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RESEARCH PAPER

Debt Thresholds and Economic Growth in Pakistan: Nonlinear Evidence from a Threshold-ARDL Model (1983–2023)

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ABSTRACT

This study examines how different threshold levels of public debt affect Pakistan's economic growth and assesses the country's overall debt sustainability. Debt can support economic growth when kept within sustainable limits, but it holds the economy back when countries resort to excessive borrowing. Using annual data from 1983 to 2023, the study employs a two-regime Threshold ARDL (TARDL) estimation approach to identify nonlinearities in the debt–growth relationship. The analysis identifies threshold ratios of 56.1% for total debt-to-GDP, 64.4% for total debt-to-gross national income, 245.27% for total debt-to-revenue, and 215.86% for total debt-to-exports of goods and services in Pakistan. Debt levels below these critical points generally support economic growth (with the exception of external debt indicators), whereas debt levels above them significantly constrain Pakistan's growth performance. The findings stress that Pakistan should enhance its productive capacity, expand export potential, and improve debt management. It will ease its debt burden and protect long-term macroeconomic stability.

Keywords: Pakistan Economy, Debt Sustainability, Economic Growth, Debt Threshold Level

Introduction

Debt substantially improves welfare if utilized wisely and in balance. Conversely, if it is handled carelessly, it could lead to negative outcomes. A substantial volume of debt impairs the government's capability to give essentials to citizens. As stated by Kemal (2001), the poor are adversely affected by receiving and servicing both domestic and foreign debt. Due to the hardships, they confront in achieving economic progress and development, underdeveloped nations heavily rely on the option of borrowing money from outside sources (Toktaş, Altiner, & Bozkurt, 2019). However, concern has been raised about the overdependency of emerging economies on exorbitant commercial borrowings (Prizzon & Mustapha, 2014). It is commonly accepted that developing countries can hardly grow without external borrowing as they must fund technological progression and capital expansion (Imbs & Ranciere, 2005). As a matter of fact, heavy external debt can have negative effects on the growth of an economy. A key hindrance towards attaining sustainable economic growth is the escalating fiscal deficit. Such deficits in budget have left developing economies more reliant on borrowing from other countries (Shabbir, 2013).

The question of whether increasing debt levels are beneficial or not has been raised repeatedly in recent years. Some events, such as the outburst of the COVID-19 epidemic and Russia's strike on Ukraine, have led to unexpected effects on the price of food and energy in the whole world. The outbreak and resulting supply chain disruptions and lockdowns have had a crucial impact on most economies. The Russo-Ukrainian war has led to a rise in the

prices of energy and food items. Many developing economies have seen their situation worsen because of these events, and majority of them have soared borrowing from both local and external traders to lower the impact of the dilemma. The question of debt sustainability is equally important as the effect of debt on growing economy. According to the International Monetary Fund (IMF), a country's debt is considered viable if it can pay all its recent and future payment liabilities without making unreasonably reshaping its balance of earnings and expenditures or restructuring its debt in the event of a default (Wyplosz, 2007). This definition includes considerations of creditworthiness, which calls for the borrower to have consistent earnings to repay its obligations, and resilience, that depends on the borrower's capacity to stand up with susceptibility brought on by shocks to "the balance of income and expenditure" (Hostland & Schembri, 2013).

According to Krugman (1988) and Servén (2007), excessive public debt would result in less economic growth by increasing capital inefficiencies, resource misallocation, and economic uncertainty. Debt sustainability needs to be assessed using more indicators. These should include measures of vulnerability, such as current-account stability. Reliance on fixed solvency thresholds is not enough. Such thresholds are usually based on debt levels, repayment capacity, receipts as a share of economic output, and foreign-exchange reserves. To handle the challenges of debt servicing, highly indebted nations had to reduce some of their social expenditures. To steer their economies toward sustainable development, many nations were compelled to devalue their currencies. It is also acknowledged that borrowing from outside sources encourages investment, which in turn promotes economic development and progress (Guzman & Heymann, 2015). However, high levels of foreign debt may hinder growth by reducing the quantity of money available to the business sector and ultimately increasing the fiscal burden. Additionally, the effectiveness and scope of local tax increases to pay off external debt are restricted, and they may possess a detrimental as well as a substantial gloomy impact on economic progress, particularly given the effect of crowding out that high taxes have on consumption and capital formation.

As per the Harrod-Domar model, it was believed that foreign monetary flows would increase investment and lead to rapid expansion of economic activity, which would provide enough money to pay back these loans (Spratt, Simms, Neitzert, & Collins, 2009). Modest amounts of borrowing from external resources would spur growth rate of the economy, mostly by raising asset creation and output (Wang, 2009). Therefore, this study investigates the inflection points of financial liabilities on economic progress and assess the nation's debt sustainability condition considering the recent revenue crisis that has beset Pakistan. A number of variables contribute to a rise in debt burden. The current account and budget imbalances can rank highest. The primary causes of deteriorating debt issues are a fiscal shortfall in the shortage of capital spending and a steadily shrinking deficit in the current account. Interest rates and exchange rates are two of the key factors that alter the entire burden of total debt in addition to GDP growth factors. While the currency rate manipulates foreign debt, the interest rate primarily manipulates its own debt.

Without a fiscal policy, any debt plan is insufficient. Since fiscal imbalances are the primary reason for debt growth, the significance of sound fiscal policy cannot be overstated. Realizing the greatest potential for growth and avoiding imbalances in the economy depend on a good fiscal strategy. Additionally, most people agree that a rule-driven fiscal policy is the sole means to achieve a continuous dedication to financial discipline. Pakistan is one of the developing countries which is highly indebted and its debt to GDP ratio has escalated during last decade (Government of Pakistan, 2025). This happened only due to the high budget deficits. These escalating financial obligations has resulted not only in macroeconomics distortions but also brought Pakistan at the edge of insolvency. The factors which are accountable for the debt dynamics in Pakistan are important to discuss here. There are many factors responsible for indebtedness but some of the most prominent are

the primary balance, the output gap, inflation, economic growth, interest rate and exchange rate (Ncube & Brixiová, 2015).

Increasing reliance on debts has become a challenge for lawmakers and economists of Pakistan. Debt to GDP ratio has increased rapidly raising question over its debt sustainability. The debt sustainability of Pakistan depends on its ability to manage its current account by either cutting down its imports or by boosting exports. But it's very tough to achieve this task due to meagre economic growth and devalued currency. The ultimate solution is to raise local taxes to pay off debt, but it is also impossible as tax system is very weak in Pakistan, and it could hurt its development by reducing investment and thus consumption. So, there is a need to think beyond the traditional measures for debt sustainability and focus on other indicators as current account balance for Pakistan's economic stability. The officials of Pakistan are now concerned about restructuring of debt as revenue shortfalls have surged. Further borrowings to pay off existing debts could be a threat for the country's sustainability and due to this reason debt service to revenue ratio is a key element to assess debt level. It is evident from various studies that it depends on the nature of debt whether it stimulates economic growth or becomes a burden on the economy (Matuka & Asafo, 2018). Although studies have shown the relation between debt and growth, but one can hardly find any study in which the role of debt thresholds on economic growth has been investigated. The effect of debt before a specific threshold can spur on economic progress (Law, Ng, Kutan, & Law, 2021). After the threshold the economic growth can be hampered. The study aims to extend research on Pakistan's debt-growth relationship by Identifying debt levels beyond which growth is hindered. These findings will help design effective debt policies to support economic growth and avoid debt crises.

Literature Review

Studies have revealed that debt has many negative consequences which will lead to complex impact on economic growth. Reinhart and Rogoff (2010) have revealed that the most haunting impact was debt overhang. In this situation high levels of debt deterred investors from investing their money in new projects as they feared that the revenue generated through investment would be used to repay debts instead of funding new projects. It was a clear discouragement for investors. Cecchetti, Mohanty, and Zampolli (2011) showed that another very castigatory consequence was crowding out effect where huge borrowings by government escalate interest rates making it challenging for private investors to borrow and invest. According to Kumar and Woo (2010), most alarming condition was the unavailability of funds for essential public services and long-term investments in areas such as infrastructure, education, and healthcare when a large portion of a country's revenue was dedicated to debt servicing. It would be a big challenge for the country to attract investors at domestic and international level when a large portion of a country's revenue is dedicated to debt servicing.

Fiscal reforms are needed in urgency to increase government revenue, reduce unnecessary expenditures, improve tax collection, and promote policies that enhance productivity and growth (Baum, Poplawski-Ribeiro, & Weber, 2012). Further high levels of debt hindered economic progress beyond a specific threshold. The sole and most appropriate solution of excessive debt was to stimulate economic growth instead of merely managing debt levels. Siddiqui and Malik (2001) found a nexus between debt and GDP exploring how high debt levels hindered economic growth in Pakistan. The threshold debt value of most developing countries was found to be 51.65% and this negatively affected economic growth when the public debt was high. Law et al. revealed that debt level is negatively related to the economic progress of a country. Research showed that the correlation between growth and foreign debt was complex and huge amounts of foreign borrowings were negatively correlated with the growth of an economy, meaning that as foreign debt increased, economic growth also decreased. This inverse relation pointed out that increased foreign debt could be a hurdle in a country's economic development.

Moreover, Çiftçioğlu and Sokhanvar (2018) revealed in their research that foreign debt had a significant causal impact on the growth of an economy, which means that increased levels of foreign debt could directly affect and then slowed down expansion of economy. They also found that there was a complex and irregular relationship between economic expansion and borrowings which depends on the debt structure. Kinyondo, Pelizzo, and Byaro (2021) found that debt remained a significant issue even in Sub Saharan African countries governed by efficient democratic system. These countries still must struggle with the high debt levels due to long-standing structural weaknesses, such as weak revenue generation, high expenditure pressures, and economic challenges. Due to all these reasons, it is difficult to reduce the debt levels effectively. Chandia and Javid (2013) research in Pakistan and Ghana have exposed an interesting fact about significant positive association between the budget surplus ratio and the previous ratio of Debt-to-GDP. This suggests that when there is higher surplus relative to its GDP, then a country tends to have less debt burden in that period.

Material and Methods

This study uses a structured estimate process for investigation of the nonlinear effect of debt on economic growth in Pakistan. The stationarity of all variables is first verified using the Augmented Dickey–Fuller (ADF) test in order to guarantee that none of the variables are integrated of order two or higher. This is a prerequisite for undergoing analysis through the ARDL approach. First, it is verified that every variable is either I(0) or I(1), then the ARDL bounds testing method presented by Pesaran, Shin, and Smith (2001) is used to determine whether there is a long-term link between them. The confirmation of cointegration permits moving on to the estimation of the ARDL model, even though the specific findings of the limits test are not presented here.

The debt level that separates the sample into lower and higher regimes is then determined using Hansen (1999) threshold estimate technique i.e two-regime Threshold ARDL (TARDL). For every regime, distinct ARDL models are estimated based on the determined threshold. The results given below illustrates the differences in the effects of debt and other control variables, such as FDI, investment (INV), inflation (INF), and exchange rate (ER). To verify the appropriateness and explanatory power of the model, diagnostic data such as the F-statistic and adjusted R^2 are also shown.

The basic framework was developed to assess the effect of financial obligations on the progress of economy,

$$GR_{it} = \alpha_i + \delta DT + \gamma ER + \beta FDI + \delta INV + \sigma \ln f + e_{it} \quad (i)$$

Where GR is the upsurge of per capita income; DT denotes every measure of financial liabilities(debt); ER is exchange rate, FDI is foreign direct investment, INV is the domestic investment, Inf is the inflation rate; and e is the stochastic error. Due to the dispute in literature as regards the relationship between growth and debt (Albu & Albu, 2021; Benli, 2020; Ibrahim & Khan, 2019), a threshold framework which had initially evolved by Hansen (1999) and in accordance with Okunade (2022), is given as below:

$$GR_{it} = \alpha_i + \Sigma_{j=1}^{P} \delta_j X_{j,it} + \varepsilon_{it} \quad (ii)$$

where t shows the time series magnitude (t = 1983,..., 2023), Xt indicates vector of independent variables including the variable for threshold, debt DT, α_i is the specific fixed effect for country, ε_{it} is the independent and identically disturbance term. The nonlinear threshold specification is given as:

$$GR_{it} = \alpha_i + \beta'_1 X_{it} I(DT_{it-1} \leq \gamma) + \beta'_2 X_{it} I(DT_{it-1} \geq \gamma) + \varepsilon_{it} \quad (iii)$$

Equation (iii) shows how an indicator is used to specify different regimes. On the other hand, two inception levels, debts and their ratios, divide the whole framework into slope coefficients denoted by 1 and 2 for two regimes. Furthermore, to recognize how thresholds impact the relation of debt with growth a two regime-single threshold ARDL model has been employed.

Results and Discussion

Table 1
Debt Threshold in Pakistan. Dependent Variable: Growth

Variable	TDT	TDT/GDP	TDT/NP	TDT/R	TDT/EXP
Threshold Level %	485.5	56.10	64.469	245.27	215.86
Regime 1: Below Threshold					
Threshold Var	0.339*** (5.719)	-23.867** (-2.880)	0.1778*** (3.357)	0.002 (0.087)	-10.99*** (-7.775)
LER	-14.591*** (- 3.189)	7.238** (2.408)	1.031 (0.659)	5.012*** (3.403)	124.087*** (3.351)
LFDI	-3.326 (-1.098)	-0.638 (-0.521)	4.254*** (3.658)	0.865 (0.561)	-14.480*** (-6.469)
LINV	-6.467*** (-3.834)	-4.625*** (-3.073)	-3.469** (-2.897)	-6.246*** (-4.102)	6.627** (2.391)
Inf	-0.321*** (-2.852)	-0.126 (-1.369)	-0.313** (-2.333)	-0.101 (-1.613)	-0.1710 (0.601)
Regime 2: Above Threshold					
Threshold Var	-0.002 (- 1.126)	-15.094** (2.711)	-0.034 (-1.152)	-0.003 (-0.523)	-0.005 (-2.004)
LER	0.539 (0.134)	-3.671 (-1.158)	1.634 (0.416)	6.150*** (2.545)	0.871 (0.321)
LFDI	0.631 (1.412)	-0.099 (- 0.206)	-0.2361 (-0.113)	-2.015 (-1.097)	0.283 (0.098)
LINV	-1.056 (-0.781)	0.202 (0.131)	-1.315 (-0.627)	-5.857 *** (-3.098)	-1.015 (-0.585)
Inf	-0.213 ** (-2.056)	-0.134** (- 0.361)	-0.110 (-0.141)	-0.013 (-0.038)	-0.088** (-3.001)
C	8.709 (1.426)	18.234** (2.520)	7.965 (1.614)	20.508*** (3.131)	9.369 (1.646)
R^2	0.703	0.5657	0.695	0.567	0.591
Adj. R^2	0.517	0.412	0.574	0.385	0.467
F-statistic	6.062***	6.019***	8.072***	5.424***	5.462***
Prob (F-statistic)	0.0000	0.0001	0.0001	0.0013	0.0000
Durbin-Watson	2.828	2.136	1.640	1.840	2.071

Note: t-statistics are reported in parentheses. Significance levels are indicated as follows: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

In Table 1, 56.1%, 64.4%, 245.27%, and 215.86% represents the thresholds for ratios of gross domestic output (TDT/GDP), gross national product (TDT/NP), revenue (TDT/R) and foreign trade of goods and services (TDT/EXP) respectively. These debt limits represent levels beyond which indebtedness becomes detrimental for the economic progress of Pakistan. The result shows that there is a nonlinear relationship between progress of Pakistan and total debt. When the total debt is maintained below the threshold limit of 485.5% it employs a statistically significant effect on Pakistan's growth. This reveals that restrained levels of debt are growth oriented by utilizing debt for productive projects. But when this estimated level of threshold is surpassed, it indicates the crowding out of private investment and deterioration of many macroeconomic indicators. Similarly, debt ratios have shown the same pattern. Total debt to GNP below threshold level supports the economic growth while total debt to GNP growth above threshold limit 56.1% has deteriorating effect on economy which shows the importance of aligning debt sustainability

with economic output. Total debt to export ratio remained negative across both regimes, indicating that fiscal strain of debt restrains economic growth.

The annual percentage change in real GDP is used to calculate economic growth (GR). To reflect various aspects of debt sustainability, total debt (DT) is stated in various ratios: total debt to GDP (TDT/GDP), total debt to GNP (TDT/NP), total debt to revenue (TDT/R), and total debt to exports (TDT/EXP). Inflation (INF) is expressed as the annual percentage change in the consumer price index (CPI), foreign direct investment (FDI) and domestic investment (INV) as percentages of GDP, and the exchange rate (ER) as the yearly average PKR per USD. To stabilize variance and interpret coefficients as elasticities, all variables—aside from inflation—are converted into natural logarithms.

Various control variables, which may also affect economic growth, have also been introduced to isolate the repercussions of debt ratios on economic expansion. These control variables include exchange rate, foreign direct investment, domestic investment and inflation. Among these control variables, exchange rate showed mixed results. When debt is below threshold level it negatively affects growth but becomes statistically significant when debt crosses the threshold level highlighting the importance of stable exchange rate for repayment of debts. Foreign direct investment on the other hand strengthens the economic growth under lower debt levels but this effect diminishes under higher debt levels. While Domestic Investment showed negative trends in both regimes. This may highlight the inefficiency of using investments and use of resources in nonproductive sectors leading to crowding out effect. Inflation has a negative impact under high debts, indicating that inflation impedes investors' confidence and reduces the returns which in turn limits the growth potential.

Table 2
Debt Threshold in Pakistan. Dependent Variable: Growth

Variable	**EDT**	**EDT/GDP**	**EDT/NP**	**EDT/R**	**EDT/EXP**
Threshold Level	185.500	25.131	53.259	235.150	167.011
			Regime 1: Below Threshold		
Variable	2.065***	1.480*	0.327***	0.007	-0.087***
	(3.913)	(1.632)	(4.346)	(0.401)	(-3.386)
LER	-75.829***	1.712	0.114	1.951	9.252**
	(-3.065)	(0.568)	(0.084)	(2.228)	(2.824)
LFDI	7.963***	2.821**	3.095***	2.961*	-2.051
	(3.061)	(2.573)	(2.610)	(1.919)	(-0.858)
LINV	-12.853***	-5.347***	-4.156***	-3.729**	-5.962***
	(-5.914)	(-5.079)	(-4.053)	(-3.154)	(-2.032)
Inf	-0.025	-0.2869**	-0.265***	-0.257	-0.106
	(-0.836)	(-1.754)	(-3.012)	(-0.3170)	(-1.529)
			Regime 2: Above Threshold		
Variable	-0.005	-0.122	-0.0153	-0.015	-0.001
	(-0.149)	(-0.069)	(0.809)	(-0.686)	(-0.056)
LER	0.433	3.021	2.057	2.214	-7.675 *
	(0.132)	(1.011)	(2.083)	(0.397)	(-1.015)
LFDI	0.811	0.319	-2.031	0.597	6.479**
	(2.045)	(0.765)	(-2.019)	(0.419)	(2.111)
LINV	-2.215	-2.476**	-1.026	-2.130 **	-1.165
	(-1.501)	(-2.123)	(-1.211)	(-2.318)	(-1.214)
INF	-0.065 **	-0.065	-0.041	-0.053*	-0.027
	(- 2.972)	(- 2.051)	(-0.626)	(- 1.989)	(-0.688)
C	12.653*	11.976**	12.026**	15.311**	26.053**
	(1.0867)	(2.094)	(2.023)	(2.137)	(3.959)
R^2	0.727	0.877	0.615	0.542	0.094
Adj. R^2	0.613	0.483	0.594	0.489	0.615
F-stats	5.045***	6.819***	8.953***	6.315***	6.032***
Prob (F-stats)	0.0001	0.0001	0.0000	0.0001	0.0001

Durbin-Watson	2.091	2.124	1.667	2.911	2.089

Note: t-statistics are reported in parentheses. Significance levels are indicated as follows: *** p < 0.01, ** p < 0.05, * p < 0.10

As per the statics given in Table 2, the values of 25.131%, 53.259%, 235.15 % and 167.011 % represent the thresholds for ratios of gross domestic output (EDT/GDP), gross national product (EDT/NP), revenue (EDT/R) and foreign trade of goods and services (EDT/EXP) respectively. These threshold values give the limits beyond which debt would be detrimental for the economy of Pakistan. This shows that association of financial obligations with economic growth is not linear. The threshold values show that beyond these levels, debt begins to impede progress. Therefore, this discovery implies that the relationship between debt and growth is dependent on a specific debt ratio before debt may negatively impact Pakistan's economic growth. Additionally, the regime determining variable which measures debt level, its immediate impact, currency rate, inward foreign investment, domestic capital formation, and rise in general price level are all shown in the table together with the dual extreme regimes and parameter estimates (Okunade, 2022). When the leverage ratio, is equal to or lower than the predicted regime determining level, these variables are assessed by the parameters in the first ultimate zone. Additionally, when leverage ratio surpasses the threshold, the parameters in the next ultimate state show the impact of the regime determining variable, involving others.

It is witnessed that debt remained growth enhancing when it is below threshold level. Total external debt along with external debt to GDP and GNP ratios all have shown positive effects on economic growth which indicates that the moderate level of debt facilitates and stimulates economic activity. But external debt to exports is harming the growth at lower debt levels too due to poor debt sustainability. Even at low debt levels, external debt to exports ratio harms economic growth as it reflects deficient debt repayment. The significant but negative coefficient reveals that it is damaging for economic growth to rely on external debt when export performance is weak.

The coefficients of threshold variable and external debt to GDP ratio turned insignificant when debt surpasses threshold level reflecting adverse effect of excessive borrowings on growth, consistent with debt Laffer hypothesis. The control variables show diverse effects across both regimes. Depreciation of exchange rate strongly hinders growth under low debt levels revealing vulnerability consequent to foreign debt while it turns to be positive though insignificant under high debt regime except in external debt to exports ratio which indicates that economic growth becomes sensitive to exchange rate disturbances. In low regime, foreign direct investment accelerates economic growth, but it loses essence during high debt regime. On the other hand, the domestic investment shows negative impact on growth in both low and high levels of debt highlighting the inefficiencies as well as crowding out effect. Inflation mostly harms the growth rate more when debt crosses high threshold levels indicating the increased economic burden of debt due to price instability.

Conclusion

The study provides evidence that the link between debt and economic growth in Pakistan is nonlinear, with clear signs of threshold effects over the period 1983–2023. When total and external debt indicators remain below the estimated thresholds, borrowing tends to support economic activity; once these limits are crossed, the contribution of debt turns adverse, especially when measured relative to exports. This highlights how a narrow and fragile export base amplifies the burden of external liabilities. The behavior of the control variables broadly reinforces this picture. Foreign direct investment appears growth-enhancing at lower debt levels but loses strength in a high-debt environment, while domestic investment and exchange rate depreciation often coincide with weaker growth,

pointing towards inefficiencies and macroeconomic fragility. Inflation, particularly when combined with elevated debt, further undermines growth prospects.

Recommendations

It is recommended that Pakistan needs to keep both total and external debt ratios within prudent bounds, strengthen revenue mobilization, and expand and diversify its export base to improve debt-carrying capacity. At the same time, maintaining relative stability in the exchange rate and prices is essential to avoid increasing the real burden of debt. Most importantly, new borrowing should be tied to productive, growth-enhancing investments rather than recurrent spending, so that debt becomes a tool for long-term development.

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