in private consumption. A study of 18 Asia-Pacific countries further finds mixed evidence for the neutral, positive and negative relationship between public debt and private consumption (Kusairi et al., 2019). According to its authors, results depend upon the specifications of the models and period analysed.

There is a scarcity of research on the impact of public debt on the marginal propensity to consume, with the exception of a few studies. Bhattacharya (1999) finds mixed evidence on the relationship between the propensity to consume and government indebtedness. However, results suggest that a negative relationship is more likely to occur once the debt-to-GDP ratio exceeds the critical threshold of around 30–35 per cent. Bhattacharya and Mukherjee (2013) further explore the hypothesis that the propensity to consume varies in a non-linear fashion with public debt. Taking Sutherland's (1997) model as a starting point and adding extensions and adjustments, the authors demonstrate how government debt can affect the marginal propensity to consume directly and in a non-linear manner. At low or moderate levels of government debt, consumers react to a fiscal policy in a Keynesian manner, partially because they do not expect tax increases in the near future. When government debt reaches high levels, households transition from Keynesian to Ricardian behaviour, with marginal propensity to consume in decline.

The relationship on the public debt-taxes nexus is recognised as bidirectional. However, in this paper, we specifically focus on the impact of debt on taxes and, by implication, on economic growth. It is likely that the effect of tax evasion is extremely important for this process (Víghová, 2023). Fiscal consolidation must occur through tax increases or public expenditure cuts to ensure fiscal solvency. Blanchard (1990) analyses a model in which consolidation means increasing taxes to stabilise debt at a constant value. The model indicates that, at a given output level, the tax rate required by a fiscal consolidation increases with the level of debt. The higher the required increase in taxes, the larger reduction in the output it will imply.

Krogstrup (2002) investigates the causality from debt to tax level, considering tax competition. Data confirms that high-debt EU member-states have higher taxes (tax revenues-to-GDP ratio), compared to low-debt EU countries. Mironikovaitė and her colleagues (Mironikovaitė et al., 2023) assess the impact of public debt on the tax burden. Their results indicate a dual impact – a reduction in the current period followed by an increase in future periods. Janeba and Todtenhaupt (2018) propose a novel channel through which public debt levels affect tax settings. When borrowing is restricted due to sovereign default or by fiscal rules, a rise in the country's initial debt level brings about a reduction of public spending on infrastructure, which lowers the attractiveness of the state for business investments. Consequently, government is cutting business tax to partially compensate for the loss of competitiveness. Using data from 22 OECD countries, Angyridis and Michelis (2021) confirm the significance of lags in the debt-to-GDP ratio in predicting changes in the tax rate. However, their argument is supported solely in the case of countries with stationary tax rates.

Research on the impact of public debt on imports remains wanting. However, it has been suggested that this impact could be indirect (Teliti & Kotorri, 2017). The level of public debt directly influences public investment. As such, it primarily affects the levels of public and private investment, employment, and consumption in the economy. The level of production further affects the level of imports. Considering the indirect impact of public debt on imports, it could be hypothesised that import growth could provide a viable explanation for the heterogeneity in the debt-growth relationship.

The invigorating effect of public expenditure on GDP growth cannot be discerned within the confines of a specific state as it spreads further to other countries through imports. Barrell and his colleagues (Barrell et al., 2012) found that import penetration is very strongly correlated with the multipliers, suggesting that more open economies tend to have smaller multipliers in response to spending cuts and tax rises. It was further argued that fiscal multipliers are reduced by greater trade openness and more flexible exchange rates (Batini et al., 2014). Aditionally, results, presented by Dime and her colleagues (Dime et al., 2021), support the argument that the size of government spending multipliers is reduced by trade openness, fiscal fragility, and exchange rate flexibility. Whilst import increases, the expenditure multiplier decreases, leading to a halt of economic growth. Although trade openness or separate imports or exports (Checherita & Rother, 2010; Bakari & Mabrouki, 2017; Bakari et al., 2019; Elkhalfi et al., 2024) are often used as growth controls, examining the debt-growth nexus, we still regard the import-to-GDP ratio as a more appropriate measure to evaluate the dynamics in operation.

Based on the discussion provided above, it could be summarised that the negative impact of debt on economic growth is associated with growing uncertainty in relation to the financial stability, rising interest rates and rising expectations for future tax increases within a specific state. Consequently, the propensities to invest and consume, and by implication, the expenditure multiplier, are declining, leading to a lower growth-enhancing effect of rising government expenditure (and debt). In addition, an increase in debt may lead to higher taxes, imports and a further decline in the expenditure multiplier. However, the occurrence and extent of the aforementioned dynamics depend upon various conditions, including, but not limited to, the quality of institutional environment and current level of indebtedness. The impact of debt on economic growth could also be associated with innovation performance (Belanová et al., 2023), or global supply chain disruption (Grondys & Kot, 2023) and etc. In this article, we assume that the positive impact of debt on economic growth is more likely if debt increases in a country with favourable conditions for a higher expenditure multiplier. In particular, we envisage that propensities to consume and invest are high, whilst tax rate and propensities to import are low.

3. Model, data, and estimation strategy

Our rationale to examine the mediating effect of the expenditure multiplier on the relationship between debt and growth relies upon the neoclassical equation, augmented by panel data:

$$g_{i,t\to T} = \alpha + \beta \times \ln Y_{i,t} + b_1 \times D_{i,t} + \sum_{k=1}^{K} c_k \times C_{k,i,t} + \mu_i + \theta_t + \varepsilon_{i,t}, \quad (1)$$

where $g_{i,t\to T}$ is the average growth rate of per capita GDP at constant prices (Y) from year t to T in country i calculated as $\ln\left(Y_{i,T} / Y_{i,t}\right) \times T^{-1}$. D is the debt variable and C is the growth controls (detailed information in regard to the variables is provided in Table 1). μ stands for

the country-specific, time-invariant effects, and θ is a set of time-dummies. ε is the idiosyncratic error term, and α, β, b_1, and c_k are coefficients to be estimated.

Table 1. Variables and descriptive statistics

Variable	Abbreviation	Mean	Median	S.D.	Min	Max	Code in WB's WDI database
GDP per capita (constant 2015 US$, 000)	Y	21	11.6	22.6	0.464	112	NY.GDP.PCAP.KD
5-year average growth rate	g	0.0202	0.0197	0.0255	–0.176	0.129	Own calculations
General government gross debt (% of GDP)	D	51.6	43.7	31.0	0.000	192.	WEO
Government effectiveness index	GEI	0.598	0.627	0.928	–1.45	2.35	WGI database
Government size (general government final consumption expenditure (% of GDP))	G	17.2	17.5	5.91	3.46	65.7	NE.CON.GOVT.ZS
Human capital (school enrollment, secondary (% net))	S	78.0	85.8	20.5	9.15	99.9	SE.SEC.NENR
Population, total (mil.)	POP	27.2	8.32	61.5	0.0788	1280	SP.POP.TOTL
Population growth	ΔlnPOP	0.00877	0.00756	0.0107	–0.0226	0.0636	Own calculations
Consumer price index (2010 = 100)	CPI	98.6	100.	27.2	29.7	433.	FP.CPI.TOTL
Inflation	ΔlnCPI	0.0388	0.0273	0.0441	–0.0458	0.465	Own calculations
Tax rate (tax revenue (% of GDP))	TAXR	19.0	18.5	7.42	0.0435	62.8	GC.TAX.TOTL.GD.ZS
Households and NPISHs final consumption expenditure (% of GDP)	C	61.3	60.6	13.3	19.5	96.6	NE.CON.PRVT.ZS
Investment (gross capital formation (% of GDP))	I	24.2	23.0	6.94	9.86	69.5	NE.GDI.TOTL.ZS
Private sector's propensity to spend	PSPS	106	103.	20.2	52.8	290	Own calculations
Imports of goods and services (% of GDP))	IMP	49.9	44.4	24.4	12.1	160	NE.IMP.GNFS.ZS
Propensity to import	PI	63.3	55.3	36.4	14.0	326	Own calculations

As mentioned previously, in this article, we propose that the expenditure multiplier mechanism may provide an explanation whether an increase in public debt invigorates or impedes economic growth.

The value of the expenditure multiplier depends upon the tax rate and marginal propensities to consume, invest and import. The aforementioned factors have differing effects on the size of the multiplier – positive in relation to marginal propensities to consume and invest and negative in relation to the tax rate and marginal propensity to import. Our aim is not to examine the effect of the multiplier itself, but to focus instead on the variables that determine its size. However, it is important to acknowledge that the size of the multiplier is unknown at a given moment and there is no scientific consensus in regard to its measurement (Ilzetzki et al., 2013). Theoretically, the impact of public debt on economic growth is explained by its crowding-out or crowding-in effect on the expenditures of the private sector. Economic growth stagnates if the motivation of the private sector to consume and invest declines as indebtedness of the public sector increases. Consequently, one may expect countries with a higher propensity to spend to borrow more, thereby avoiding adverse effects on growth. Following Dafermos (2018), we consider the propensity of the private sector to spend out of its income (*PSPS*) as an economic growth variable and estimate it as a ratio of private expenditures (consumption of households (*C*) plus the investment of firms (*I*)) to income of private sector after taxes.

Since marginal propensities tend to converge to average in the long run, we utilise the latter in our specification. Following the rationale of Brambor and his colleagues (Brambor et al., 2006), adding to the Eq. (1) *PSPS*, the propensity to import (*PI*), and tax rate (*TAXR*) as mediators of the effect of debt on growth, we derive a specification with multiplicative terms:

$$\begin{aligned} g_{i,t\to T} = {} & \alpha + \beta \times lnY_{i,t} + b_1 \times D_{i,t} + b_2 \times PSPS_{i,t} + b_3 \times PI_{i,t} + b_4 \times TAX_{i,t} + \\ & b_{12} \times D_{i,t} \times PSPS_{i,t} + b_{13} \times D_{i,t} \times PI_{i,t} + b_{14} \times D_{i,t} \times TAXR_{i,t} + b_{23} \times PSPS_{i,t} \times PI_{i,t} + \\ & b_{24} \times PSPS_{i,t} \times TAXR_{i,t} + b_{34} \times PI_{i,t} \times TAXR_{i,t} + b_{123} \times D_{i,t} \times PSPS_{i,t} \times PI_{i,t} + \\ & b_{124} \times D_{i,t} \times PSPS_{i,t} \times TAXR_{i,t} + b_{134} \times D_{i,t} \times PI_{i,t} \times TAXR_{i,t} + b_{234} \times PSPS_{i,t} \times PI_{i,t} \times \\ & TAXR_{i,t} + b_{1234} \times D_{i,t} \times PSPS_{i,t} \times PI_{i,t} \times TAXR_{i,t} + \ldots + \varepsilon_{i,t}. \end{aligned} \tag{2}$$

Rearranging Eq. (2), we can better see the composite slope of growth on debt, which depends on *PSPS*, *PI*, *TAXR,* and their interactions:

$$\begin{aligned} g_{i,t\to T} = {} & \alpha + \beta \times \ln Y_{i,t} + (b_1 + b_{12} \times PSPS_{i,t} + b_{13} \times PI_{i,t} + b_{14} \times TAXR_{i,t} + \\ & b_{123} \times PSPS_{i,t} \times PI_{i,t} + b_{124} \times PSPS_{i,t} \times TAXR_{i,t} + b_{134} \times PI_{i,t} \times TAXR_{i,t} + \\ & b_{1234} \times PSPS_{i,t} \times PI_{i,t} \times TAXR_{i,t}) \times D_{i,t} + b_2 \times PSPS_{i,t} + b_3 \times PI_{i,t} + b_4 \times TAX_{i,t} + \\ & b_{23} \times PSPS_{i,t} \times PI_{i,t} + b_{24} \times PSPS_{i,t} \times TAXR_{i,t} + b_{34} \times PI_{i,t} \times TAXR_{i,t} + \\ & b_{234} \times PSPS_{i,t} \times PI_{i,t} \times TAXR_{i,t} + \ldots + \varepsilon_{i,t}. \end{aligned} \tag{3}$$

The expression in the parentheses shows the conditional growth outcomes of debt, which depend on the levels of the propensity of the private sector to spend (*PSPS*), the propensity to import (*PI*), and tax rate (*TAXR*). In multiplicative regression, not only the slope coefficients are conditional and depend upon the values of the mediator(s), but also the standard error associated with the slope coefficient. In our multiplicative setting, we use a formula, developed by Liobikienė and Butkus (2021), to calculate standard errors.

To examine whether government effectiveness additionally shapes the effect of debt on growth, we estimate our specification separately for countries with relatively low and high government effectiveness, based on the median level.

Our specifications are constructed to regress the existing debt level and other independent variables against the 5-year forward-looking overlapping average per capita GDP growth rate. This technique enables us to tackle multiple issues. The first one is related to the influence of cyclical economic changes on estimates derived from annual per capita GDP growth. The averaged future values of growth can partially avert reverse causality and alleviate endogeneity bias, as present growth rates (or the anticipated growth rate for the forthcoming year) influence debt, just as debt influences growth rates. This method enlarges the sample size relative to non-overlapping growth episodes. However, it simultaneously introduces a moving average structure in the error term. In accordance with Panizza and Presbitero (2014), we employ the Huber-White Sandwich correction within the least square dummy variable (LSDV) estimator framework for general estimations, to model autocorrelation in the error term.

Our unbalanced panel comprises 94 countries from various geographical regions and income groups worldwide (see Table 2, with variables and descriptive statistics introduced in Table 1) for the period 1996–2020. States, subject to our study, account for around 80 per cent of the world's GDP and 70 per cent of its population. It is important to acknowledge that this research does not incorporate all countries worldwide, with exclusions due to missing data series or uneven data flow. The analysis relies upon data from the World Bank, more specifically – the World Development Indicators database, with some variables based on our own calculations. We utilise 989 observations, ranging from 3 to 17 per country, averaging 10.5 observations per country.

Table 2. Countries in the sample

	High income	Upper middle income	Lower middle income	Low income
East Asia & Pacific	Australia (3); Korea, Rep. (17); Macao SAR, China (15); New Zealand (4)	Fiji (4); Malaysia (16); Thailand (9)	Cambodia (6); Indonesia (11); Mongolia (4); Philippines (11); Timor-Leste (4)	
Europe & Central Asia	Austria (16); Belgium (16); Croatia (13); Cyprus (16); Czech Republic (6); Denmark (17); Estonia (17); Finland (17); France (16); Germany (15); Greece (13); Hungary (17); Iceland (17); Ireland (15); Italy (16); Latvia (9); Lithuania (17); Luxembourg (15); Malta (14); Netherlands (13); Norway (17); Poland (16); Portugal (9); Slovak Republic (15); Slovenia (17); Sweden (16); Switzerland (16); United Kingdom (16)	Albania (5); Belarus (7); Bulgaria (17); Georgia (10); Kazakhstan (7); Moldova (16); Romania (5); Serbia (9); Turkey (9)	Armenia (7); Kyrgyz Republic (4); Ukraine (14)	
Latin America & Caribbean	The Bahamas (13); Barbados (12); Chile (10); Uruguay (6)	Brazil (6); Colombia (9); Costa Rica (6); Dominican Republic (14); Guatemala (11); Jamaica (10); Mexico (10); Paraguay (10); Peru (15)	Bolivia (7); El Salvador (14); Honduras (3); Nicaragua (6)	

End of Table 2

	High income	Upper middle income	Lower middle income	Low income
North America	Canada (5); United States (8)			
Middle East & North Africa	Bahrain (7); Israel (16)	Jordan (10)	Morocco (9)	
South Asia			Bangladesh (12); Bhutan (13); India (3); Nepal (3)	
Sub-Saharan Africa	Seychelles (10)	Mauritius (5); Namibia (5); South Africa (6)	Angola (6); Cabo Verde (8); Cameron (5); Ghana (11); Lesotho (10)	Burkina Faso (13); Central African Republic (4); Madagascar (9); Mali (8); Mozambique (6); Rwanda (4)

Note: The number of observations per country is in parentheses.

4. Estimation results

According to the theoretical underpinnings of macroeconomics, increasing PSPS leads to a higher expenditure multiplier effect. As such, public spending, financed by borrowed funds (an increase in public debt), is expected to have a growth-enhancing effect. The opposite effect is expected when the tax rate and/or propensity to import increases. Our results are in line with the multiplier effect (see Table 3 and Figure 1).

Table 3. LSDV estimates. Dependent variable – 5-year forward-looking overlapping average per capita GDP growth rate

Variable	Abbreviation	Coef.	All observations	GEI<0.627	GEI>0.627
			(1)	(2)	(3)
Constant		α	0.2376***	0.07460	0.7826***
			(0.04537)	(0.06654)	(0.1098)
Initial per capita GDP	lnY	β	–0.01025***	–0.005672***	–0.01385***
			(0.001600)	(0.001946)	(0.002008)
General government gross debt	D	b_1	–0.001262	–0.0001336	–0.008946***
			(0.0008125)	(0.001379)	(0.001668)
Private sector's propensity to spend	PSPP	b_2	–0.001102***	0.0001887	–0.006035***
			(0.0004064)	(0.0006132)	(0.001016)
Propensity to import	PI	b_3	–0.0002136	–0.0004687	–0.004759***
			(0.0004482)	(0.0007162)	(0.001179)

Continued Table 3

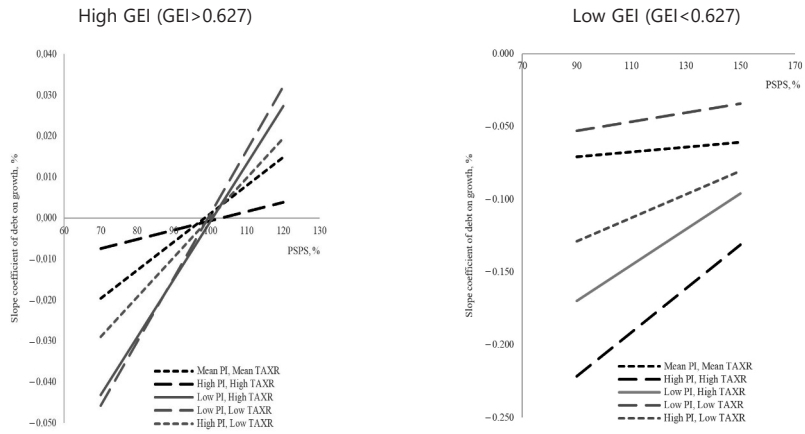
Variable	Abbre-viation	Coef.	All observations	GEI<0.627	GEI>0.627
			(1)	(2)	(3)
Tax rate	TAXR	b_4	–0.004400***	0.002637	–0.02050***
			(0.001563)	(0.003249)	(0.003595)
Interactions	D×PSPP	b_{12}	1.291e-05	1.659e-06	9.207e-05***
			(8.061e-06)	(1.344e-05)	(1.680e-05)
	D×PI	b_{13}	–1.049e-06	–2.414e-05	–6.964e-05***
			(8.288e-06)	(1.637e-05)	(1.757e-05)
	D×TAXR	b_{14}	0.0001155***	2.246e-05	0.0003738***
			(3.176e-05)	(6.653e-05)	(6.233e-05)
	PSPS×PI	b_{23}	3.491e-06	2.496e-06	4.587e-05***
			(3.722e-06)	(5.761e-06)	(1.070e-05)
	PSPP×TAXR	b_{24}	5.682e-05***	–1.047e-05	0.0002148***
			(1.562e-05)	(3.188e-05)	(3.506e-05)
	PI×TAXR	b_{34}	1.659e-05	9.484e-08	0.0001717***
			(1.511e-05)	(2.666e-05)	(4.190e-05)
	D×PSPS×PI	b_{123}	3.519e-08	9.891e-08	6.973e-07***
			(7.683e-08)	(1.349e-07)	(1.724e-07)
	D×PSPS× TAXR	b_{124}	–1.239e-06***	–2.691e-07	–3.852e-06***
			(3.054e-07)	(6.347e-07)	(6.166e-07)
	D×PI×TAXR	b_{134}	–3.947e-07	–9.808e-07*	–2.558e-06***
			(2.534e-07)	(5.137e-07)	(6.117e-07)
	PSPS×PI× TAXR	b_{234}	–2.339e-07**	–1.226e-08	–1.615e-06***
			(9.538e-08)	(1.446e-07)	(3.474e-07)
	D×PSPS× PI×TAXR	b_{1234}	3.795e-09**	5.737e-09	2.552e-08***
			(1.720e-09)	(3.559e-09)	(5.250e-09)
Government effectiveness index	GEI	c_1	0.003991**		
			(0.001892)		
Government size	G	c_2	–0.001262***	–0.001114***	–0.001154***
			(0.0001997)	(0.0002794)	(0.0003578)
Human capital	S	c_3	6.574e-05	9.819e-05	–2.644e-05
			(6.877e-05)	(9.327e-05)	(0.0001557)
Population growth	ΔlnPOP	c_4	–0.5252***	–0.4377***	–0.3874***
			(0.08661)	(0.1299)	(0.1447)

End of Table 3

Variable	Abbre-viation	Coef.	All observations	GEI<0.627	GEI>0.627
			(1)	(2)	(3)
Inflation	ΔlnCPI	c_5	–0.03712**	–0.04114**	–0.08550
			(0.01836)	(0.02052)	(0.05644)
Sample size			989	494	495
Number of countries			94	47	47
Adj. R^2			0.320	0.265	0.389
Pesaran CD test(1) [p-value]			0.083	0.078	0.085
Test for differing group intercepts(2) [p-value]			[<0.001]	[<0.001]	[<0.001]
Wald test (3) [p-value]			[<0.001]	[<0.001]	[<0.001]
Hausman test(4) [p-value]			[<0.001]	[<0.001]	[<0.001]
Wooldridge test(5) [p-value]			[<0.001]	[<0.001]	[<0.001]

Note: (1) A low p-value counts against the null hypothesis: cross-sectional independence. (2) A low p-value counts against the null hypothesis: the groups have a common intercept, i.e. OLS outperforms the estimator based on within transformation. (3) A low p-value counts against the null hypothesis: no time effects, i.e. time-dummies, are irrelevant. (4) A low p-value counts against the GLS estimates with random-effects in favour of the estimator based on within transformation. (5) A low p-value counts against the null hypothesis: no first-order serial correlation in error terms. Heteroscedasticity robust standard errors are presented in parentheses. All estimations include time and country fixed-effects and are based on within transformation with a Huber-White Sandwich correction. *, **, *** indicates significance at the 10, 5 and 1 percent levels, respectively.

Estimates show that low levels (as a share in GDP) of imports and tax rates, combined with growing PSPS, are the most favourable conditions for an increase in public debt in order to achieve a positive impact on output growth (Barrell et al., 2012). However, such interplay of factors leads to a growth-stimulating effect solely in the sample of countries with relatively high government effectiveness. In the sample with low GEI scores, the marginal effect of debt



High GEI: TAXR Mean 21.7 High 29.2 Low 14.2; PI Mean 70.7 High 111.8 Low 29.7;
Low GEI: TAXR Mean 16.3 High 22.5 Low 10.0; PI Mean 55.9 High 85.2 Low 26.6.

Figure 1. Modelling of the debt-growth relationship based on expenditure multiplier factors in groups of countries with different levels of government efficiency

on growth remains negative, but less harmful than it is when PI and TAXR are high. Regardless of the quality of government effectiveness, the largest difference in the impact of debt is observed when both PI and TAXR are low, compared to the when both variables are high.

If PI and TAXR are relatively high, rising debt may have a growth-promoting effect. However, it is observed solely in cases, in which the propensity of the private sector to spend and government effectiveness are relatively high. If only one of the variables is high, whilst the other remains low, results differ across countries with different levels of GEI. Findings suggest that in a sample with relatively low GEI, the impact of debt on economic growth is more exacerbated by high TAXR than high PI. Conversely, if government effectiveness is relatively high, debt affects growth in a similar manner, regardless of whether tax rate is low or high, if the propensity to import is low.

However, it is worth noting that the moderating effect of the multiplier on the debt-to-growth ratio contradicts theoretical assumptions when GEI is relatively high and PSPS is relatively low. For instance, Figure 1 suggests that at the same level of PSPS (e.g., 80%), debt may have the lowest negative effect on growth when both TAXR and PI are high. The multiplier effect is related to an enhancement of the impact of government expenditure on the expenditure of the private sector. As such, in cases where the public sector dominates the economy, the impact of debt on economic growth is determined by factors other than the multiplier effect, such as whether the funds borrowed were used for investment or social spending.

Even though the factors determining the size of the expenditure multiplier, combined with the effectiveness of the government, cannot fully explain the impact of debt on economic growth, the results of this study lead to several significant conclusions. The body of literature suggests that higher interest rates and higher tax rates are expected to follow increasing public debt and, in turn, may inhibit private consumption, economic growth and investment. In line with these arguments, we find that the lower the propensity of the private sector to spend, the stronger the negative impact of public debt on economic growth, regardless of the level of government effectiveness. In addition, we confirm that the propensity to import plays a role in explaining the public debt-growth nexus. Studies suggest that fiscal multipliers tend to be lower in countries with a higher propensity to import (Barrell et al., 2012; Ilzetzki et al., 2013). Consequently, we expect a less positive (or more negative) marginal effect on the growth of additional public borrowing.

A number of empirical studies have investigated the non-linear debt-growth nexus, aiming to determine the so-called debt threshold, or the debt-to-GDP ratio at which the marginal effect of debt on growth changes from positive to negative. A body of literature on the topic (see Bentour, 2020; Salmon & de Rugy, 2020; Law et al., 2021; Gomez-Puig et al., 2022; Augustine & Rafi, 2023), clearly demonstrates that there is no universally applicable debt threshold for all countries. With the same level of public indebtedness, some countries can still borrow and boost their economies, whilst others are starting to face negative outcomes. As such, instead of estimating a debt threshold, the emphasis should be placed on analysing the conditions that shape the impact of debt on economic growth. Our findings suggest that relatively high government effectiveness, coupled with a high private sector propensity to spend is required for increasing debt to have a positive effect on growth. Our results are in line with the strand of literature, asserting that debt is more likely to stimulate growth in countries with better institutions (see for the review Abbas et al., 2021; Law et al., 2021).

5. Conclusions and final remarks

As per the theoretical underpinnings, the negative impact of debt on economic growth is associated with growing uncertainty in regard to the financial stability of a given state, rising interest rates and rising expectations for future tax increases. Theoretical explanations of the effect of debt on growth highlight its leverage on investment, imports and private consumption. As such, an impact on the expenditure multiplier can be anticipated. The value of the expenditure multiplier relies upon the tax rate and marginal propensities to consume, invest and import. The aforementioned factors have differing effects on its size – positive, in relation to marginal propensities to invest and consume and negative in relation to the tax rate and a marginal propensity to import.

The results of this study demonstrate that the multiplier effect is observed solely in countries with a high government effectiveness index. Low levels of imports (as a share of GDP) and tax rates, combined with a growing propensity of the private sector to spend out of its income, are the most favourable conditions for a positive impact of rising public debt on economic growth to be observed. In states with low government effectiveness, the marginal effect of debt on economic growth remains negative, but less harmful than it is when the propensity to import and the tax rate are high. Regardless of the quality of government effectiveness, the largest difference in the impact of debt on economic growth is observed when both the propensity to import and the tax rate are low, compared to when both factors are high.

The findings indicate that in countries with relatively low government effectiveness, public debt has a stronger effect on economic growth, primarily driven by high tax rate rather than by a high propensity to import. Additionally, when government effectiveness is relatively high, public debt affects economic growth similarly, regardless of whether the tax rate is low or high, as long as the propensity to import is low. Our findings are in line with a strand of literature, suggesting that there is a higher likelihood of a positive impact of debt on economic growth in countries with better institutional quality. The multiplier effect is related to enhancing the impact of government expenditure on the expenditure of the private sector. As such, if the public sector dominates the economy, the impact of debt on growth is more influenced by factors, other than the multiplier effect. We find that if the propensity of the private sector to spend is lower, the negative impact of public debt on economic growth is stronger, irrespective of the level of government effectiveness.

Findings indicate that if the aim of policy makers is to benefit from a positive impact of increasing public debt on economic growth, they should be aware of the crucial significance of relatively high government effectiveness, coupled with a high private sector propensity to spend. Such an enhancement of economic growth may be achieved by maintaining the debt-to-GDP ratio, effective allocation of financial resources, increase of the propensity of the private sector to spend and better functioning institutions. Policy responses that increase public debt may be effective in the short term and help stimulate growth, but increasing the debt-to-GDP ratio may partially (or completely) negate the effects of a fiscal stimulus in the medium term, which may ultimately slow down the recovery from the pandemic or other shocks.

It is important to acknowledge the limitations of this research. Our study uses a complex multiplicative regression model, which makes it challenging to isolate the direct impact of public debt on economic growth. The study uses data from 1996 to 2020, as not all the official data required for the study were provided in full. However, since the study used a large amount of data covering various periods, the findings of this study are relevant and

significant in assessing the impact of public debt on economic growth. The analysis employs data from 94 countries. However, the sample is unbalanced, with varying numbers of observations per country. This could potentially introduce biases or inconsistencies in the results, particularly when comparing high- and low-income states. The study does not incorporate variables such as political stability, external shocks, tax evasion, innovation performance, or global supply chain disruption, which may have significant effects on both public debt and economic growth. This omission could, to some extent, lead to omitted variable bias. The value of the expenditure multiplier is not directly observed, and there is no consensus definition in the literature. This uncertainty complicates the interpretation of results that depend heavily on the estimated size of the multiplier. Despite efforts to mitigate endogeneity (for instance, using lagged variables and fixed effects), there remains a possibility that reverse causality or unobserved confounding factors could influence the results.

Future research may include other variables, such as political and geo-political stability, external shocks, global supply chains disruption, and focus on public finance resilience, measuring and modelling studies, because the amount of public debt and its fluctuations are directly related to public finance management decisions.

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Author contributions

The authors contributed equally to this work.

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