

## A NOTE ON PUBLIC DEBT–PRIVATE INVESTMENT NEXUS IN EMERGING ECONOMIES

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### ABSTRACT

We examine the effect of public debt on private investment in selected emerging economies. Using a panel threshold regression model, we estimate a threshold value of about 3 percent, on average, below which public debt stimulates private investment. Our additional analysis involving selected developed economies suggests that the crowding out effect is less evident relative to the emerging economies as higher public debt stocks do not seem to significantly undermine their private investments. These results have implications for debt sustainability and maintaining a reasonable public debt–GDP ratio is crucial for sustainable investment growth.

*Keywords:* Debt; Investment; Nonlinearity; Threshold regression models.

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## I. INTRODUCTION

In this study, we examine the crowding-out effect of government borrowing in selected emerging and advanced economies, using a panel threshold regression model. This model enables us to determine the threshold level below (above) which public debt strengthens (undermines) private investment. The past decade has been characterized by a broad-based increase in the debt stock of various economies with serious concerns about its attendant impact on investment and, by extension, economic growth. For instance, since 2010<sup>1</sup>, the debt stock of both emerging markets and the developing economies increased by 60 percent points of GDP to an all-time high of over 170 percent of GDP in 2019 (see Kose *et al.*, 2020). The outbreak of the COVID-19 pandemic among other crises has worsened the debt experience (see Kose *et al.*, 2020; Law *et al.*, 2021).

Notwithstanding the debt crisis being witnessed globally, borrowing is of economic significance in several ways among the sources of funds for financing various expenditures of the government. First, the central bank can influence the money supply by buying and selling government securities, which is a plausible option for effective monetary policy operations. Second, borrowing avoids the negative effects of taxes on incentives, especially if taxes are raised considerably above the 'prohibitive' range (see Laffer, 2004). In other words, borrowing allows the government to spend more money than it would otherwise be able to. In addition, when government borrows externally, it gains access to a larger amount of foreign currency, which allows it to finance the import of capital goods that are vital for economic growth. Essentially, government's borrowing from the domestic market comes at the cost of higher interest rates, which impose more burden on the budget and reflects in the cost of private sector financing and the availability of financing of private sector—crowding out (Al-Majali, 2018).

Moreover, the discussions around the effects of government borrowing on private investment can be summarized in twofold. First, it crowds out private investment since a high public debt is a burden on the economy<sup>2</sup> and forces the government to increase taxes in the future to service the debt (Mabula and Mutasa, 2019); alternatively, the high public debt can potentially increase interest rates since the government may decide to incur more debt to service existing debt stock (see Anyanwu *et al.*, 2018). Second, public debt may crowd-in private investment if used to finance infrastructures, which are self-financing (Mabula and Mutasa, 2019). In other words, there are two sides to public debt—it can either crowd-in or crowd-out private investment depending on the development agenda and policy choice of the government. Following this, empirical analyses on debt-investment nexus remain inconclusive, with some studies providing supportive evidence that public debt spurs private investment (see Al-Majali, 2018; Anyanwu *et al.*, 2018; Liaqat, 2019; Antunes and Ercolani, 2020), while others find that it crowds out private investment (see Ardagna *et al.*, 2007; Khan and Gill, 2009; Fayed, 2013; Ntshakala, 2015).

<sup>1</sup> See Jacob *et al.* (2011) for an empirical analysis of debt market behaviour during this period.

<sup>2</sup> The adverse effect of public debt on economic growth is well articulated in the literature (see for example, Daud, 2020).

The new thinking in the debt sustainability analysis is the possibility of nonlinearity between public debt and private investment, whereby the former can either stimulate or undermine the latter depending on the threshold level of public debt (see Chang and Chiang, 2011; Lau *et al.*, 2019; Mabula and Mutasa 2019; Caner *et al.*, 2021; Kassouri *et al.*, 2021; Law *et al.*, 2021). However, there is no study, to the best of our knowledge, that offers a broader perspective to the subject matter whereby the nexus is conducted distinctly for a group of emerging economies as well as the developed economies and whereby a threshold level of debt is simultaneously determined. This is the contribution of our study. In addition, aside being grossly understudied, our choice of the emerging economies is also underscored by the halt that usually greet the flow of private financing into the economies following crises.<sup>3</sup> During the early period of COVID-19 crisis, for instance, the IMF put the estimate of private portfolio capital that exited these economies to above one hundred billion dollars. This is expected to limit the funding options of these economies (see Ocampo, 2020) and, consequently, has an implication for the management of debt and private investment. The study is further motivated by the fact that the outcome of such group analyses would offer a useful guide to regional, international, and multilateral agencies, who are usually required to determine thresholds for different macroeconomic variables to ensure the actualization of development goals across countries. Thus, following the studies by Kremer *et al.* (2013), and Panizza and Presbitero (2013) on the threshold and nonlinearity feature of debt–growth nexus, this study examines the effect of public debt on private investment in twelve emerging market economies from 1990 to 2020 using a panel threshold regression model. For robustness, we repeat the same analysis for five developed countries in order to check for possible heterogeneous effect of public debt on the two economic classifications.

In summary, we establish evidence for a nonlinear relationship between public debt and private investment for the emerging market economies, thereby lending credence to the findings by Lau *et al.* (2019) and Mabula and Mutasa (2019), who report similar results for Malaysia and Tanzania, respectively. However, our finding is in contrast with that of Law *et al.* (2021), who failed to accept the hypothesis of nonlinear relationship between the two variables, in the sample of developing economies they considered. We also obtain a significant threshold value of about 3 percent, on average, below which public debt stimulates private investment. In addition, while the nonlinear relationship is still upheld for the advanced economies, the crowding-out effect is less evident relative to the emerging economies as higher public debt stocks do not seem to significantly undermine their private investments, on average. Therefore, we conclude that the response of both economic classifications to higher debt stocks is heterogeneous.

Following this introduction, Section II reviews the related theoretical literature, Section III presents the methodology and data, Section IV discusses the results while Section V concludes.

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<sup>3</sup> This played out after the fall of Lehman Brothers in 2008, and such is repeating itself in the wake of the COVID-19 pandemic.

## II. THEORETICAL LITERATURE

Debt–investment relation has a strong backing in the theoretical literature and two significant views are usually referenced. First, the conventional view holds that public debt is necessary to enhance aggregate income and demand and, by extension, the aggregate output through increase in capital accumulation over the period (see Eisner, 1992). In this regard, governments can stimulate economic growth using deficit, causing an expansionary fiscal policy with the assumption of no full employment and that the interest rate sensitivity of investment is low. Under risk diversification, the access to safe government assets allows banks to take more risk and thus increase their lending to the private sector leading to crowding-in effect (Chebet and Kiemo, 2017). In addition, Kassouri *et al.* (2021) argue that the crowding-in effect is only significant in the short-run when countries are in their early stages of economic development and possess little amount of capital stock. Conversely, the liquidity constraint and debt overhang hypotheses hold that public debt negatively influences investment and by extension economic growth. The liquidity constraint theory posits that public debt constrains the amount of credit available to businesses by increasing the cost of borrowing (Hofman and Reisen, 1991; Chang and Chiang, 2011) and thereby hampers economic growth through the various channels. Similarly, the debt overhang hypothesis argues that government borrowing is tantamount to imposing taxes on future output, and is thus capable of crowding out investment and delaying economic growth (Krugman, 1988). The foregoing also relates to the ‘lazy bank’ model, which suggests that access to safe government assets may create moral hazard and thus discourage banks from lending to the risky private investors, hence leading to crowding out of private investment.

In addition, issues around the non-linear effects of debt on growth (including investment) have been raised by Reinhart and Rogoff (2010), positing that a low level of debt can promote productivity growth, while a high level of debt is disastrous to productivity growth. Hence, in the initial stages of development, borrowing is encouraged to aid productive investments. Debt accumulation, on the other hand, operates as a tax on future productivity in the long run, thus, inhibiting productive private sector investment plans and government adjustment attempts. In this sense, there is likelihood of an inverted U-shaped relationship between debt and growth, implying that higher debt levels are associated with lower long-run productivity (Eberhardt and Presbitero, 2015). Meanwhile, reasons have been alluded to regarding the heterogeneous relationship between debt and growth (see Kassouri *et al.*, 2021).

More recently, Gosh *et al.* (2013) propose a new framework on public debt, which conceptualizes ‘fiscal space’. That is, the difference between country’s current debt level and its debt limit – the level of debt beyond which fiscal solvency fails. Therefore, an improvement in a country’s structural characteristics or productivity raises the debt limit. This implies that an improvement in the performance of an economy propels public borrowing. Some empirical studies have examined these theories/postulations (see Kassouri *et al.*, 2021; Law *et al.*, 2021; among others), and the current study further advances these discussions with special focus on nonlinearity and threshold effect from the perspectives of both emerging and developed economies.

### III. DATA AND METHODOLOGY

#### A. Datasets

This paper utilizes yearly data on 12 emerging market and five developed economies covering a total time span from 1990 to 2020. The countries included in the sample of emerging market are: Brazil, China, Colombia, Egypt, India, Indonesia, Mexico, Peru, Philippines, Russia, South Africa, and Thailand, while those considered for the developed countries are: Australia, Japan, Singapore, United Kingdom, and United States. Our choice of countries is informed by: (i) most of the countries considered are ranked very high (i.e., they among 1 to 20) in the country-by-country ranking of debt using the combination of debt-to-GDP, gross debt, and percentage of world total in the ranking (see <https://www.visualcapitalist.com/69-trillion-of-world-debt-in-one-infographic/>); and, (ii) data availability. All the data are sourced from the World Development Indicators (WDI) (see <https://databank.worldbank.org/source/world-development-indicators>). We choose Gross Fixed Capital Formation (GFCF) in current US\$ as a proxy for private investment. Public and Publicly Guaranteed (PPG) external debt stocks is used to proxy government borrowing for the emerging market economies, while central government debt<sup>4</sup> is used for developed economies based on the tracked dataset by the World Bank. Related studies have considered GFCF and PPG as proxies of investment (see Ali, 2015; Pasara and Garidzirai, 2020) and external debt stocks (see Grekou, 2015; Bandiera and Tsiropoulos, 2020), respectively. Similarly, the definition/description of variables provided by the WDI, equally affirms to the suitability of these variables as proxies for investment and government debt. For estimation, we scaled both the dependent and independent variables by GDP and, therefore, the former is expressed as the ratio of private investment to GDP (*privinvgdp*), while the latter is the ratio of public debt to GDP (*debtgdp*). This transformation facilitates the interpretation of the coefficients in terms of the international norm for debt sustainability, which also requires scaling the debt stock by GDP. Other variables considered are exchange rate, GDP (in constant 2000 US\$) and inflation rate. Finally, inflation and exchange rates are the control variables.<sup>5</sup>

#### B. Methodology

We construct a panel threshold regression model to analyze the association between public debt and private investment in line with the theories and empirical studies presented in the preceding sections (see also, Kremer *et al.*, 2013). One of the attractions to the approach used here lies in its ability to determine the threshold effect endogenously, while accounting for nonlinearity in the nexus.

<sup>4</sup> This is reported (from the source) in Local Currency Unit (LCU). Therefore, to express in the same currency unit as other variables such as GFCF, GDP and PPG, the value for each of the countries considered is divided by their respective exchange rate (expressed in LCU per USD). In addition, we opt for central government debt as a proxy for government borrowing for the developed economies due to unavailability of PPG for this class of economies.

<sup>5</sup> Since our interest is to keep the paper as concise as possible, some preliminary analyses such as descriptive statistics and graphs are suppressed here.

The estimated panel threshold regression model takes the form (see Hansen, 1999; Wang, 2015) <sup>6</sup>:

$$\begin{aligned} \text{privinv}gdp_{it} = & \alpha + \lambda_1 \text{debt}gdp_{it}(q_{it} < \gamma) + \lambda_2 \text{debt}gdp_{it}(q_{it} \geq \gamma) + X'_{it}\phi + \mu_i + \varepsilon_{it} \\ & i = 1, 2, \dots, N; \quad t = 1, 2, \dots, T. \end{aligned} \quad (1)$$

where *privinv**gdp* is ratio of private investment to GDP; *debt**gdp* is the ratio of public debt to GDP; *q* is the threshold variable;  $\gamma$  is the threshold parameter that divides the equation into two regimes with coefficients  $\lambda_1$  and  $\lambda_2$ ; *X* is a vector of control variables (i.e., inflation and exchange rates, which serve as proxies for macroeconomic environment or stability);  $\mu_i$  is the individual effect, while  $\varepsilon$  is the disturbance term. Since Equation (1) is a fixed effect panel threshold model, the within-group estimator, which involves deviations from group means is employed. The null hypothesis of no threshold effect (i.e.,  $H_0: \lambda_1 = \lambda_2$  implying a linear model) is tested against the alternative hypothesis (i.e.,  $H_1: \lambda_1 \neq \lambda_2$ , which implies the presence of both nonlinearity and threshold effect). We use the bootstrap design of Hansen (1999) to obtain the *F*-statistic used to test the significance of the threshold effect (see also, Wang, 2015).

#### IV. MAIN FINDINGS

Table 1 presents the estimated debt threshold values for both the emerging market and the developed economies. The latter economies are included for robustness, as our focus is on the emerging market economies. Thus, for the former, the debt threshold value (with or without control) is estimated to be significant at 2.7861 percent. Our estimated threshold values are well below the 64 percent for the emerging market economies by Caner *et al.* (2010) and 90 percent for the developed economies (see Reinhart and Rogoff, 2010). This is expected since we focus on public debt, while those cited studies capture the total debt stock. Thereafter, we activate lower and upper debt regimes to evaluate the effects of government borrowing on private investment (see the coefficients of *debtgdp\_0* and *debtgdp\_1* in Table 1 under the emerging economies category).

Our results show that, below a 3 percent threshold, any increase in public debt is associated with significant improvement in private investment (with and without control variables), confirming the crowding-in effect in the emerging market economies. However, above this threshold value, an increase in public debt has a negative effect on private investment (crowding-out effect). Thus, a higher debt profile becomes a threat to private investment in the emerging market economies. This indicates that, when public debt exceeds this threshold of about 3 percent for the emerging economies, each additional debt incurred by the government impedes private investment by 0.224 and 0.207 percentage points

<sup>6</sup> An extension of the panel threshold model used here is the dynamic variant of Kremer *et al.* (2013) which technically involves including the first lag of the dependent variable as an additional regression in the model. However, this model is not considered here as it requires small *T* since it relies on the IV-GMM approach where large time series observations may lead to proliferation of instruments.

(without or with control, respectively). While the reduction in private investment-GDP ratio is minimal (0.2 percent, on average) when the threshold level is exceeded, maintaining public debt-GDP ratio below the threshold level produces significantly higher values of private investment-GDP ratio of about 8 percent, on average (in both cases with and without control values). In other words, at the public debt level of above the 2.7861 percent, investors are discouraged by the probable debt overhang, which they believe would (negatively) affect their profit in a bid for government to service its debt in the future. They may thereby relocate their businesses to the environment where taxes are expected to be relatively lower. Thus, with the contrasting evidence between the two regimes, we provide evidence in support of the possibility of a nonlinear relationship between public debt and private investment for the emerging economies. Our finding is in contrast with that of Law *et al.* (2021), who failed to accept the hypothesis of an inverted U-shaped relationship between public debt and economic growth in the developing economies. However, our results are consistent with the findings by Lau *et al.* (2019), and Mabula and Mutasa (2019), who report similar results for Malaysia and Tanzania, respectively.

**Table 1.**  
**Panel Threshold Results for Public Debt – Private Investment Nexus<sup>7</sup>**

Standard errors in parentheses; \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ ; *debtgdp\_0* and *debtgdp\_1* denote the variables below and above the threshold respectively; the threshold effect test is *F*-test based and the critical values are given as 27.7674, 32.1553 and 39.6148 for 10%, 5% and 1%, respectively. The *F*-test involves the null hypothesis of no threshold (implying a linear relationship) against the alternative hypothesis of the presence of threshold effect (implying a nonlinear relationship).

Regime Dependent Variables	Emerging		Developed	
	Without Control	With Control	Without Control	With Control
<i>debtgdp_0</i>	8.892*** (1.309)	8.834*** (1.295)	315.8*** (38.55)	309.9*** (39.30)
<i>debtgdp_1</i>	-0.224** (0.0954)	-0.207** (0.0948)	0.0129 (0.00893)	0.0111 (0.00951)
Constant	20.62*** (1.238)	20.81*** (1.240)	18.63*** (0.668)	18.89*** (0.929)
Threshold value	2.7861	2.7861	0.0582	0.0582
Threshold test [ <i>debtgdp_0</i> vs. <i>debtgdp_1</i> ]	47.28***	47.84***	56.22***	52.93***
Observations	324	324	155	150
R-squared	0.158	0.182	0.316	0.320
Number of country_id	12	12	5	5

<sup>7</sup> The full results including the control variables can be made available upon request.

**Table 2.**  
**Panel Threshold Results for Public Debt – Private Investment Nexus**  
**(Standardized Results)**

Standardized values are derived by taking the ratio of each coefficient with their respective standard error; \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ ; *debtgdp\_0* and *debtgdp\_1* denote the variables below and above the threshold respectively; the threshold effect test is *F*-test based and the critical values are given as 27.7674, 32.1553 and 39.6148 for 10%, 5% and 1%, respectively. The *F*-test involves the null hypothesis of no threshold (implying a linear relationship) against the alternative hypothesis of the presence of threshold effect (implying a nonlinear relationship).

Regime Dependent Variables	Emerging		Developed	
	Without Control	With Control	Without Control	With Control
<i>debtgdp_0</i>	6.7930***	6.8216***	8.1920***	7.8855***
<i>debtgdp_1</i>	-2.3480**	-2.1835**	1.4446	1.1672
Constant	16.6559***	16.7823***	27.8892***	20.3337***
Threshold value	2.7861	2.7861	0.0582	0.0582
Threshold test [ <i>debtgdp_0</i> vs. <i>debtgdp_1</i> ]	47.28***	47.84***	56.22***	52.93***
Observations	324	324	155	150
R-squared	0.158	0.182	0.316	0.320
Number of country_id	12	12	5	5

For robustness, we consider a panel of five developed countries, and we find that, at the lower regime, the coefficient of debt-GDP ratio is positive and significant at the 1 percent level—with or without control—suggesting a crowding-in effect, while, at the upper regime, the coefficient is positive but not significant. This indicates that above the public debt threshold of 0.0582 percent, additional debt incurred has a negligible deteriorating effect on private investment in the developed countries. This could be attributed to the nature of projects these additional debts are committed to, as expenditure on developmental project (such as infrastructure) could take a longer time before stimulating investment. In addition, as stated in Equation (1), additional control variables, such as inflation and exchange rate,<sup>8</sup> also show that lower public debt ratio (below the threshold value) encourages private investment in both economies, while the results obtained for the upper regime remains mixed between the two groups. While the crowding out effect is evident for the emerging economies, it is less evident for the developed economies as higher public debt stocks of the latter do not seem to significantly undermine their private investments, on average.

Furthermore, given the wide gap between the two groups in terms of the countries covered, our results are standardized to deal with any inherent size effect by adopting the coefficient of variation approach, which allows for comparison of samples in different magnitudes (see Table 2). We find that at the lower regime, public debt crowds-in more private investment in the developed economies than it does in the emerging economies, while the reverse is the case for the upper regime as public debt crowds-out more private investment in the emerging economies than it does for the developed economies. In all, we establish heterogeneous

<sup>8</sup> These are considered as control variables given the fact that they usually serve as channels through which the impact of public borrowing is transmitted to investment.



responses of private investment to higher public debt stocks in both economies. This outcome further advances the literature on debt–investment nexus and we hope future studies will find this evidence useful when revisiting the nexus with additional contributions that further add value to the extant literature.

## V. CONCLUSION

Motivated by the concerns over rising debt stock in the emerging economies (see Kose *et al.*, 2020) and evidence in the literature suggesting a nonlinear relationship between debt and growth (see Kremer *et al.*, 2013; Panizza and Presbitero, 2013), we examine the effect of public debt on private investment in selected emerging and developed economies. We construct a panel threshold regression model for the analysis of the debt–growth nexus, while we utilize annual data<sup>9</sup> over the period of 1990 through 2020. Our choice of samples is informed by the availability of data for the countries considered. Some studies have estimated threshold levels for debt, beyond which debt may undermine private investment. We contribute to this strand of the literature within the context of both emerging and developing economies, while also focusing on public debt rather than total debt stock.

We find that when public debt is below the threshold value of about 3 percent, private investment tends to respond positively suggesting evidence of crowding-in effect. However, as debt rises above this threshold, its effect on private investment becomes significantly negative (crowding-out effect). Thus, we provide evidence in support of the possibility of a nonlinear relationship between public debt and private investment for the emerging economies. While there is still evidence of nonlinear relationship for the advanced economies, the crowding-out effect is less evident relative to the emerging economies as higher public debt stocks do not seem to undermine their private investments. Thus, we conclude that private investment in emerging and developed economies respond heterogeneously to an increase in public debt. Based on these findings, we recommend that the public policy makers, especially the fiscal managers, maintain reasonable levels of public debt ratio that complement private sector's productivity rather than undermine it.

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<sup>9</sup> This is sourced from World Development Indicators (WDI). See <https://databank.worldbank.org/source/world-development-indicators>

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