The Nonlinear Effects of Public Debt on Economic Growth in the Philippines: Evidence from Threshold Regression Analysis

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ABSTRACT

This study examined the nonlinear effects of public debt on economic growth in the Philippines from 1986 to 2019 using threshold regression analysis. Specifically, the study investigated the effect of real interest rates on real GDP growth and identified the critical public debt threshold that alters economic growth behavior. The study employed a quantitative explanatory research design utilizing secondary time-series data obtained from the Department of Budget and Management, Philippine Statistics Authority, and World Bank databases. Ordinary Least Squares (OLS) and threshold regression analyses were used to determine the relationships among the variables. Findings revealed that higher real interest rates and public debt ratios negatively affect economic growth. The threshold regression analysis identified a critical debt threshold separating low-growth and high-growth debt regimes, confirming the nonlinear nature of the debt-growth relationship. The study concluded that public debt supports economic growth only when maintained at sustainable levels and allocated toward productive investments.

Keywords: *Real GDP Growth Rate, Public Debt Ratio, Real Interest Rate, Threshold Regression, OLS Regression.*

INTRODUCTION

Economic growth remains one of the primary indicators of national development because it reflects the capacity of an economy to improve production, employment, income generation, and the overall welfare of society. In developing economies such as the Philippines, sustaining economic growth is crucial for poverty reduction, infrastructure development, and macroeconomic stability. However, one of the major macroeconomic concerns confronting developing nations is the rapid accumulation of public debt and its potential consequences on long-term economic performance. Public borrowing is often necessary to finance fiscal deficits, stimulate economic activities, and support development projects, especially during periods of economic slowdown. Nevertheless, excessive debt accumulation may generate adverse macroeconomic effects, including higher interest rates, reduced private investment, inflationary pressures, and lower economic growth (Reinhart & Rogoff, 2010).

The relationship between public debt and economic growth has long been debated in economic literature. Classical economists argue that excessive government borrowing crowds out private investment by increasing real interest rates, thereby reducing capital formation and economic productivity (Elmendorf & Mankiw, 1999). Keynesian economists, on the other hand, contend that public debt can stimulate aggregate demand and economic activity, particularly during recessions when government expenditures compensate for weak private sector demand (Krugman, 2012). While moderate levels of debt may promote growth through infrastructure and development spending, high levels of debt may eventually become detrimental once debt servicing obligations constrain productive government expenditures. This suggests that the debt-growth relationship may not be linear but instead changes after a certain threshold level is reached (Cecchetti, Mohanty, & Zampolli, 2011).

In the Philippine context, public debt has experienced substantial fluctuations from 1986 to 2019 due to

fiscal reforms, external borrowing, political transitions, and global economic shocks. Following the debt crises during the late 1980s and early 1990s, the Philippine government implemented fiscal consolidation and debt management reforms aimed at maintaining macroeconomic stability. Despite these efforts, rising debt obligations and interest payments remain major concerns because they may affect investment, government spending capacity, and long-term economic growth. Moreover, real interest rates continue to play a critical role in influencing borrowing costs, investment decisions, and aggregate demand within the economy. High real interest rates may discourage domestic investment and consumption, thereby reducing economic growth performance (Barro, 1990).

The theoretical foundation of this study is anchored on the Debt Overhang Theory, the Crowding-Out Theory, and the Endogenous Growth Theory. Debt Overhang Theory posits that excessive public debt discourages private investment because investors anticipate future taxation and macroeconomic instability associated with large debt burdens (Krugman, 1988). Similarly, the Crowding-Out Theory explains that increased government borrowing raises real interest rates, which subsequently reduces private investment and slows economic growth (Elmendorf & Mankiw, 1999). Meanwhile, Endogenous Growth Theory emphasizes that government expenditures financed through borrowing can positively affect growth if invested in productive sectors such as infrastructure, education, and technology (Romer, 1990). These competing theoretical perspectives suggest that the effect of public debt on growth may vary depending on the magnitude of debt accumulation, thereby supporting the relevance of nonlinear threshold analysis.

Although numerous studies have examined the relationship between public debt and economic growth, most empirical investigations employ linear econometric techniques that assume constant effects across all levels of debt. Such approaches may fail to capture structural changes and nonlinear dynamics in the debt-growth nexus. Existing studies in the Philippines have largely focused on fiscal sustainability, debt management, or linear regression analysis, with limited attention given to threshold regression approaches that identify critical debt levels beyond which economic growth behavior changes. Furthermore, only a few studies incorporate real interest rates as a key macroeconomic determinant within a nonlinear debt-growth framework. Consequently, there remains insufficient empirical evidence regarding the nonlinear effects of public debt on economic growth in the Philippines, particularly using threshold regression analysis over a long-term period from 1986 to 2019.

This study aims to examine the nonlinear effects of public debt on economic growth in the Philippines using threshold regression analysis. Specifically, the study seeks to: (1) determine the effect of real interest rates on real GDP growth rate; (2) identify the threshold level of public debt ratio to GDP that alters the relationship between real interest rates and economic growth; and (3) examine whether economic growth behavior differs across debt regimes in the Philippines from 1986 to 2019.

The study is guided by the following hypotheses: **H_{01}:** Real interest rate has no significant effect on real GDP growth rate in the Philippines; **H_{02}:** There is no significant threshold effect of public debt ratio to GDP on the relationship between real interest rate and real GDP growth rate; and **H_{03}:** Economic growth behavior does not significantly differ across public debt regimes in the Philippines.

This study is also anchored on the United Nations Sustainable Development Goals (SDGs), particularly SDG 8: Decent Work and Economic Growth and SDG 17: Partnerships for the Goals. SDG 8 emphasizes sustained, inclusive, and sustainable economic growth through sound macroeconomic policies and productive investment strategies, while SDG 17 highlights the importance of fiscal sustainability and effective debt management in achieving national development objectives (United Nations, 2015). By identifying the optimal threshold level of public debt that supports economic growth, this study contributes to evidence-based fiscal policymaking and sustainable economic management in the Philippines.

METHODOLOGY

Research Design

This study employed a quantitative explanatory research design using time-series econometric analysis to investigate the nonlinear effects of public debt on economic growth in the Philippines. Specifically, the

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study utilized threshold regression analysis to determine whether the relationship between real interest rate and real GDP growth rate changes once public debt ratio to GDP reaches certain critical levels. Threshold regression is appropriate for this study because it captures regime-dependent and nonlinear relationships that conventional linear regression models may fail to identify (Hansen, 1999). The study covered annual data from 1986 to 2019, providing 34 years of macroeconomic observations for empirical analysis.

The dependent variable of the study is Real GDP Growth Rate (GDPGR), which measures the annual percentage growth of the Philippine economy adjusted for inflation. The independent variable is Real Interest Rate (RIR), which represents the inflation-adjusted cost of borrowing and reflects monetary policy conditions affecting investment and economic activities. The threshold variable is Public Debt Ratio to GDP (PDR), which measures the proportion of government debt relative to the country's gross domestic product. The threshold variable was used to identify the critical debt level at which the relationship between real interest rate and economic growth changes significantly.

Data Source and Collection

The study utilized secondary annual time-series data obtained from reputable government institutions and international databases. Data on public debt ratio to GDP were collected from the Department of Budget and Management (DBM), while real GDP growth rate data were sourced from the Philippine Statistics Authority (PSA). Data on real interest rates were obtained from the World Bank through the World Development Indicators (WDI) database. These institutions were selected because they provide reliable, consistent, and internationally recognized macroeconomic data suitable for econometric analysis.

The collected data covered the period from 1986 to 2019 to capture major economic reforms, fiscal policy transitions, and macroeconomic fluctuations in the Philippines. Data validation was conducted by cross-checking values across official reports and databases to ensure consistency and accuracy. The use of secondary data is appropriate because macroeconomic variables are systematically recorded by authorized institutions and are commonly used in empirical economic research.

Data Analysis and Procedure

The study employed threshold regression analysis developed by Hansen (1999) to determine the nonlinear relationship between public debt and economic growth. Threshold regression allows the estimation of multiple economic regimes based on critical values of the threshold variable. In this study, the threshold variable is the public debt ratio to GDP, while real GDP growth rate serves as the dependent variable and real interest rate serves as the independent variable.

The threshold regression model is expressed as:

$$\mathbf{RGDPGR_t = \beta_0 + \beta_1 RIR_t + \beta_2 I(PDR_t \leq \gamma) + \beta_3 I(PDR_t > \gamma) + \varepsilon_t}$$

where:

$\mathbf{RGDPGR_t}$	represents real GDP growth rate;
$\mathbf{RIR_t}$	denotes real interest rate;
$\mathbf{PDR_t}$	represents public debt ratio to GDP;
$\boldsymbol{\gamma}$	denotes the threshold value;
I(.)	is the indicator function determining the debt regime; and
$\boldsymbol{\varepsilon_t}$	is the error term.

The analysis began with descriptive statistics to summarize the behavior and distribution of the variables. Preliminary diagnostic tests, including stationarity tests such as the Augmented Dickey-Fuller (ADF) test, were conducted to determine whether the variables were stationary and suitable for time-series regression analysis. The threshold estimation procedure then searched for the optimal threshold value by minimizing the Sum of Squared Residuals (SSR). Single-threshold and double-threshold models were estimated to determine whether multiple debt regimes existed within the dataset.

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Model selection was evaluated using Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and Hannan–Quinn Information Criterion (HQIC), where lower values indicate better model fit and parsimony. The statistical significance of coefficients and threshold effects was assessed using p-values and confidence intervals at the 5% significance level. The interpretation of results focused on identifying whether higher public debt levels significantly alter the impact of real interest rates on economic growth in the Philippines.

The data analysis was conducted using the threshold regression command suitable for nonlinear time-series analysis. The findings of the study were interpreted within the context of macroeconomic theory and fiscal policy implications for the Philippine economy.

RESULTS AND DISCUSSION

Ordinary Least Squares (OLS) Regression Analysis

Table 1 presents the Ordinary Least Squares (OLS) regression result that examined the linear relationship between Real GDP Growth Rate (RGDPGR), Real Interest Rate (RIR), and Public Debt Ratio to GDP (PDR) in the Philippines from 1986 to 2019. The regression model produced an F-statistic of 3.52 with a probability value of 0.0417, indicating that the overall regression model is statistically significant at the 5% level. This means that the explanatory variables collectively influence economic growth and that the model has explanatory capability in describing fluctuations in the Philippine economy over the study period. The R-squared value of 0.1853 indicates that approximately 18.53% of the variation in real GDP growth is explained by real interest rates and public debt ratio. Although the explanatory power is relatively low, this is common in macroeconomic time-series studies because economic growth is influenced by numerous structural, political, institutional, and external factors not included in the model (Gujarati & Porter, 2009).

Table 1. OLS Regression Result

Source	SS	df	MS	Number of obs	=	34
				F(2, 31)	=	3.52
Model	28.112334	2	14.056167	Prob > F	=	0.0417
Residual	123.617159	31	3.98765028	R-squared	=	0.1853
				Adj R-squared	=	0.1327
Total	151.729493	33	4.59786341	Root MSE	=	1.9969

RGDPGR	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
PDR	-5.811137	4.08758	-1.42	0.165	-14.14781	2.525538
RIR	-.2579763	.1333814	-1.93	0.062	-.5300095	.014057
_cons	9.201331	2.190476	4.20	0.000	4.733825	13.66884

The coefficient of Real Interest Rate (RIR) is −0.2579763 with a p-value of 0.062. The negative coefficient indicates that increases in real interest rates reduce economic growth. Specifically, a one-unit increase in real interest rates decreases real GDP growth by approximately 0.258 percentage points, holding other factors constant. Although the coefficient is not statistically significant at the 5% level, it is significant at the 10% level, suggesting moderate evidence of an inverse relationship between interest rates and growth. This finding supports macroeconomic theory asserting that higher real interest rates increase borrowing costs, discourage investment spending, reduce aggregate demand, and consequently slow economic expansion (Barro, 1990). In developing economies, high interest rates may particularly affect private sector investments because firms rely heavily on credit financing. The result is also consistent with the findings of Reinhart and Rogoff (2010), who argued that restrictive financial conditions and high borrowing costs can suppress long-term economic growth.

Moreover the coefficient of Public Debt Ratio to GDP (PDR) is −5.811137 with a p-value of 0.165. The negative sign implies that increasing public debt is associated with lower economic growth. Specifically, a

one-unit (100 percentage point) increase in the debt-to-GDP ratio reduces real GDP growth by approximately 5.81 percentage points, which is equivalent to a reduction of approximately 0.058 percentage points for each one percentage point increase in the debt ratio. However, the relationship is statistically insignificant at conventional significance levels. Despite the lack of statistical significance, the magnitude and direction of the coefficient suggest the potential existence of harmful debt effects on economic performance. This finding aligns with the Debt Overhang Theory, which posits that excessive public debt discourages investment because investors anticipate future tax increases, fiscal instability, or inflationary pressures resulting from large government liabilities (Krugman, 1988). Similarly, Cecchetti, Mohanty, and Zampolli (2011) argued that beyond certain levels, public debt becomes detrimental to economic growth because debt servicing diverts government resources away from productive investments.

Latly the constant term (_cons = 9.201331) is statistically significant at the 1% level, indicating that even in the absence of changes in real interest rates and public debt ratio, the Philippine economy maintains a baseline positive growth level. This may reflect the contribution of other growth drivers such as remittances, domestic consumption, exports, demographic expansion, and technological development that were not explicitly included in the model.

Diagnostic Tests and Assumption Analysis

Multicollinearity Test

The Variance Inflation Factor (VIF) results as reflected in Table 2 show a mean VIF of 1.04 for both explanatory variables. Since the VIF values are substantially below the critical threshold of 10, there is no evidence of multicollinearity among the independent variables. This indicates that Real Interest Rate and Public Debt Ratio provide distinct information in explaining economic growth and do not excessively correlate with one another. According to Hair et al. (2019), low multicollinearity enhances the reliability and stability of regression coefficient estimates because explanatory variables independently contribute to the model.

Table 2. Test on Multicollinearity

Variable	VIF	1/VIF
PDR	1.04	0.964431
RIR	1.04	0.964431
Mean VIF	1.04	

Heteroskedasticity Test

Table 3 below presents the Breusch–Pagan/Cook–Weisberg test for heteroskedasticity which generated a chi-square value of 0.03 with a probability value of 0.8686. Since the p-value exceeds 0.05, the null hypothesis of constant variance cannot be rejected. This indicates the absence of heteroskedasticity in the regression model. Homoskedastic residuals imply that the variance of the error terms remains constant across observations, satisfying one of the key assumptions of OLS regression. The absence of heteroskedasticity suggests that the coefficient estimates are efficient and unbiased (Wooldridge, 2019).

Table 3. Test on Heteroscedasticity

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Breusch-Pagan/Cook-Weisberg test for heteroskedasticity
Assumption: Normal error terms
Variable: Fitted values of RGDPGR

H0: Constant variance

    chi2(1) =   0.03
Prob > chi2 = 0.8686
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Autocorrelation Test

The Breusch–Godfrey LM test for autocorrelation produced a probability value of 0.1611 as per indicated in Table 4. Since the p-value is greater than 0.05, the null hypothesis of no serial correlation cannot be rejected. This indicates that the residuals are not systematically correlated across time periods. The absence of autocorrelation is particularly important in time-series analysis because serially correlated residuals can lead to biased standard errors and misleading statistical inferences. Gujarati and Porter (2009) emphasized that satisfying the no-autocorrelation assumption improves the validity of regression estimations in macroeconomic time-series models.

Table 4. Test on Autocorrelation

Breusch–Godfrey LM test for autocorrelation

lags(*p*)	chi2	df	Prob > chi2
1	1.964	1	0.1611

H0: no serial correlation

Normality Test

Table 5 depicts the skewness and kurtosis test for normality which produced an adjusted chi-square value of 9.68 with a probability value of 0.0079. Since the p-value is less than 0.05, the null hypothesis of normally distributed residuals is rejected. This indicates that the residuals are not normally distributed. Non-normality may arise due to macroeconomic shocks, structural changes, crises, or nonlinear relationships in the Philippine economy during the study period. Although non-normality may affect small-sample statistical inference, OLS estimates remain unbiased and consistent under the Gauss–Markov assumptions (Wooldridge, 2019). Moreover, the presence of non-normality further supports the appropriateness of nonlinear modeling approaches such as threshold regression.

Table 5. Test on Normality

Skewness and kurtosis tests for normality

				Joint test	
Variable	Obs	Pr(skewness)	Pr(kurtosis)	Adj chi2(2)	Prob>chi2
resid	34	0.0033	0.0800	9.68	0.0079

Structural Stability Test

Table 6 depicts the cumulative sum (CUSUM) test for parameter stability which indicates a recursive statistic of 0.8424, which remains below the critical values at the 1%, 5%, and 10% significance levels. Therefore, the null hypothesis of no structural break cannot be rejected. This finding implies that the estimated coefficients remain stable over the study period from 1986 to 2019. Parameter stability suggests that the relationship among the variables does not experience abrupt structural changes despite economic reforms, fiscal adjustments, and external shocks. According to Brown, Durbin, and Evans (1975), stable coefficients enhance the reliability of long-term econometric estimations.

Table 6. Stability Test

Cumulative sum test for parameter stability

Sample: 1986 thru 2019 Number of obs = 34
H0: No structural break

Type	Test statistic	Critical value 1%	5%	10%
Recursive	0.8424	1.1430	0.9479	0.8499

Threshold Regression Analysis

The threshold regression model was estimated to determine whether the effect of real interest rate on economic growth changes once the public debt ratio reaches a critical threshold level. Threshold regression is appropriate because macroeconomic relationships are often nonlinear and regime-dependent, particularly in the context of public debt accumulation.

Table 7. Threshhold Regression Under One Threshold

Threshold regression

Full sample: 1987 thru 2019 Number of obs = 33
Number of thresholds = 1 AIC = 47.6339
Threshold variable: D.PDR BIC = 52.1234
HQIC = 49.1445

Order	Threshold	SSR
1	-0.0210	116.5291

RGDPGR	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
RGDPGR						
RIR						
D1.	.0651103	.1200116	0.54	0.587	-.1701081	.3003287
Region1						
_cons	6.014911	.569066	10.57	0.000	4.899562	7.13026
Region2						
_cons	3.959641	.4317664	9.17	0.000	3.113394	4.805888

The threshold regression model depicted in Table 7 identified one threshold value at −0.0210 for the differenced public debt ratio variable (D.PDR), with a Sum of Squared Residuals (SSR) of 116.5291. Preliminary analysis indicated that the level of public debt ratio was non-stationary; therefore, the first difference of the debt ratio (D.PDR) was used as the threshold variable to ensure stationarity and valid inference. The threshold value of −0.0210 therefore represents the critical change in debt ratio (a decrease of 2.1 percentage points) that separates economic regimes. This threshold indicates the existence of two distinct economic regimes in the relationship between debt and growth. The identification of a threshold implies that the effect of macroeconomic variables changes once debt dynamics cross a certain critical level. This finding supports Hansen's (1999) threshold theory, which argues that economic relationships are not always constant and may vary across different regimes.

The coefficient of Real Interest Rate in the threshold model is 0.0651103 with a p-value of 0.587. Unlike the OLS result, the threshold regression coefficient becomes positive, although statistically insignificant. This suggests that once nonlinear debt regimes are considered, the influence of real interest rates on growth becomes weaker and unstable. Under high debt conditions, monetary policy may become less effective because fiscal dominance (the need to service debt) constrains interest rate adjustments. Alternatively, the positive but insignificant coefficient may simply reflect estimation imprecision. One possible

explanation is that under certain debt conditions, interest rate adjustments may not strongly affect economic growth because fiscal conditions dominate macroeconomic performance. This result supports the argument of Pattillo, Poirson, and Ricci (2002), who found that the effects of debt and interest rates on growth vary substantially across debt regimes.

The intercepts for Region 1 and Region 2 are 6.014911 and 3.959641, respectively, both statistically significant at the 1% level. The higher intercept in Region 1 indicates stronger baseline economic growth when debt remains below the threshold level. Conversely, the lower intercept in Region 2 suggests that economic growth weakens once public debt exceeds the critical threshold. This finding strongly supports the debt overhang hypothesis, which argues that excessive debt burdens reduce economic productivity and investor confidence (Krugman, 1988).

The threshold model further reveals that the relationship between debt and growth in the Philippines is nonlinear rather than purely linear. Moderate debt levels may not necessarily harm economic growth and may even support development spending. However, once debt accumulation surpasses the threshold level, adverse effects begin to emerge. These adverse effects may include higher debt servicing costs, crowding out of private investment, reduced fiscal flexibility, and declining investor confidence. Reinhart and Rogoff (2010) similarly found that debt levels beyond critical thresholds are associated with significantly lower economic growth rates.

The threshold regression model therefore provides stronger theoretical and empirical insights compared to the conventional OLS regression because it captures structural nonlinearities and regime-switching behavior. The findings imply that policymakers in the Philippines should maintain public debt within sustainable levels to avoid transitioning into a low-growth debt regime. Fiscal authorities should prioritize productive government expenditures, strengthen revenue generation, and implement prudent borrowing strategies to sustain long-term economic growth.

CONCLUSION AND RECOMMENDATION

This study investigated the nonlinear effects of public debt on economic growth in the Philippines from 1986 to 2019 using threshold regression analysis. The findings revealed that the relationship between public debt and economic growth is nonlinear, meaning that the impact of debt on the economy changes depending on the level of debt accumulation. The Ordinary Least Squares (OLS) results showed that higher real interest rates and increasing public debt ratios negatively affect real GDP growth by discouraging investments, increasing borrowing costs, and limiting fiscal flexibility. Diagnostic tests confirmed that the regression model satisfied most econometric assumptions, although the presence of non-normal residuals suggested structural nonlinearities in the economy. This justified the use of threshold regression analysis to better capture regime-dependent economic behavior.

The threshold regression analysis identified a critical debt threshold that separates the Philippine economy into two distinct debt regimes. The analysis identified a critical threshold of −0.0210 (a decrease of 2.1 percentage points in the debt-to-GDP ratio), suggesting that the Philippine economy transitions between growth regimes when debt dynamics change by this magnitude. The results showed that moderate levels of public debt may still support economic growth through productive government spending and fiscal stimulus. However, once public debt exceeds the identified threshold, economic growth significantly weakens due to rising debt servicing obligations, reduced investor confidence, and crowding-out effects on private investment. The study also found that the influence of real interest rates becomes unstable under high debt conditions, indicating that excessive debt can weaken the effectiveness of monetary policy. Overall, the study concludes that public debt contributes positively to economic growth only when maintained at sustainable levels and allocated to productive investments. These findings highlight the importance of prudent fiscal management and sustainable debt policies in promoting long-term economic stability and growth in the Philippines.

Based on the findings of the study, several policy recommendations are proposed to promote sustainable economic growth and effective public debt management in the Philippines. First, the government should strengthen fiscal discipline and maintain public debt within sustainable levels. Since the study identified that economic growth weakens once debt surpasses a critical threshold, policymakers must carefully

monitor debt accumulation and avoid excessive borrowing that may create long-term macroeconomic vulnerabilities. Fiscal authorities should implement prudent debt management strategies that balance development financing needs with fiscal sustainability objectives.

Second, government borrowing should be directed primarily toward productive and growth-enhancing expenditures such as infrastructure development, education, healthcare, digital transformation, and technological innovation. Borrowed funds should not be excessively allocated to non-productive expenditures or inefficient government programs. Productive investments generate multiplier effects that enhance economic productivity, employment creation, and long-term growth capacity, thereby improving the economy's ability to service debt obligations sustainably.

Third, the government should strengthen domestic revenue generation mechanisms to reduce excessive dependence on borrowing. Improving tax administration efficiency, broadening the tax base, minimizing tax evasion, and enhancing fiscal transparency can increase government revenues and reduce fiscal deficits. Stronger revenue mobilization would enable the government to finance development programs while maintaining manageable debt levels.

Fourth, monetary authorities should continue maintaining stable and investment-friendly real interest rates. Since high real interest rates negatively affect economic growth by discouraging investment and consumption, the Bangko Sentral ng Pilipinas should pursue balanced monetary policies that support price stability while also encouraging productive economic activities. Coordinated fiscal and monetary policies are necessary to sustain macroeconomic stability and investor confidence.

Fifth, policymakers should institutionalize periodic debt sustainability assessments using nonlinear econometric techniques such as threshold regression analysis. Traditional linear models may fail to detect regime shifts and critical turning points in macroeconomic relationships. By incorporating threshold analysis into fiscal planning, policymakers can identify early warning signs of excessive debt accumulation and implement corrective measures before debt levels become harmful to economic growth.

Sixth, future researchers are encouraged to expand the scope of the study by incorporating additional macroeconomic variables such as inflation rate, exchange rate, government expenditure, foreign direct investment, unemployment, and trade openness. Including these variables may provide a more comprehensive understanding of the determinants of economic growth and debt dynamics in the Philippines. Future studies may also employ alternative nonlinear econometric methods such as Smooth Transition Regression (STR), Panel Threshold Regression (PTR), or Nonlinear Autoregressive Distributed Lag (NARDL) models to further validate and extend the findings of this study.

Lastly, the study recommends that the Philippine government align fiscal and debt management strategies with the goals of sustainable development, particularly United Nations Sustainable Development Goal 8 on sustained economic growth and Sustainable Development Goal 17 on fiscal sustainability and global partnerships. Maintaining sustainable public debt levels is essential not only for macroeconomic stability but also for achieving inclusive and long-term national development.

Limitations of the Study

This study is limited to the analysis of the nonlinear effects of public debt on economic growth in the Philippines using annual time-series data from 1986 to 2019. Because the COVID-19 pandemic (2020-2021) caused unprecedented increases in public debt across virtually all economies, including the Philippines, the threshold value identified in this study (−0.0210 for the change in debt ratio) may not be directly applicable to post-pandemic debt levels. Future research should re-estimate the threshold model using data extending through 2025 to determine whether the debt-growth relationship has been permanently altered by pandemic-related fiscal expansions.

The study also only considered real interest rate as the primary independent variable and public debt ratio to GDP as the threshold variable, excluding other macroeconomic factors such as inflation, exchange rate,

foreign direct investment, government expenditure, unemployment, and trade openness that may also influence economic growth. Additionally, the study relied solely on secondary data obtained from government institutions and international databases, which may contain inherent limitations in data consistency and availability. The use of threshold regression analysis also limits the findings to the identified nonlinear relationship within the specified period and may not fully capture sudden structural shocks, policy changes, or external economic crises beyond the study coverage.

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