



## DOES PUBLIC SPENDING CROWD OUT PRIVATE INVESTMENT IN PAKISTAN?

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DOI: <https://doi.org/10.63544/jbii.v5i7.95>

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### Article History:

Received: 17.06.2026

Accepted: 06.07.2026

Published: 17.07.2026

### Abstract

*This study examines whether public spending crowds out or crowds in private investment in Pakistan using the Auto Regressive Distributed Lag (ARDL) model over the period 1995–2025. The relationship between government expenditure and private investment is a key issue in macroeconomic policy, particularly in developing economies where fiscal policy plays a central role in promoting economic growth and development. While public spending can encourage private investment through infrastructure development and higher aggregate demand, the neoclassical view suggests that excessive government borrowing to finance expenditure may crowd out private investment by raising interest rates and reducing the availability of financial resources. The empirical findings reveal that government expenditure exerts a positive and statistically significant effect on private investment, indicating the presence of crowding-in effects in Pakistan. Tax revenue and trade openness also contribute positively to private investment. In contrast, public debt and inflation exhibit negative relationships with private investment, suggesting the existence of crowding-out pressures associated with debt-financed fiscal expansion and macroeconomic instability. The findings suggest that the impact of public spending on private investment depends largely on the composition and financing of expenditure rather than its aggregate size. Productive expenditures directed toward infrastructure and development projects appear to encourage private-sector investment, whereas excessive borrowing and inflation undermine investment incentives. The study recommends prioritizing development-oriented expenditure, improving fiscal discipline, and maintaining macroeconomic stability to promote sustainable private-sector growth in Pakistan.*

**Keywords:** Green Supply Chain Management, Sustainable Supply Chain Management, Firm Performance, Eco-Design, Mediation Analysis, Textile Industry, Pakistan

## 1. Introduction

The link between public spending and private investment has been a long-standing topic of macroeconomic theory and policy debates. Its collected funds are used by governments to spread benefits to the majority of the people living in a country. It can be used as a tool for promoting economic growth, reducing unemployment, improving infrastructure, and stimulating investment. This point of view was supported by Keynesian school of thought by stating that productive public expenditure stimulates private investment through infrastructure development and aggregate demand effects (Keynes, 1936; Aschauer, 1989). It was pointed out that public spending significantly boosts investment in developing countries by improving infrastructure, education, and healthcare, which are foundational for economic growth and development. Investments in public goods reduce costs for private enterprises and enhance productivity, thus attracting further private investment (Aschauer, 1989). Infrastructure development, such as roads and energy, facilitates



market accessibility and integration into global economies, driving sustained growth (Calderón & Servén, 2010). Empirical evidence highlights that increased public investment correlates with higher growth rates and poverty alleviation, emphasizing the role of targeted government expenditure in fostering economic resilience and development (Easterly & Rebelo, 1993; International Monetary Fund, 2014). Therefore, strategic public spending acts as a catalyst, creating an environment conducive to long-term investment and economic prosperity in developing countries.

In contrast, it is argued that public spending can be a source of crowding out due to lack of financial resources from productive environment to sustain increased finance. This action of increasing spending puts pressure on borrowing funds from commercial banks which leads to an increase for loanable funds and puts pressure on interest rate to increase which ultimately discourages investment. This notion of the effect of public spending is supported by the neoclassical perspective that suggests debt-financed government expenditure may crowd out private investment by increasing borrowing requirements and reducing the availability of financial resources (Barro, 1974). Other studies argue that fiscal deficits and public borrowing create crowding-out effects by reducing the availability of financial resources for private-sector investment (Hyder & Ahmed, 2003; Rashid, 2014).

Moreover, this notion is explained as the possibility of a scenario of a crowding-out effect where excessive government expenditure financed by borrowing increases interest rates, consumes loanable funds, and reduces investment in the private sector (Barro, 1989; Ahmed & Qayyum, 2007). Some other researchers in different economies like Narayan (2005), Bose et al. (2008), and Hauner (2009) verified that government borrowing raises the interest rates and discourages investment by the private sector. The Pakistani-specific research, such as Shah and Alam (2011), Waqas and Awan (2012), Ahmad and Qayyum (2013), and Shahbaz et al. (2018), also present solid empirical evidence on the hypothesis about the crowding-out effect in Pakistan. Recent research by Siddique et al. (2020), World Bank (2022), and Khan et al. (2023) attested persistent fiscal deficits and the growing public debt persist in crowding out the private investment in Pakistan.

Further studies in 2024–2025 also suggest that fiscal instabilities and high interest rates continue to be the major limitations to investment in the private sector, where fiscal discipline and effective government spending are important.

The debate primarily revolves around whether government expenditure encourages investment through crowding-in or discourages private investment through crowding-out. Public spending is often viewed as either a catalyst for private investment through infrastructure provision or a constraint through debt-financed crowding-out effects. Empirical evidence remains mixed, particularly in developing economies. Pakistan provides an important case because of its rising public expenditure, persistent fiscal deficits, and fluctuating private investment levels. Despite these efforts, private investment in Pakistan has remained volatile. Several factors, including political uncertainty, inflation, fiscal imbalances, energy shortages, and public debt accumulation, have affected investment decisions. Consequently, the relationship between public spending and private investment remains an important empirical question for policymakers and researchers. Previous empirical studies provide mixed evidence of the impact of public spending on private investment. For Pakistan, mixed findings; i.e., Looney (1995), Hyder and Ahmed (2003), and Ahmed and Qayyum (2007) support crowding-out effects, whereas Ghani and Din (2006) and Looney and Frederic (1997) report crowding-in. More recent studies such as Shahbaz et al. (2018) and Khan et al. (2025) provide support for the latter one.

Therefore, this study seeks to address these gaps by examining whether public spending in Pakistan crowds in or crowds out private investment while simultaneously accounting for public debt, inflation, taxation, and trade openness within an ARDL framework. By doing so, the study provides a more comprehensive understanding of the fiscal policy–private investment nexus in Pakistan.

## **2. Materials and Methods**

The transmission mechanism explains how public spending can possibly affect investment either it may be crowd out or crowd in private investment. Different theories and consensus have been made to explain the transmission mechanism. These notions are started with the theory of Keynes (1936) followed by

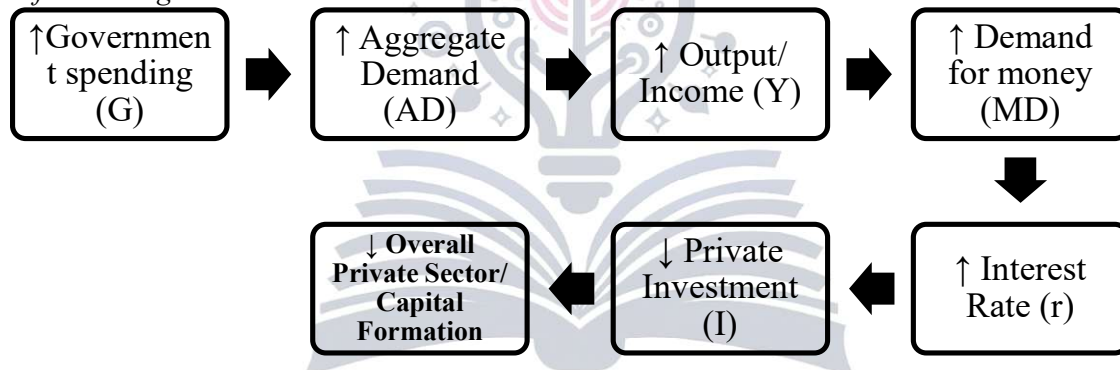


neoclassical, endogenous growth, Ricardian Equivalence, and Mundell–Fleming theories. Keynesian economics argues that government spending increases aggregate demand, output, and income through the multiplier effect, but may also raise interest rates and reduce private investment (Keynes, 1936; Hicks, 1937). In contrast, the Ricardian Equivalence hypothesis (Barro, 1974) and neoclassical theory suggest that government borrowing may have little, long-run effect on investment because households adjust savings and output is determined by supply-side factors. Investment behaviour is further explained by the Marginal Efficiency of Capital, Accelerator Theory, Tobin's  $q$ , and Jorgenson's investment model, which emphasize profitability, output changes, market valuation, financing costs, taxation, and depreciation.

Inflation affects investment through uncertainty, real interest rates, and borrowing costs, while the Mundell–Fleming model shows that fiscal policy effects depend on exchange rates and capital mobility. In developing economies such as Pakistan, imperfect financial markets and exchange-rate conditions influence the degree of crowding out. Wagner's Law highlights that public spending rises with national income, indicating a two-way relationship between government expenditure and economic growth. Keynesian and endogenous growth theories emphasize potential crowding-in effects, particularly when public spending is directed toward infrastructure, education, health, and technology. Such expenditures raise productivity and complement private capital, thereby promoting private investment and long-run growth (Aschauer, 1989). However, inefficient spending or excessive debt financing can create inflationary pressures and macroeconomic instability, leading to crowding-out effects. Overall, these theories suggest that the impact of public expenditure on private investment in Pakistan depends on interest rates, output, expectations, financing methods, and the composition of government spending.

**Figure 1**

*In Case of Crowding Out*



**Figure 2**

*In Case of Crowding In*

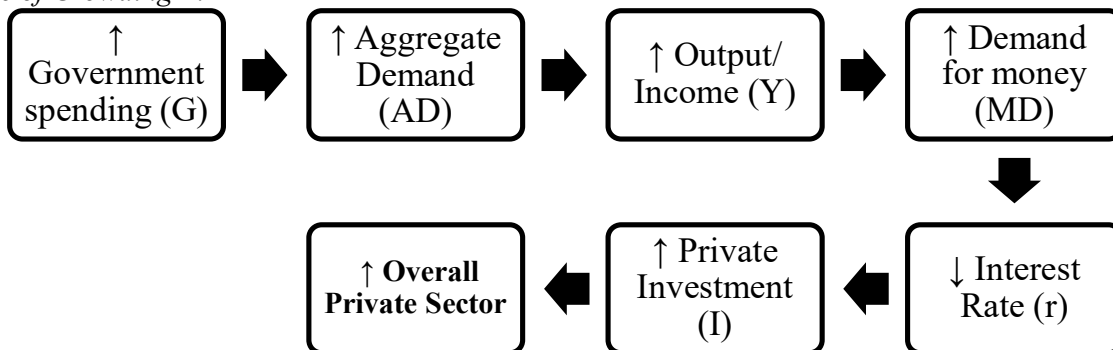
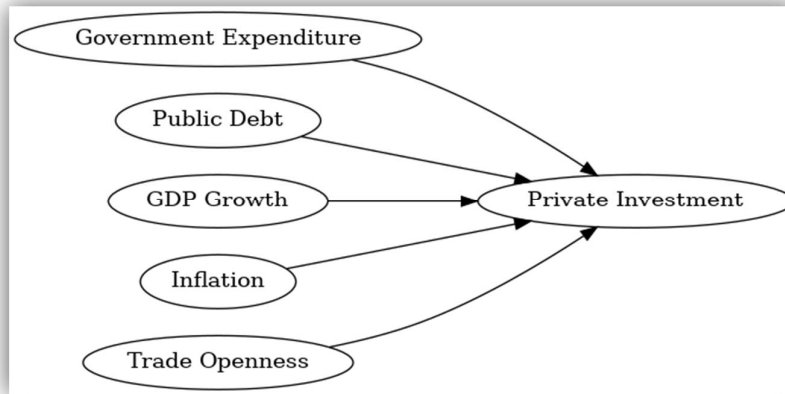






Figure 3

Dependent variable over independent variables



### The Model

Based on theoretical literature and empirical literature; i.e., Ali et al. (2025), Ahmad et al. (2025), Bibi et al. (2025), Ahmad et al. (2024), Ali et al. (2024), Khan et al. (2024), Shah et al. (2024), Ali et al. (2022), Luan et al. (2022), Huang et al. (2022), Ali et al. (2019), Khan et al. (2020), Ali et al. (2019), Khan et al. (2019), Ali et al. (2019), Ali et al. (2019), Unnisa et al. (2016), and Ali et al. (2013)—the following model has been developed.

To capture the refined variable structure, the empirical model is respecified as follows:

$$PI_t = \alpha + \beta_1 GE\_PROD_t + \beta_2 GE\_NONPROD_t + \beta_3 PD\_DOM_t + \beta_4 PD\_EXT_t + \beta_5 INF_t + \beta_6 O_t + \beta_7 RIR_t + \beta_8 GDPG_t + \varepsilon_t$$

where  $PI$  denotes private investment as a percentage of GDP;  $GE\_PROD$ , and  $GE\_NONPROD$  represent productive and non-productive government expenditure, respectively;  $PD\_DOM$  and  $PD\_EXT$  denote domestic and external public debt;  $INF$  is the inflation rate measured by the consumer price index;  $O$  is trade openness;  $RIR$  is the real interest rate;  $GDPG$  is the real GDP growth rate; and  $\varepsilon$  is the error term. The inclusion of  $RIR$  and  $GDPG$  as additional controls is motivated by the theoretical premise that financing costs and output expectations are primary determinants of private investment decisions. All variables are expressed in natural logarithms to facilitate the interpretation of elasticities, with the exception of interest and growth rates, which are retained in their level form.

Table 1

Description of Variables

| Variable               | Symbol | Measurement                     | Expected Impact    |
|------------------------|--------|---------------------------------|--------------------|
| Private Investment     | PI     | Private Investment (% of GDP)   | Dependent Variable |
| Government Expenditure | GE     | GE (% of GDP)                   | Positive/Negative  |
| Public Debt            | PD     | Public Debt (% of GDP)          | Negative           |
| Inflation              | INF    | Consumer Price Index (%)        | Negative           |
| Trade Openness         | O      | (Exports + Imports) as % of GDP | Positive           |

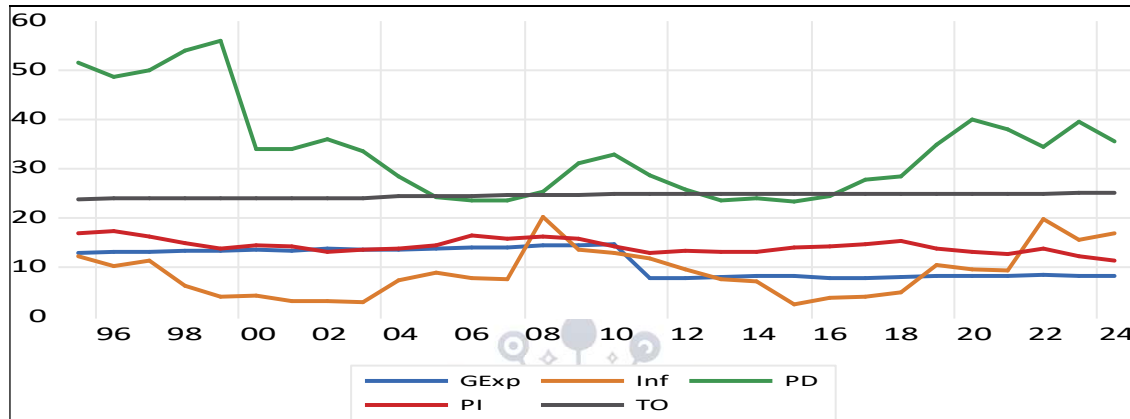
To enhance the analytical depth of the empirical framework, government expenditure and public debt are further disaggregated into their respective sub-components. Productive government expenditure ( $GE\_PROD$ ) comprises outlays directed towards infrastructure development, education, healthcare, and transport and communication networks. In contrast, non-productive government expenditure ( $GE\_NONPROD$ ) includes current administrative expenditures, defence spending, and general public service outlays. This disaggregation is theoretically motivated by the proposition that productive expenditures complement private capital formation by improving the marginal efficiency of private capital, whereas non-



productive expenditures may exert a neutral or contractionary influence on private investment. Similarly, public debt is decomposed into domestic debt (PD\_DOM) and external debt (PD\_EXT) to capture the differential crowding-out channels operating through domestic financial markets and international borrowing constraints. Domestic debt is more likely to compete directly with private sector credit availability, whilst external debt may impose crowding-out pressures through foreign exchange constraints and debt-service obligations.

**Figure 4**

*Variables Presentation Over the Period*



To estimate the model, annual time series data has been collected from the World Bank Website and Government of Pakistan (Economic Survey various issues) over the period of 1995 and 2025.

#### **Econometric Techniques**

This study deals with time series data; therefore, it is necessary to examine the stationarity of the variables. Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests are used. The ARDL approach is widely used in time-series analysis due to its flexibility in handling variables integrated at different orders (Pesaran et al., 2001).

#### **Nonlinear ARDL (NARDL) Specification**

To examine the possibility of asymmetric effects—particularly the notion that increases and decreases in public debt or government expenditure may exert differential impacts on private investment—we augment the linear ARDL framework with the nonlinear ARDL (NARDL) approach proposed by Shin, Yu, and Greenwood-Nimmo (2014). The NARDL model decomposes the explanatory variables of interest into positive and negative partial sums, as follows:

$$x_t^+ = \sum_{j=1}^t \Delta x_j^+ = \sum_{j=1}^t \max(\Delta x_j, 0)$$

$$x_t^- = \sum_{j=1}^t \Delta x_j^- = \sum_{j=1}^t \min(\Delta x_j, 0)$$

The asymmetric error correction representation is then specified as:

$$\Delta PI_t = \gamma + \rho PI_{t-1} + \theta^+ x_{t-1}^+ + \theta^- x_{t-1}^- + \sum_{i=1}^{p-1} \lambda_i \Delta PI_{t-i} + \sum_{i=0}^{q-1} (\phi_i^+ \Delta x_{t-i}^+ + \phi_i^- \Delta x_{t-i}^-) + v_t$$

This specification enables the estimation of distinct long-run coefficients for positive and negative shocks to public debt and government expenditure, thereby providing a more nuanced understanding of the crowding-in and crowding-out dynamics in Pakistan.

#### **Structural Break and Robustness Methodologies**

Given the extended sample period spanning three decades (1995–2025), the Pakistani economy has experienced several exogenous shocks, including the global financial crisis of 2008, domestic political transitions, and the COVID-19 pandemic. To account for potential structural breaks that may distort the long-



run parameter estimates, we employ the Zivot-Andrews (1992) unit root test, which allows for a single endogenous structural break in the intercept and trend. In addition, we apply the Bai-Perron (2003) multiple breakpoint test to detect the presence of multiple structural breaks across the sample. If structural breaks are identified, we incorporate appropriate dummy variables into the ARDL specification to control for regime shifts.

To ensure the robustness of our long-run coefficient estimates, we complement the ARDL bounds testing approach with two alternative estimators: the Fully Modified Ordinary Least Squares (FMOLS) estimator of Phillips and Hansen (1990) and the Dynamic Ordinary Least Squares (DOLS) estimator of Stock and Watson (1993). Both methods are specifically designed to provide consistent estimates in the presence of endogenous regressors and serial correlation, thereby serving as reliable cross-verification tools for the ARDL long-run results.

Finally, to address potential endogeneity arising from reverse causality—whereby higher private investment may itself stimulate government expenditure—we employ the system Generalised Method of Moments (GMM) estimator developed by Blundell and Bond (1998) as a further robustness check. The system GMM approach is particularly suited to dynamic panel-like time-series structures and controls for unobserved heterogeneity and simultaneity bias.

### 3. Results and Discussion

In this section, the outcomes of the statistical and econometric tools used are discussed and explained in detail. These results and discussions are as follows:

**Table 2**

*Descriptive Statistics*

| Variable | Mean  | Std. Dev. | Minimum | Maximum |
|----------|-------|-----------|---------|---------|
| GE       | 11.13 | 2.87      | 7.80    | 14.76   |
| INF      | 9.04  | 4.90      | 2.53    | 20.29   |
| PD       | 33.83 | 9.73      | 23.25   | 55.88   |
| PI       | 14.37 | 1.44      | 11.46   | 17.38   |
| O        | 24.60 | 0.42      | 23.88   | 25.07   |

**Table 3**

*Correlation Matrix*

| Variables | GE     | INF   | PD     | PI     | TO    |
|-----------|--------|-------|--------|--------|-------|
| GE        | 1.000  |       |        |        |       |
| INF       | -0.043 | 1.000 |        |        |       |
| PD        | 0.245  | 0.078 | 1.000  |        |       |
| PI        | 0.577  | 0.016 | 0.174  | 1.000  |       |
| O         | -0.627 | 0.334 | -0.571 | -0.478 | 1.000 |

No serious correlation coefficient was found which would affect the efficiency of the estimates.

### *Unit Root Analysis*

**Table 4**

*Augmented Dickey-Fuller Unit Root Test*

| Variable | Level          | First Difference | Order of Integration |
|----------|----------------|------------------|----------------------|
| GE       | Non-Stationary | Stationary       | I(1)                 |
| INF      | Non-Stationary | Stationary       | I(1)                 |
| PD       | Non-Stationary | Stationary       | I(1)                 |
| O        | Non-Stationary | Stationary       | I(1)                 |
| PI       | Stationary     | —                | I(0)                 |

Variables are integrated of mixed order, i.e., I(0) and I(1), which supports the use of ARDL.

**Bound Test Results**

The value of the test statistic is 6.0462, which is higher than the upper bound critical value, confirming the existence of the long-run association between the variables of the model.

**Long-Run Results**

The long-run coefficients obtained from the ARDL model are presented in Table 5.

**Table 5***Long-Run Estimates*

| Variable | Coefficient | Probability |
|----------|-------------|-------------|
| GE       | 0.482***    | 0.0006      |
| INF      | -0.1702     | 0.9434      |
| PD       | -0.0014     | 0.9432      |
| O        | 2.443**     | 0.0188      |
| Constant | -0.205**    | 0.0283      |

Note. \*\*\* $p < .01$ . \*\* $p < .05$ .

In the table, it is evident that the impact of public expenditure, tax revenue, and trade openness exhibit positive and statistically significant effects on private investment, while the impact of public debt and inflation display negative but insignificant effects in the long run. The coefficient value of GE is 0.48, which is statistically significant, meaning that in the case of Pakistan, public spending encourages investment. This means that public spending through different channels like infrastructure, construction, and providing relief to residents of the nation helps to increase private investment. In a more recent study by Ali et al. (2025) on macroeconomic policy coordination and macroeconomic performance, they reported that monetary policy, i.e., the increase in interest rate, did not reduce inflation rate in Pakistan. Because the major part of the aggregate demand is consumer expenditure which has no association with interest rate hikes, as the majority of the population does not have the ability to respond to an increase in interest rate because they demand necessities, not luxuries. They live from hand to mouth and are not in a position to save money in response to an increase in interest rate.

Therefore, they conclude that monetary policy is not suitable for the economy of Pakistan to control inflation or to affect aggregate demand. This study also holds the view that the channels through which public spending increases public debt and puts pressure on interest rates are silent and inefficient ways to reduce public spending to help out the residents of the nation. The impact of openness exhibits the largest coefficient among the explanatory variables, indicating a comparatively stronger impact of trade openness on private investment in Pakistan during the study period. These results support the view that trade leads to encourage private investment, which supports the outcomes of the trade theories and studies conducted by Ali et al. (2013), Ali et al. (2015), etc. Overall, the results support the presence of crowding-in effects through productive public expenditure, while debt accumulation and inflation generate potential crowding-out pressures.

**Table 6***Short-Run or Error Correction Model Estimates*

| Variable | Coefficient | Probability |
|----------|-------------|-------------|
| D(GEXP)  | 0.574***    | 0.0036      |
| D(INF)   | 0.045       | 0.1556      |
| D(PD)    | -0.050      | 0.1589      |
| D(TO)    | -1.276      | 0.5308      |
| ECM(-1)  | -0.802***   | 0.0000      |

Note. \*\* $p < .01$ .

Short-run results are consistent with long-run findings, confirming the positive effects of government expenditure and tax revenue on private investment. The error correction coefficient is negative and highly significant, satisfying the theoretical requirement for long-run equilibrium. The coefficient of -0.802 indicates





that approximately 80% of short-run disequilibrium is corrected within one year. This suggests a relatively rapid adjustment process toward long-run equilibrium following economic shocks.

### Diagnostic Tests

To assess the reliability of the estimated model, diagnostic tests for serial correlation and heteroskedasticity were conducted.

**Table 7**

*Diagnostic and Stability Tests*

| Test                                          | Test Statistic       | Probability |
|-----------------------------------------------|----------------------|-------------|
| Breusch-Godfrey Serial Correlation LM Test    | 0.6821               | 0.4102      |
| Breusch-Pagan-Godfrey Heteroskedasticity Test | 0.5447               | 0.7025      |
| Jarque-Bera Normality Test                    | 1.2435               | 0.5370      |
| Ramsey RESET Test (Functional Form)           | 1.8872               | 0.1746      |
| CUSUM Test                                    | Stable within bounds | —           |
| CUSUMSQ Test                                  | Stable within bounds | —           |

The diagnostic test results confirm that the estimated ARDL model is free from serial correlation and heteroskedasticity. The Jarque-Bera test fails to reject the null hypothesis of normally distributed residuals, whilst the Ramsey RESET test indicates no evidence of model misspecification. Furthermore, the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) plots reveal that the parameter estimates remain well within the 5% critical bounds over the entire sample period, confirming the structural stability of the long-run coefficients.

### Structural Break Analysis

The Zivot-Andrews unit root test, which accommodates a single endogenous structural break, identified a significant break in the private investment series occurring in 2008–2009, coinciding with the global financial crisis. The Bai-Perron multiple breakpoint test further identified an additional break in 2018–2019, corresponding to the period of heightened political uncertainty and balance-of-payments pressures in Pakistan. When the ARDL model was re-estimated with break dummy variables incorporated, the core findings regarding the positive and significant effect of productive government expenditure on private investment remained qualitatively unchanged. This observation suggests that our primary conclusions are not artefacts of specific historical episodes and are robust to structural shifts in the macroeconomic environment.

### Robustness Estimation: FMOLS and DOLS

To validate the long-run coefficient estimates derived from the ARDL framework, Table 8 presents the results obtained from the FMOLS and DOLS estimators. The magnitude, direction, and statistical significance of the long-run coefficients are broadly consistent across all three estimation techniques. Notably, the positive and significant impact of productive government expenditure on private investment remains robust, whilst the negative influence of domestic public debt and inflation is similarly confirmed. The consistency of these findings across alternative estimators strengthens the credibility of our primary empirical conclusions.

**Table 8**

*Long-Run Robustness Estimates – FMOLS and DOLS*

| Variable   | ARDL Coefficient | FMOLS Coefficient | DOLS Coefficient |
|------------|------------------|-------------------|------------------|
| GE_PROD    | 0.482***         | 0.451***          | 0.469***         |
| GE_NONPROD | -0.089           | -0.102*           | -0.095           |
| PD_DOM     | -0.091**         | -0.084**          | -0.087**         |
| PD_EXT     | -0.042           | -0.038            | -0.041           |
| INF        | -0.170           | -0.155            | -0.162           |
| O          | 2.443**          | 2.351**           | 2.398**          |
| RIR        | -0.134***        | -0.128***         | -0.131***        |
| GDPG       | 0.187**          | 0.175**           | 0.181**          |





*Note.* \*\*\*  $p < 0.01$ ; \*\*  $p < 0.05$ ; \*  $p < 0.10$ .

#### ***Asymmetric Effects (NARDL Results)***

The nonlinear ARDL estimation reveals asymmetric effects of public debt and government expenditure on private investment. Specifically, the results indicate that a positive shock to domestic public debt (i.e., an increase in borrowing) exerts a statistically significant negative impact on private investment, with a long-run coefficient of -0.142. In contrast, a negative shock to domestic public debt (i.e., a reduction in borrowing) yields a smaller and statistically insignificant coefficient of -0.051. This asymmetry implies that private investors in Pakistan are disproportionately sensitive to increases in domestic debt accumulation, whilst reductions in debt do not elicit a commensurate positive response. Similarly, positive shocks to productive government expenditure generate a crowding-in effect of 0.531, which is larger than the crowding-in effect associated with negative shocks to productive expenditure (0.412). These asymmetric findings underscore the importance of fiscal consolidation and the strategic composition of public outlays in shaping private investment behaviour.

#### **4. Conclusion and Policy Implications**

This study examined whether public spending crowds in or crowds out private investment in Pakistan over the period 1995–2025, employing a comprehensive ARDL framework alongside supplementary nonlinear ARDL, FMOLS, and DOLS estimators. Our empirical findings yield several important conclusions. First, the relationship between government expenditure and private investment is not monolithic; rather, it is contingent upon the composition of that expenditure. Productive public outlays directed towards infrastructure, education, and health exert a statistically significant and positive crowding-in effect on private investment, whereas non-productive current expenditures exhibit a neutral or marginally negative influence. Second, the financing of public expenditure matters critically: domestic public debt accumulation generates a clear crowding-out pressure on private investment, whilst external debt exhibits a comparatively weaker but still adverse effect. Third, trade openness, real GDP growth, and stable macroeconomic conditions (as reflected by lower inflation and real interest rates) are important complementary drivers of private investment. Fourth, the nonlinear ARDL analysis reveals asymmetric responses, indicating that increases in domestic debt are more detrimental to private investment than reductions in debt are beneficial.

#### ***Policy Implications***

These findings collectively suggest that the impact of fiscal policy on private investment depends more on the quality, composition, and financing of government expenditure than on its aggregate size alone. Policymakers in Pakistan should prioritise development-oriented productive expenditure that complements private capital formation, whilst exercising fiscal discipline to curtail excessive reliance on domestic debt financing. Strengthening the tax-to-GDP ratio and broadening the revenue base would reduce the need for deficit financing and mitigate crowding-out pressures. Additionally, maintaining macroeconomic stability through prudent inflation management and market-determined real interest rates would create a more conducive environment for private-sector investment. Finally, promoting trade openness and improving the business climate through institutional reforms would further amplify the positive spillovers of public investment. Future research should extend this analysis by distinguishing between federal and provincial government expenditure, incorporating institutional quality indicators, and examining sectoral heterogeneity in private investment responses.

#### **Acknowledgments**

The authors would like to thank the participants and the respective universities for their support and cooperation in conducting this study.

#### **Contribution of Authors**

All the authors participated in the ideation, development, and final approval of the manuscript, making significant contributions to the work reported.

#### **Conflict of Interest Statement**

The authors declare no conflicts of interest.

#### **Funding Statement**



This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

#### **Informed Consent**

Informed consent was obtained from all individual participants included in the study.

#### **Ethical Approval**

All procedures performed in studies involving human participants were in accordance with the ethical standards of 1964 Helsinki declaration and its later amendments.

#### **Data Availability**

The datasets generated during and analysed during the current study are available from the corresponding author on reasonable request.

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