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The Role of Government Spending and Public Debt in Shaping Pakistan's Economic Growth: A Statistical Analysis

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ABSTRACT

Pakistan has yet to gather enough funds to cover its budget. As a result, twin deficits emerged, forcing the government to rely on domestic and international debt to fund development projects. Current study investigates the link between government debt, expenditure and economic advancement in Pakistan. Several sources, including the World Bank database, International Financial Statistics, Pakistan Economic Survey, and others, offered statistics on public debt, government expenditure, inflation, GDP growth rate, and interest rates for 41 years from 1980 to 2020. Autoregressive distributed lag model was used for econometric research. Study used unit root (ADF and PP) tests to confirm the data's stationarity. Findings of the study revealed that public debt and interest rates had a substantial negative link with economic growth. However, expenditure on both development and non-development and inflation had a significant positive correlation with GDP growth. The findings show that all of the identified variables substantially influence government spending. Pakistan's economic development is driven mainly by governmental spending, interest rates and debt. The study recommends that to secure long-term economic growth, the government should responsibly manage debt stocks.

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1. Introduction

Two significant issues are frequently discussed in academic circles and popular discourse: how government spending affects economic development and how it is financed. This is particularly valid for developing and rising countries. A critical consideration in this topic is the kind of governmental expenditure. The appropriate strategy to finance public investment has long been a source of disagreement among economists. This topic has emerged as a crucial consideration in assessing the macroeconomic impacts of public expenditure. The study would be skewed if the funding options for the public investment were ignored (Marglin, 2014). Most conventional economists believe fiscal expansion is futile to boost the economy. Theoretically, when government expenditure rises, nations with weak governance will see little or no growth (Mitchell & Soga, 2005). Taxes and government spending discourage private investment in human and material capital, which is detrimental to the economy, claim

(Facchini & Seghezza, 2018). Hein et al. (2020) uses a Kaleckian framework to investigate how different types of government expenditure affect capacity utilisation and growth. He points out that government expenditure on consumer goods increases the equilibrium rate of capacity utilisation, increasing the equilibrium rate of capital accumulation via influencing effective demand. However, fiscal investment expenditure influences the capacity utilisation rate in three ways. It does this by increasing the effective demand first. It also draws much money from the private sector. Third, capital productivity is increased when fiscal investment expenditures increase the potential output-capital ratio. Therefore, it is still being determined how a country's economic performance is impacted by increased fiscal spending (via taxes or public debt) (Berg, Portillo, Yang, & Zanna, 2013; Nawaz, Azam, & Bhatti, 2019).

Most literature on the topic views governmental debt as domestic debt (Missale, 1994; Presbitero & Arnone, 2006; Reinhart, Reinhart, & Rogoff, 2015). However, in this situation, the makeup of the public debt matters, as Diamond's seminal analysis from 1965 makes clear. Similarly, risk default, public debt management, and the credibility of economic policy were the main focus of Alesina, De Broeck, Prati, and Tabellini (1992); Drudi and Giordano (2000) and (de Mendonça & Machado, 2013). An academic addition to managing public debt in developing economies was made by Singh (2016).

Various developing and rising countries have recently implemented aggressive measures to replace foreign public debt with local debt (Abbas & Christensen, 2010; Wheeler, 2004). These countries still mostly rely on foreign loans to pay off their national debt. According to Ali Abbas, Belhocine, El-Ganainy, and Horton (2011) examination of current trends in the composition of public debt in emerging countries, public debt for all developing countries was around 64% of GDP in 2005 (comprised of 40% foreign debt and 23% domestic debt). However, the total public debt of emerging nations increased to 60.1% of GDP in 2021 from 35.01 per cent in 2010, which affected economic growth. Macroeconomic policy has recently made achieving sustainable growth a top priority, especially for the Less Developed Countries (LDCs), including Pakistan. However, attaining these goals in Pakistan will be very challenging, where significant trade deficits, persistent unemployment, and high inflation rates are the main barriers to economic growth and stability (George, 2023; Shittu, Hassan, & Nawaz, 2018). Law, Ng, Kutan, and Law (2021) underscore the gravity of these concerns by emphasising their role in the escalation of the national debt and its deleterious consequences on the economy of Pakistan. Governments need help to function successfully or efficiently; they need assistance. Due to a lack of cash, we believe Pakistan will borrow more money to supplement its savings from domestic or international sources. Thus, borrowing is the second-best alternative after capital formation during economic downturns (Ashfaq & Bashir, 2021).

These issues were made worse in underdeveloped countries by the COVID-19 epidemic. To lessen the epidemic's recessionary impacts, the government enacted expansionary fiscal policy measures, such as lower taxes and higher government expenditures. Unfortunately, these measures were heavily constrained by political pressure from military and religious organizations and macroeconomic issues, including massive public debt, a faltering economy, and little budgetary flexibility (Skies, 2019).

Before the outbreak, Pakistan's macroeconomic circumstances severely limited the government's ability to respond financially. This resulted from inadequate structural actions. The government requested a rescue package from the IMF, contingent on fixing structural problems and staying within financial constraints. As part of the scheme, the government decided to dramatically devalue the currency, increase taxes and interest rates, and cut spending. These measures increased inflation while decreasing the current account deficit, attracting foreign investment, and slowing economic development (Rasheed, Rizwan, Javed, Sharif, & Zaidi, 2021). Because of this, the country's GDP growth forecasts for 2019–20 fell from 3.3% to 1.9%, and its public debt–to–GDP ratio was already 87.56% prior to the pandemic (Kilby & McWhirter, 2022; Rasheed et al., 2021).

This study explores the relationship between government debt and expenditure and Pakistan's economic development. Numerous academic studies have examined the effects of public debt or government expenditure on growth in Pakistan; nevertheless, these analyses have highlighted the inconsistent correlations between the different elements of debt or government spending and growth. This research will incorporate the impacts of public debt and expenditure on growth by extending the data analysis to the present period and utilising the autoregressive distributed lag (ARDL) methodology, which has yet to be applied in Pakistan. This research study starts by identifying the gap in the literature and then provides background information on the topic. The paper's last part, which follows the citation of relevant works, looks at the research technique. The data analysis, conclusion, and suggestions parts follow, listed in that order.

2. Literature Review

The ARDL technique was used to analyze the relationship between fiscal spending, trade openness, and state debt in Pakistan (Buthelezi, 2024). The study found a correlation between public debt, GDP growth, and inflation. It also found that inflation, interest rate, and unemployment impact trade openness. The study concluded that responsible debt management is crucial for fiscal sustainability and growth. Another study focused on fiscal consolidation in South Africa (Buthelezi, 2024). They used SVAR analysis to examine the effects of tax hikes and reductions in government expenditure on the economy. The study aimed to understand the outcomes of fiscal consolidation in emerging nations like South Africa. A study conducted by Shkodra, Krasniqi, and Ahmeti (2022) found that government spending positively impacts economic growth. The Ordinary Least Squares (OLS) analysis showed a direct relationship between government expenditure and economic expansion.

Similarly, Kirikkaleli and Ozbeser (2022) found that government spending stimulates economic growth in the short term, especially during holidays. However, in the long run, government expenditure is a consequence of economic growth. Bahaa (2021) investigated the impact of debt on fiscal expenditure in Palestine. The study found that public debt benefits government expenditure, indicating that most of the debt is caused by unproductive consumer spending. The study concluded that there is a direct relationship between government debt and expenditure in both advanced and emerging economies. A study on OECD nations found that government spending contributes to the escalation of public debt (citation not provided). Iiyambo and Kaulihowa (2020) analyzed the trends in Nigeria's public debt, government revenue, and government spending. They found comparable connections between public debt and government spending but argued that government debt is not an effective tool for funding expenditures. Le Van, Nguyen-Van, Barbier-Gauchard, and Le (2019) investigated the relationship between public debt, taxation, investment, and growth. They found that a robust and healthy economy requires sufficient productivity and a moderate tax rate. Jibir and Aluthge (2019) analyzed government expenditure in the Nigerian economy and found that the role of the government has transformed to enhance the population's welfare. They also found that other factors have a substantial effect on government expenditure. Chinanuife, Eze, and Nwodo (2018) discussed the impact of public debt on Nigeria's economy. They highlighted the significance of the public debt to GDP ratio and found a negative link between government debt and investment. A study on Southeast Asian nations found that the accumulation of public debt over a prolonged period substantially influences economic growth (Kilby & McWhirter, 2022; Nawaz, Ahmad, Hussain, & Bhatti, 2020; Rasheed et al., 2021).

Lucky and Godday (2017) provided a rationale for countries to accumulate national debt. They argued that the expansion of business organizations depends on credit. The same is true for a nation, provided that the revenue streams generated by the borrowed money are not more significant than the interest rates and other costs related to the funds. Furthermore, public debt

is advantageous when it fosters economic growth and improves citizen welfare. They also pointed out a connection between Nigeria's internal and foreign debt. They conclude that there has been constant growth in both debt profiles. Most remarkably, domestic debt positively affects GDP growth, whereas foreign debt has a negative correlation with Nigeria's growth.

Japan's rapidly rising fiscal burden is the additional revenues required to cover government spending and maintain debt using a neoclassical growth model. It illustrates how Japan's ageing population will demand more income in the future, increasing the nation's debt. They conclude that substantial adjustments to tax revenues would be required to achieve financial sustainability and suggest the necessary legislative actions.

Odo, Igberi, and Anoke (2016) Investigate the relationship between state debt and spending in Nigeria from 1980 to 2015. It implies that increasing deficit spending will eventually lead to increased state debt. Their intention is to address the question of whether government expenditure on social welfare is actually warranted or if it is only carried out to obtain preferential treatment from financial institutions on a local and international scale. Using the VEC test, they conclude that there is a strong positive correlation between public debt and government spending in Nigeria.

Saifuddin (2016) examined Bangladesh's debt and growth. The study used a quantitative research approach due to the collection of secondary data during the years 1974–2014. We used the TSLS repression analysis and the augmented Dickey-Fuller test to analyze the data. The study's conclusions revealed a positive relationship between public debt and investment and economic growth. This finding indicates that Bangladesh uses the money it borrows from the government to make profitable investments.

Mwaniki (2016) evaluated the effect of Kenya's state debt on GDP. The study examined how GDP was affected by Kenya's central bank overdrafts, commercial bank advances, government securities, and external debt. The study gathered secondary data from 2003 to 2015, utilizing an OLS regression and a causal research methodology. We did an inferential analysis of the study's data sets. The research findings, which demonstrated a strong relationship between GDP and bank loans, external debt, and government securities, recommended that the government encourage responsible domestic and international borrowing and direct funds towards successful business endeavors.

The relevant literature frequently uses the following techniques: regression analysis, OLS, Johansen Cointegration, TSLS, and VAR. Research has demonstrated that public debt and government spending can impact growth in both positive and negative ways. The preceding discussion presents divergent conclusions regarding the effectiveness of debt and fiscal expenditure based on the countries' diverse political and economic structures. Variables, model design, econometric technique, and data type all affect how different the results are.

This study is notable for its unique approach and valuable contribution to the literature, as it directly addresses a real problem facing the Pakistani economy. Although there have not been many studies on this subject in Pakistan before, this one offers a new angle by analyzing the data up to the present and examining the aspects of the relationship unique to the country to comprehend how government debt and spending affect economic growth.

In light of this study, we should consider how and to what degree government debt and spending are critical to Pakistan's economic development. Therefore, the study's primary goal is to close the research gap by using the ARDL approach to examine the effects of government debt and spending on economic growth, focusing on Pakistan.

3. Data and Methodology

This study focused on the impact of government debt and spending on Pakistan's economic growth. Nonetheless, the main emphasis of this study was the impact of government spending on development and non-development, public debt, interest rates, and inflation on Pakistan's economic growth. The study will run from 1980 to 2020, a span of 41 years. The World Development Indicators, International Financial Statistics, International Debt Statistics, and the Pakistan Economic Survey will all supply secondary data for this study. This study's annual time series data came from the Pakistan Economic Survey. The current study used the autoregressive distributed lag technique with the latest data range and critical macroeconomic variables, which were ignored in earlier empirical studies.

3.1. Model Specification

The study's model calculated economic growth in terms of GDP, or gross domestic product growth. Conversely, we measured public spending using PD, interest rate INT, development and non-development expenditures (NDE), and inflation (INF). When estimating time series models, it is necessary to consider the connections between variables in both the short and long run. The literature reveals the many strategies used to identify these correlations between the variables of interest. Before adopting any approach, determine the sequence in which the variables are integrated. The stated model is provided below to assist in identifying the relationships between the variables in the government expenditure and debt response function.

3.2. Model: Government Spending, Government Debt and Economic Growth

This model uses an econometric form and a general form equation to show the relationship between government debt, spending, and economic growth.

$$GDPg = f\,(DE, NDE, PD, IN) \quad (1)$$

The econometric form of the specified model is:

$$GDPg = \alpha_0 + \alpha_1 DE + \alpha_2 NDE + \alpha_3 PD + \alpha_4 INT + \alpha_5 INF + \mu \quad (2)$$

3.3. Cointegration Technique

Granger and Engle created cointegration in the 1980s to model temporal series while retaining long-term information. It entails integrating a linear combination of variables into a specified order, I(d), to preserve equilibrium.

Table 1
Selected Variables Detail

Variables	Description	Data Resources
GPCI	GDP Growth (annual %)	World Development Indicator (WDI)
DE	Development Expenditure (% of GDP)	Pakistan Economic Survey (Various Issues)
NDE	Non-development Expenditure (% of GDP)	Pakistan Economic Survey (Various Issues)
PD	Public Debt (% of GDP)	International Financial Statistics (IFS)
INT	Interest Rate/Lending Rate (annual %)	International Financial Statistics (IFS)
	Inflation Rate (CPI annual %)	International Financial Statistics (IFS)

Source: Calculations by E-views

Cointegration is an econometric concept that refers to a long-term equilibrium between economic time series that progressively converge over time. It offers a solid framework for

creating empirical error correction models based on short- and long-term data. Cointegration testing is critical for identifying whether a model has significant long-term linkages. However, long-term data could be lacking. Other cointegration tests include the Autoregressive Distributed Lag cointegration technique, also known as bound cointegration testing.

3.4. ARDL Model Specification

Study uses the ARDL model for empirical analysis. The co-integrating approach generates long-term correlations between variables of different integration orders. It provides impressions of the interactions between the specified variables in the short and long term. In contrast to Johansen and Juselius (1990) co-integrating method, the ARDL approach to cointegration yields distinct long-run connection equations for each variable. This technique ensures realistic results by managing variables with different integration orders (I (0), I (1), or a combination). The discovery of a co-integrating vector enables the reparameterization of the ARDL model into the Error Correction Model (ECM), allowing for the investigation of both short- and long-term interactions inside a single model.

Basic ARDL equation of model 1, which links government spending, debt, and economic growth, given below:-

$$\Delta(GDPg) = \alpha + \beta_1(GDPg)_{t-1} + \beta_2(DE)_{t-1} + \beta_3(NDE)_{t-1} + \beta_4(PD)_{t-1} + \beta_5(INT)_{t-1} + \beta_6(INF)_{t-1} + \sum_{i=1}^{\alpha 1} \delta_1 \Delta(GDPg)_{t-i} + \sum_{i=0}^{\alpha 2} \delta_2 \Delta(DE)_{t-i} + \sum_{i=0}^{\alpha 3} \delta_3 \Delta(NDE)_{t-i} + \sum_{i=0}^{\alpha 4} \delta_4 \Delta(PD)_{t-i} + \sum_{i=0}^{\alpha 5} \delta_5 \Delta(INT)_{t-i} + \sum_{i=0}^{\alpha 7} \delta_6 \Delta(INF)_{t-i} + + \varepsilon_t \quad (3)$$

The parameters represent the long-term multipliers, while the symbols Δ and white noise error term indicate the short-term dynamic coefficients of the ARDL model and the first difference of the variables. Here is an equation that can help you determine the long-run parameters of the model:

$$\Delta(GDPg) = \alpha + \sum_{i=1}^{\alpha 1} \eta_1(GDPg)_{t-i} + \sum_{i=0}^{\alpha 2} \eta_2(DE)_{t-i} + \sum_{i=0}^{\alpha 3} \eta_3(NDE)_{t-i} + \sum_{i=0}^{\alpha 4} \eta_4(PD)_{t-i} + \sum_{i=0}^{\alpha 5} \eta_5(INT)_{t-i} + \sum_{i=0}^{\alpha 7} \eta_6(INF)_{t-i} + \varepsilon_t \quad (4)$$

Here is a method to analyze the short-term dynamics of the model:

$$\Delta(GDPg) = \alpha + \sum_{i=1}^{\alpha 1} \lambda_1 \Delta(GDPg)_{t-i} + \sum_{i=0}^{\alpha 2} \lambda_2 \Delta(DE)_{t-i} + \sum_{i=0}^{\alpha 3} \lambda_3 \Delta(NDE)_{t-i} + \sum_{i=0}^{\alpha 4} \lambda_4 \Delta(PD)_{t-i} + \sum_{i=0}^{\alpha 5} \lambda_5 \Delta(INT)_{t-i} + \sum_{i=0}^{\alpha 7} \lambda_6 \Delta(INF)_{t-i} + \omega ECM_{t-1} + \varepsilon_t \quad (5)$$

4. Results And Discussion

This part examines an econometric and statistical analysis of Pakistan's "public debt and public expenditure and its impact on economic growth".

4.1. Descriptive Statistics and Correlation Analysis

This part contains data on central tendencies, dispersion measures, minimum and maximum values, degree of peak ends, asymmetric values, Jarque-bera statistics for all of the study's series, and descriptive statistics for each variable used in the analysis. This section's statistics included information on the centre's location and the standard deviation, or root, mean squared deviation, which was used to depict the distribution of each variable's values around the centre. The skewness value of each variable indicates its symmetric character, while the kurtosis statistics show peakedness and the Jarque-Bera statistics indicate normalcy for each series.

Table 2
Descriptive Statistics of Key Variables (1980-2020)

	GDPG	DE	NDE	PD	INT	IN
Mean	3.08	6.11	16.27	69.97	11.93	8.16
Median	3.10	4.50	16.20	67.20	11.76	7.84
Maximum	4.70	29.40	20.50	102.01	16.63	20.29
Minimum	0.30	1.70	10.70	47.10	7.25	2.53
Std. Dev.	1.00	5.71	2.63	13.58	2.35	3.76
Skewness	-0.43	3.34	-0.39	0.11	-0.07	0.68
Kurtosis	2.97	14.02	2.54	2.22	2.25	3.77
Jarque-Bera	1.26	283.80	1.37	1.13	0.99	4.13
Probability	0.53	0.00	0.50	0.57	0.61	0.13
Sum	126.40	250.50	667.10	2868.90	489.05	334.69
Sum Sq.Dev.	40.38	1303.14	277.56	7373.89	220.50	566.43
Observations	41	41	41	41	41	41

Source: Calculations by using E-view

Table 2 shows descriptive statistics for factors observed and collected between 1980 and 2020. The table shows the average GDP values, public debt, interest rate, development spending, non-development expenditure, and inflation at 3.08, 6.11, 16.27, 69.97, 11.9, and 8.16 per cent. The average interest rate and inflation are 11.93 and 8.16 per cent, respectively. Table 2 shows that the minimum and maximum values for gross domestic product, development expenditures, and non-development expenditures, presented as percentage annuals, were 4.70 and 0.30, 29.40 and 1.70, and 20.50 and 10.70, respectively. In contrast, the public debt is 102.01 and 47.10, the interest rate is 16.63 and 7.25, and the inflation rate is 20.29 and 2.53 per cent, respectively. The skewness data in Table 2 show that the study's interest rate, non-development spending, and GDP growth are all negatively skewed. In contrast, the stated numbers for development spending, public debt, and inflation are 3.34, 0.11, and 0.68, respectively, favorably skewed. According to stated kurtosis statistics, all variables other than development spending and inflation, which are leptokurtic, are Platykurtic in distribution peaking. The reported kurtosis values for GDP, NDE, PD, INT, DE, and INF were 2.97, 2.54, 2.22, 2.25, 14.02, and 3.77, respectively. The Jarque-Bera statistics in Table 2 show that all variables are regularly distributed. The coefficients are 1.26 ($p=0.5>0.05$) for GDP, 283.80 ($p=0.00 < 0.05$) for development spending, 1.37 ($p=0.50 > 0.05$) for non-development spending, 1.13 ($p=0.57 > 0.05$) for public debt, 0.99 ($p=0.61 > 0.05$) for interest rates, and 4.13 ($p=0.13 > 0.05$) for inflation.

Table 3
Correlation Matrix of Key Variables (1980-2020)

	GDPG	DE	NDE	PD	INT	INF
GDPG	1					
DE	0.13	1				
NDE	0.01	-0.23	1			
PD	0.09	0.00	0.61	1		
INT	-0.27	-0.11	0.02	-0.06	1	
INF	-0.20	-0.06	0.33	-0.14	0.31	1

Source: Calculations by using E-view

Table 3 shows the correlation coefficients for the variable pairings in the research. The findings revealed that, while interest rates, inflation, and GDP were negatively connected, public debt, development expenditure, non-development spending, and GDP were favorably correlated. GDP, on the other hand, correlates positively with DE, NDE, and PD. A -0.27 and -0.20 correlation existed between INT, GDPg, and INF and GDPg, respectively. The findings demonstrate that, whereas INT and INF primarily move in the opposite direction of GDP, DE, NDE, and PD had a negative relationship with GDP throughout the research period. Furthermore, development expenditures, except for GDP

and PD, are negatively correlated with interest rates and inflation. Non-development expenditures, with the exception of NDE, are also positively correlated with GDP, PD, INT and INF.

4.2. Unit Root Test

The Dickey-Fuller (DF), Augmented Dickey-Fuller (ADF), and PP tests are commonly used to assess unit root processes and data stationarity. Pierre Perron and Peter C. B. Phillips created the Phillips-Perron test as a statistical approach for determining unit roots. The Phillips-Perron test is commonly used in time series analysis to explore the null hypothesis of order one-time series integration. Study employs the ADF test for higher-order correlations and the DF test for AR (1) processes. Furthermore, the DF test is used when the residuals show no auto-correlation, and the ADF test is used when there is auto-correlation in the residuals. The Dickey-Fuller estimation considers the parameters necessary for the model estimate.

Table 4
Unit Root Test Results by using Trend and Intercept

Variables	**Level**		**First Difference**		**Order of Integration**
	ADF	**PP**	**ADF**	**PP**	
GDPg	-4.831695 0.0012	-4.219940 0.0019	-7.255256 0.0000	-15.29177 0.0000	I(0)
Development Expenditure	-2.032975 0.2721	-2.965225 0.0467	-6.172403 0.0000	-14.00712 0.0000	I(1)
Non-development Expenditure	-2.789738 0.0685	-2.782927 0.0695	-7.395998 0.0000	-8.402065 0.0000	I(1)
Public Debt	-1.772757 0.3883	-1.798784 0.3759	-6.680171 0.0000	-6.669752 0.0000	I(1)
Lending Interest Rate	-3.275588 0.0228	-2.362958 0.1582	-5.359311 0.0001	-5.353469 0.0001	I(1)
Inflation	-3.061620 0.0376	-3.201049 0.0271	-7.449372 0.0000	-7.434078 0.0000	I(1)

Source: Calculations by E-views

Table 4 values show the results of stationarity. The P-values of the two coefficients, which show general stationarity in the data, except for GDPg, which indicates stationarity at I (0), or the level, support this. In the case of a unit root, each variable represents a rejection of the null hypothesis.

As a result, study employ ARDL method to estimate the model. The ARDL approach is appropriate when certain variables remain stable at the level and others at the first difference.

4.3. Lags selection Criteria

The selection criteria are used in time series analysis to determine the appropriate amount of lags to include in an auto-regressive model. The five lag selection criteria are AIC, SIC, BIC, HQC, and FPE. Numerous research studies have employed SIC and AIC; however, despite the reasoning, there are limited sample sizes. When the sample size is less than 60, AIC and SIC are appropriate criteria (Ayomitunde, 2020).

Table 5
Lag Length Selection Criteria

Lag	Log L	LR	FPE	AIC	SC	HQ
0	-547.2713	NA	2165866	31.61550	31.88213	31.70754
1	-466.3073	129.5423*	171384.0*	29.04613	30.91255*	29.69042*
2	-431.6264	43.59891	223698.4	29.12151	32.58771	30.31804
3	-387.5297	40.31702	246634.1	28.65884	33.72483	30.40762

Source: Calculations by using E-view

4.4. Bound Test Analysis

Bound test analysis is a valuable tool for estimating the long-term relationship between variables. We expect the long-run coefficient of variables to be zero.

Table 6
Bound Test Results

Model	F- Statistic	Critical Value I(0)	Critical Value I(1)	Critical Value I(0)	Critical Value I(1)	Remarks
GDPg **/** DE, NDE, PD, INT, INF	3.64	2.39	3.38	2.08	3	Accept the alternative hypothesis and reject the null hypothesis.

Source: calculations by E-views

The model's computed F-statistics value is 3.64 and its upper bound critical value is 3.38 at 5% and three at 10%. The calculated value, F-stat > I(1) 3.64 > 3.38, exceeds the upper bound critical value.

We will accept the alternative hypothesis and reject the null hypothesis, which suggests no cointegration in the model. Therefore, we can assert that the model incorporates cointegration and establishes long-term relationships among the variables.

4.5. Results of Long Run Analysis

In this section, we will talk about the long-term relationship between variables. Table 6 displays the results of applying ARDL procedures.

Table 7
Long Run Results of Government Spending, Government Debt and Economic Growth

Dependent Variable: GDPg				
Regressors	**Coefficient**	**S.E**	**t-Statistic**	**P-value**
DE	-0.141793	0.082256	-1.723803	0.0966
NDE	-0.704509	0.338351	-2.082185	0.0473
PD	0.103770	0.050132	2.069926	0.0485
INT	-0.451102	0.210929	-2.138644	0.0420
INF	0.289095	0.164775	1.754487	0.0911
C	11.03334	3.613486	3.053378	0.0052

Source: Calculations by E-views

Table 6 shows the long-term relationship between the independent variables DE, NDE, PD, INT, and INF and the dependent variable GDPg. Table 6 demonstrates that the development expenditure (DE) coefficient is negative and statistically significant, as shown by its probability value 0.0966. According to the coefficient of determination (DE), every 1% increase in ED would cause the GDP to decrease by 0.141793 units. Theoretically, we support the conventional perspective on government spending. According to this perspective, public spending stifles private investment. Increased government spending,

whether paid for by debt or taxes, raises interest rates, making capital more expensive, and decreases private investment, hindering the nation's ability to thrive economically. This study's findings are consistent (Devarajan, Swaroop, & Zou, 1996).

There is a negative correlation between NDE and GDP, as indicated by the negative coefficient of non-development expenditure. Government spending on debt servicing, debt repayment, defense, subsidies, civil administration, and pensions are all considered non-development expenditures. People generally believe that non-development expenditures (NDE) negatively affect economic growth. These findings corroborate the conventional wisdom regarding public spending—these outcomes resemble those reported by Pieroni (2009).

Table 9 demonstrates that the public debt (PD) coefficient is positive and statistically significant, as shown by its probability value 0.0485. According to the PD coefficient, a 1% increase in PD will result in a 0.103770 unit increase in GDP. It is clear that although public debt stocks hurt performance, they benefit economic growth. The nation's capital markets compete for funds due to government borrowing, discouraging private investment. A large amount of government debt and a higher credit risk premium lead to higher long-term interest rates. The government raises distortionary taxes and debt repayments to pay for future obligations. Increased inflation is another way that large and growing public debt impedes economic progress. Mencinger, Aristovnik, and Verbic (2014) Moreover, Elmendorf and Mankiw (1999) conducted research that supports these findings.

The probability value of 0.0420 supports the statistical significance of the negative coefficient of interest rate (INT). According to the INT coefficient, a 1% increase in INT will result in a 0.451102 unit increase in GDP. Theoretically, Keynesian theory's interest rate channels verify the inverse connection between interest rates and economic growth. An increase in interest rates raises the cost of capital, discouraging private investment and detrimental economic expansion (Cœuré, 2017; Shafiq, Bhatti, Bashir, & Nawaz, 2022).

With a value of 0.289095, INF has a positive coefficient. Its probability value of 0.0911 indicates that it is statistically significant. According to the inflation rate coefficient, an increase of 1% in INF would increase to 0.289095 units in economic growth. Theoretically, people's wealth decreases when inflation increases, according to Mendel's model. This is because the rate of return on each natural money balance decreases. To achieve their desired wealth, individuals increase their savings. As a result of rising asset values, people will save more money by converting their holdings. Simply put, it is believed that increased savings equates to increased capital accumulation, accelerating a nation's economic progress. The outcomes line up with Kryeziu and Durguti (2019) findings.

4.6. Error Correction Model (ECM) Results

In economics, James Davidson, David F. and others introduced the time series regression model, the error correction model. It assesses how one time series influences another across long and short periods. Furthermore, it offers an estimate of the pace of adjustment, which refers to the time required for the variables under consideration to reach their long-term equilibrium point. Study used an ECM or counter to investigate the coefficient's short-term results. Table 7 summarizes the ECM model's findings.

Table 8
Short Run Results of Government Spending, Government Debt and Economic Growth

Dependent Variable: GDPg				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
sD(DE)	-0.053680	0.028175	-1.905202	0.0679
D(DE(-1))	0.072623	0.025377	2.861741	0.0082
D(NDE)	0.043281	0.062395	0.693665	0.4940
D(NDE(-1))	0.150464	0.082240	1.829570	0.0788
D(INF)	-0.017681	0.043261	-0.408709	0.6861
D(INF(-1))	-0.178897	0.044894	-3.984836	0.0005
CointEq(-1)*	-0.633626	0.113100	-5.602356	0.0000

Source: calculations by E-views

With a negative sign (-0.633626), the error correction term (ECT) is noteworthy and indicates a long-term relationship between the chosen variables. The coefficient of the ECM term indicates that a brief shock will rectify it over more than half a year.

4.7. Diagnostics and Stability Tests

Diagnostic tests were undertaken to check the health conditions of the series. The serial correlation (Breusch-Godfrey LM test) and Heteroscedasticity. Results indicate that the model used for the analysis is free from serial correlation and exhibits homoscedasticity, demonstrating stability and satisfying the diagnostic tests. The long-run coefficient's stability is assessed through the examination of short-run dynamics. The CUSUM and CUSUMSQ tests are used to evaluate the stability of parameters, as described by Pesaran, Shin, and Smith (1997).

Table 9
Diagnostics Tests Results

Test	**X^2 (p value)**	**Results**
Breusch-Pagan-Godfrey	0.3187	No heteroscedasticity issue
Ramsey RESET Test	0.1056	Model is specified correctly
Jarque-Bera Test	0.4772	Estimated residuals are normal
CUSUM	Stable	
CUSUMSQ	Stable	

Source: Calculations by E-views

5. Conclusions and Policy Recommendations

This study examined the macroeconomic effects of government expenditure and public debt on Pakistan's economic expansion. The time series data used in the study covered the years 1980– 2020. The study focused on a single model. The ARDL technique's results demonstrate that public debt and inflation have a significant and favourable influence on economic growth. It also examined how INT, DE, and NDE were among the other elements negatively impacting economic growth. Many factors, including therapy, methodological techniques, country-specific characteristics (political, institutional, and developmental), variable selection, and others, can lead to confusing results. Consequently, nation-specific initiatives that prioritize each of these areas can resolve all of these issues. Findings of the study revealed that public debt and interest rates had a substantial negative link with economic growth. However, expenditure on both development and non-development and inflation had a significant positive correlation with GDP growth. The findings show that all of the identified variables substantially influence government spending. Pakistan's economic development is driven mainly by governmental spending, interest rates and debt.

In light of the current study's goals, the following suggestions aim to enhance Pakistan's economic growth:

This study suggests the adoption of a broad use of fiscal spending. The government's funds for development and non-development sectors can boost the economy and enhance performance overall. According to the report, Pakistan's economic performance is favorably impacted by debt buildup. The research suggests treating these debt positions with caution. Clear rules on the intent, length, conditions, obligations, and procedures for foreign debt should be established by the Federal Reserve. The Federal Reserve needs to develop plans for repaying foreign debt quickly. These loans are only applied to projects with excellent creditworthiness. On the other hand, our economy would continue to face serious financial difficulties if we do nothing.

Monetary authorities must effectively regulate and oversee interest rates, a key component of monetary policy, to support economic growth. The government should actively encourage inflation to ensure economic growth and prosperity. Pakistan's economy needs to perform up to standard, and our nation needs assistance in realizing the potential of its resources and labor force. Given the current conditions, there is a theoretical basis for supporting inflation to increase production. Better financial resources lead to more spending, which raises demand overall and compels producers to raise output to keep up with demand.

Authors' Contribution

Sadia Mustafa: Initiated the core idea of performed data analysis and drafting and write-up of the manuscript.
Suraya Ismail: Provided guidance for data analysis, reviewed, supervised.
Muhammad Zeeshan Mustafa Shah: Provided guidelines for empirical analysis.

Conflict of Interests/Disclosures

The authors declared no potential conflict of interest w.r.t the research, authorship and/or publication of this article.

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