

## **Long- and short-run relationship between government spending and economic growth of Pakistan**

**Khurram Shehzad<sup>1</sup> and Hafiz Adnan Munir<sup>2</sup>**

<sup>1</sup>*Lahore Business School, The University of Lahore, Lahore, Pakistan*

<sup>2</sup>*University of Management and Technology, Lahore, Pakistan*

[khurram.shahzad@lbs.uol.edu.pk](mailto:khurram.shahzad@lbs.uol.edu.pk)\*

[seth\\_adnan444@yahoo.com](mailto:seth_adnan444@yahoo.com)

*\*Corresponding Author*

### **ABSTRACT**

The tenacity to do this work is to discover the long term and short-run relationship between government spending (defence spending and development expenditure) and economic growth. To this end, we use the Auto-Regressive Distributed Lag (ARDL) model on sample time-series over 1980-2015. The findings show that positive and significant relation prevails concerning long-term and short-term relationship between the Pakistan government's defence spending and economic growth. Further, outcomes illuminate that there is also a positive and significant relationship that prevails between the development spending by the government and the economic growth in both the long term and the short run.

**Keywords:** Defence spending, ARDL, economic growth, development spending.

### **INTRODUCTION**

Numerous governments worldwide stimulate the economy by augmenting the government spending in the country. On the contrary, various experts criticized government spending- economic growth nexus (Larch & Lechthaler, 2013). The core objective of a government is to increase the economic growth of the country. To this end, governments must spend wisely on different projects. The government spends majorly in two different areas, which are development and current. The development consists of expenditures, infrastructure, health, and education, for instance. On the other hand, the current expenditures government spend on defence, law and order, subsidies. Development expenditures directly affect any country's economic growth; however, the current expenditures indirectly impact any country's economy. Current expenditures play a supportive role in economic development. Several studies conducted over recent history illuminate the positive relationship between defence spending and economic growth (Dunne & Nikolaidou, 2012). One of the rudimentary requirements of any state is that it should be protected from external threats in terrorism or

military action from any other country. For a country's betterment and prosperity, there must be peace in the country, which is achieved by spending on its defence. Spending on defence enhances the military's power and ability to protect the country from external and internal threats.

More spending on defence military can acquire the new technologies and equipment for protecting the country, which ultimately leads to peace and development in the economy. If we spotlight Adam Smith, who has an integral position regarding the flourish of the economy today, who gave the concept, there must be a free economy. Through the free market, economic development can be ensured. On the part of the government, it should fill the condition of a free economy by giving support in the country's form of defence (Korkmaz (2015). Development expenditures are more productive expenditures than other expenditures and enhance long term economic growth (Bose, Haque, & Osborn, 2007). The essential part of any country growth is that government invests in development projects like infrastructure, health and education. Development expenditures are done in health and education to increase the people of the country's ability and skills, which ultimately enhance the economy's development. Government expenditure on infrastructure facilitates the exporters to take their products to the international market at a competitive price. The government needs to encourage development expenditure because these expenditures are directly related to the economy's growth.

This study aims to discover the relationship as long term and short term between economic growth and the government's spending in Pakistan. Pakistan government spends a significant portion concerning its GDP on defence because of the continuous threat from the Indian side and terrorist attacks from other countries' sides. Pakistan government needs more development projects like CPEC. This study's fundamental question is to explore the Pakistan government spending on defence and development expenditure has prospered economy development. The research findings guide the policymakers on how defence spending and development spending in Pakistan cause the economy's growth. Furthermore, this study provides various answers to the questions: is defence spending create peace in the country, leading to economic development? Are development expenditures enhance the growth of the economy of Pakistan or not? In this study, we will identify through econometric analysis.

## **LITERATURE REVIEW**

Various studies have been conducted to examine the role of government spending concerning economic growth in the country. Balaev (2019) has examined the impact of productive and non-productive spending on Russia's economic growth from 2003 to 2017. Their study's outcomes illuminate that

productive spending increases its economic growth while non-productive spending by the country's declining economic growth. Phiri (2019) has revealed the nonlinear relationship between the growth of the economy and military spending. The study's findings suggested that the government should spend more on the other productive areas except for the military for more growth of the economy.

Amusa and Oyinlola (2019) stated that Botswana's government's overall expenditure negatively affects economic growth in the short-run; however, the overall expenditure positively influences economic growth. On the other hand, the outcomes depict that development expenditure positively influence economic growth in the short run. Babatunde (2018) stated through the outcomes of the analysis that government spending on transportation, education, communication, and health significantly enhances Nigeria's economic growth while spending on agriculture decreases economic growth. Dudzevičiūtė, Šimelytė, and Liučvaitienė (2018) have discovered the significant relationship between government spending concerning economic growth. Further, the analysis depicts that some EU countries show a positive relationship with the government's spending with economic growth and some other countries depict a significant negative relationship.

Mazorodze (2018) has contradicted the IMF's suggestion to the Zimbabwe government that decreasing government spending augments economic growth. The outcomes of the study depict that increasing the Zimbabwe government spending enhance economic growth. AAnwar, Rafique, and Joiya (2012) find a relation with defence expenditure concerning Pakistan's security and its linking with economic growth. Their study's findings represent that defence is the core need of Pakistan concerning issues of geological position. This period of this research consists from 1980 to 2010. Analysis of their research depicts that there is a long-run relationship between defence expenditures and economic growth. Arshad, Syed, and Shabbir (2017) used the Augment Solo Model to seek the association between economic growth and military expenditure from 1988 to 2015. The result shows that military expenditure under the external conflicts caused low economic growth, and the military's ammunition negatively impacted economic growth.

Research conducted by O. T. Apanisile and O. C. Okunlola (2014) used the bound testing approach to know the relation between the economy's growth and the military expenditures on Nigeria. Researchers discovered the long-run positive significant relationship between economic growth and spending on the army. A significant negative relationship exists in the short-run and the long-run. Further, in their findings, labour and capital show a

positive (significant) relation to economic growth. Künü, Hopoglu, and Bozma (2016) conducted a study to observe the connection between spending on defence and economy growth under the conflict from 1998-2012 in the Middle East. The study results show a negative association between defence spending and the economy's growth under external and internal conflict. Devarajan, Swaroop, and Zou (1996) inspect the association between public spending and the economic growth for 43 countries over the 20 years. The findings depicted that spending relevant to current expenditure has a positive (significant) association with growth. On the other hand, expenditures as the capital of public spending have a negative influence on GDP. Gulzar Ali (2015) discovered the relation of capital (gross fixed capital formation) concerning Pakistan's economic growth. The data of their study lies from 1981-2014. They applied cointegration, which shows a significant positive association between capital and the economy's growth.

Muhammad, Xu, and Karim (2015) on Pakistan from 1972 to 2013 discovered the relation between public spending and economic growth, representing no long-run relationship between the variables. Farooq (2016) find the relation of public spending effect on the economy. Public spending depicts a positive influence on the economic movement. Their study shows that government spend sufficiently on infrastructure and maintenance, which resulted in a better economic growth effect. Landau (1983) conducted the relation between economic growth and spending of government. Government spending depicts the negative impact on the growth of the economy. Cashin (1995) conducted a cross-sectional study on 23 countries from 1971 to 1988, which presented that public finance affects economic growth. The results of their study show a positive association between economic evolutions.

Begović and Kreso (2017) researched exchange rate fluctuations on the trade balance; their results supported that fluctuation exchange in trade balance ultimately result in the downfall of economic growth in the short-run. Javed and Farooq (2009) discover that fluctuation in the exchange rate causes uncertainty in the economy's growth. ARDL approach is used in the scenario of Pakistan from 1982 to 2007. Results depict that fluctuation in exchange rate resulted in a negative impact on the economy's growth in the long run. Shahid (2014) depict the result relevant to the labour force impact on economic growth in the node of Pakistan from 1980 to 2012, which shows that the labour force has a positive impact on the economic growth in the long-run. However, in the short-run, it depicts a significantly negative relation. On the other hand, it was discovered that fixed gross capital also has a significantly positive long-term and short-term relationship with the economy.

Accordingly, the hypothesizes of this study paper is designed as follows:

*Hypothesis 1: Defence spending has a positive impact on economic growth in the long run in the context of Pakistan.*

*Hypothesis 2: Defence spending has a positive impact on the economic growth in the short run in the context of Pakistan.*

*Hypothesis 3: Development expenditure has a positive impact on the economic growth in the long-run in the context of Pakistan.*

*Hypothesis 3: Development expenditure has a positive impact on the economic growth in the short-run in the context of Pakistan.*

## RESEARCH METHODOLOGY

The study based on secondary data and the variables are collected from 1980 to 2015

### Basic Model

The basic model of this study is

$$\ln GDP_t = \alpha_0 + \alpha_1 \ln CAP_t + \alpha_2 \ln LABOR_t + \alpha_3 \ln REER_t + \alpha_4 \ln DEF_t + \alpha_5 \ln DEV_t + \varepsilon$$

**Table 1. Data Source and Transformation**

Variable name	Representation	Proxy	Transformation	Data Source
Economic growth	LNGDP	GDP per Capita	Ln GDP per Capita	World Bank
Labour	LNLABOR	Total Labour force	Ln (Total labour force)	World Bank
Capital	LNCAP	Gross fixed capital formation as share of GDP	LN (Gross fixed capital formation proportion of GDP)	World Bank
Development expenditures	LNDEV	Developing expenditures	Ln (Development expenditure over total expenditures)	Pakistan Economy Survey
Defence Spending	LNDEF	Defence Expenditures	Ln (Defence expenditures over total expenditures)	Pakistan Economy Survey
Exchange rate	LNREER	Real effective Exchange rate	Ln (Real effective exchange rate)	World Bank

### Variable Explanation

#### Gross Domestic Product as Per Capita

LNGDP is the dependent variable, and it is represented of economic prosperity. Per capita GDP is taken as representative of economic growth.

This measure is used by other studies as well (Hassan, Tahir, Wajid, Mahmood, & Farooq, 2018).

### **Labour Force**

This variable chooses as the independent variable. Labour force depict that how many peoples in a country can work as labour. Many research papers enlightened the role of the labour force concerning GDP. Labour force used as a component of the production function. This variable is incorporated by many studies as well (Hassan et al., 2018; Solow, 1956; Uzawa, 1965).

### **Capital**

Capital is used on behalf of the production function as an independent variable in our model. This variable is used by other researchers in their studies as well (Hassan et al., 2018; Solow, 1956; Uzawa, 1965).

### **Rate of Exchange as Real Effective**

This variable is used as independent in our model because of many studies conducted to check the impact on the rate of exchange (real effective) on economic growth (Aghion, Bacchetta, Ranciere, & Rogoff, 2009; Eichengreen, 2007; Patrick, 1966).

### **Defence Spending**

Many studies are conducted in which researchers worked to find the impact of spending on defence on the economy's growth. In this paper, defence spending is used as an independent variable. (Faini, Annez, & Taylor, 1984; Heo, 1996).

### **Development expenditures**

Different studies conducted that use the subcategories of developing spending like education, health, infrastructure impact economic growth. However, in this study, we choose development expenditure as a whole as an independent variable (Danladi, Akomolafe, Olarinde, & Anya, 2015).

### **Descriptive Statistics**

**Table 2: Descriptive Statistics**

	<b>LNCAP</b>	<b>LNDEF</b>	<b>LNDEV</b>	<b>LNGDP</b>	<b>LNLABOR</b>	<b>LNREER</b>
Mean	-1.71	-1.54	-1.54	10.66	17.48	4.79
Median	-1.68	-1.51	-1.58	10.66	17.45	4.71
Max	-1.49	-1.28	-0.90	10.98	17.99	5.42

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Min	-2.03	-1.93	-2.07	10.26	16.99	4.53
Std. Dev.	0.16	0.19	0.31	0.20	0.31	0.26
Skewness	-0.44	-0.57	0.32	-0.20	0.09	1.18
Kurtosis	1.98	2.20	2.31	2.06	1.68	3.05
Jarque-Bera	2.75	2.93	1.33	1.55	2.66	8.36
Probability	0.25	0.23	0.512	0.45	0.26	0.01

This descriptive Table 2 guides the basic descriptive statistics of all the variables of this study. The value of the mean, standard deviation, kurtosis, are represented by individual variables. All the variables except LNREER are distributed normally.

## RESULTS AND DISCUSSION

### Unit root test

ADF unit root test is applied to find out that the data is stationary or not.

**Table 3. Unit root test at level**

LNGDP	-0.89 (0.77)	Non-Stationary
LNLABOR	0.61 (0.98)	Non-Stationary
LNCAP	-0.78 (0.81)	Non-Stationary
LNDEF	-1.51 (0.51)	Non-Stationary
LNDVE	-2.15 (0.22)	Non-Stationary
LNREER	-4.44 (0.00)	Stationary
<b>Unit root test at first difference</b>		
LNGDP	-3.90 (0.01)	Stationary
LNLABOR	-5.41 (0.00)	Stationary
LNCAP	-4.89 (0.00)	Stationary
LNDEF	-5.70 (0.00)	Stationary
LNDVE	-7.51 (0.00)	Stationary
1% level	-3.63	
5% level	-2.95	
10% level	-2.61	

According to the ADF unit root (Table 3) test, LNGDP, LNLABOR, LNDEF, LNDEV and LNCAP are stationary at the first difference, and LNREER is stationary at level. In the ADF unit root test, we reject the null hypothesis (Data has unit root) if the p-value is less than 10%. So, variables have a mixed order of integration. Through this equation ADF test for the unit root is conducted.

$$DF_{\tau} = \frac{\hat{\gamma}}{SE(\hat{\gamma})}$$

### Variance inflation factor Matrix

**Table 4: Variance inflation factor**

	LNGDP	LNCAP	LNLABOR	LNREER	LNDEF	LNDV
LNGDP	1	3.64	2.99	3.44	2.55	1.77
LNCAP	3.64	1	5.56	1.79	2.42	1.75
LNLABOR	2.99	5.56	1	2.67	3.42	1.75
LNREER	3.44	1.79	2.67	1	1.70	2.75
LNDEF	2.55	2.42	3.42	1.70	1	1.36
LNDV	1.77	1.75	1.75	2.75	1.36	1

According to the VIF matrix (Table 4) result, there is no multi-collinearity among the independent variables because the value of VIF is less than 10 among the independent variables (O'brien, 2007).

### ARDL Bound Testing Approach

Pesaran, Shin, and Smith (2001) introduced this technique. According to this technique, cointegration identified between the dependent and independent variables. This method identified that if the F-statistics value is above the upper bound, cointegration exists. If the F-statistics value lies between the lower and upper bound, then the result cannot define. Further, if F-statistics lies lower than the lower bound, then there is no cointegration.

**Table 5: ARDL Model Results**

Estimated Model	LNGDP=f(LNCAP,LNLABOR, LNREER,LNDEF,LNDEV)			
Optimal lag	(1,0,0,0,1,1)			
F-statistic	4.04*			
W-statistic	24.27*			
Significance level	Critical value of F-test		Critical value of W-test	
	Lower bond	Upper Bond	Lower bond	Upper Bond
10%*	2.52	3.73	15.10	22.39

The ARDL model's result (Table 5) depicts cointegration because F-statistics and W-statistics value lie greater than the upper critical bond at 10% level Significance.

### Diagnostic test

Different diagnostics tests are conducted to check the validity of results. All diagnostics are cleared.

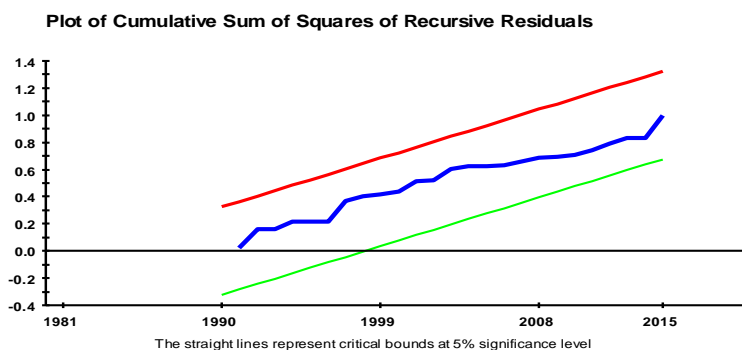
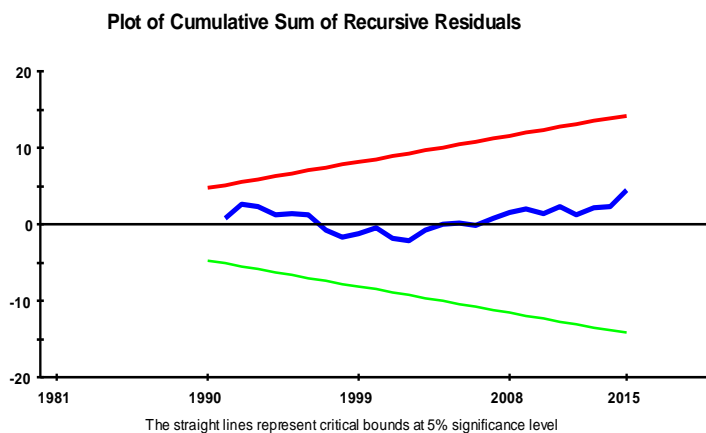
**Table 6. Diagnostic Tests**

Serial Correlation	0.07[.786]
Functional Form	1.43[.231]
Normality	1.38[.501]
Heteroscedasticity	0.48[.485]

There is no issue of serial correlation, functional form, normality, and heteroscedasticity in this model. The p-value is greater than 10%, which



depicts that the null hypothesis accepted, which shows these issues do not prevail in this model.



Furthermore, CUSUM and CUSUM square presents no issue of a structural-break in this model in the short term and the long run.

**Long run coefficient**

$$\begin{aligned} \Delta \ln GDP_t = & d_0 + d_1 \ln GDP_{t-1} + d_2 \ln CAP_{t-1} + d_3 \ln REER_{t-1} + d_4 \ln DEF_{t-1} + d_5 \ln DEV_{t-1} \\ & + d_6 \sum_{i=1}^p \Delta \ln GDP_{t-i} + d_7 \sum_{i=0}^p \Delta \ln CAP_{t-i} + d_8 \sum_{i=0}^p \Delta \ln LABOR_{t-i} + d_9 \sum_{i=0}^p \Delta \ln REER_{t-i} \\ & + d_{10} \sum_{i=1}^p \Delta \ln DEF_{t-i} + d_{11} \sum_{i=1}^p \Delta \ln DEV_{t-i} + \eta_1 \end{aligned}$$

**Table 7. Long Run**

<b>Dependent Variable: LNGDP</b>			
Variables	Coefficient	Standard Error	T-Ration [Prob]
LNCAP	-0.01	0.13	-0.58[0.56]
LNLABOR	0.66	0.08	8.16[0.00]

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LNREER	-0.18	0.06	-2.93[0.01]
LNDVE	0.14	0.05	2.58[0.01]
LNDEF	0.24	0.07	3.20[0.00]
Constant	0.42	1.47	28751[0.77]

According to Table 7, development expenditure has a significant impact on Pakistan's economic growth in the long run, representing that if the government spends on infrastructure, education, and health, it causes an increase in economic growth. This relation further found by Minoiu and Reddy (2010). This indicates that if the government spends on development which ultimately leads to economic growth in the long-run. On the other hand, defence spending also represents a positive and significant impact on economic growth in the long run because spending on defence leads to peace and stability, which resulted in a suitable economic growth situation (Narayan & Singh, 2007) (Feridun, Sawhney, & Shahbaz, 2011). The Labour force has a positive and significant impact on economic growth in the long-run. This relation also found by Shahid (2014) and Apanisile and Okunlola (2014). Further capital has a negative and insignificant impact on the economic growth in the long run in this analysis. Exchange as real effective has a negative and significant relation to the economy's growth, in the long run.

**Short-run Coefficient**

$$\Delta \ln GDP_t = d_0 + d_1 \sum_{i=1}^p \Delta \ln GDP_{t-i} + d_2 \sum_{i=0}^p \Delta \ln CAP_{t-i} + d_3 \sum_{i=0}^p \Delta \ln LABOR_{t-i} + d_4 \sum_{i=1}^p \Delta \ln DEF_{t-i} + d_5 \sum_{i=1}^p \Delta \ln DEV_{t-i} + \psi_1 ecm_{t-1} + \delta_1$$

**Table 8. Short Run**

<b>Dependent Variable: LNGDP</b>			
Variable	Coefficient	Standard Error	T-Ratio [Prob]
dLNCAP	-0.02	0.04	-0.60[0.54]
dLNLABOR	0.22	0.06	3.5[0.00]
dLNRE	-0.06	0.02	-2.46[0.02]
dLNDV	0.04	0.01	3.35[0.00]
dLNDEF	0.05	0.02	2.21[0.03]
ecm(-1)	-0.33	0.08	-4.01[0.00]

Short-term results (Table 8) show that defence spending has positive and significant economic growth, representing that if government spending on defence creates peace in the country, ultimately leading to economic growth. The same results are identified by (Chowdhury, 1991; Narayan & Singh, 2007). Additionally, developing expenditures in infrastructure, health, and education increases economic growth in the short term because these expenditures increase the country's skills, ability, and opportunities. This relation is identified by Loizides and Vamvoukas (2005). According to this

model, the speed of adjustment is 2.95 years, which represent the 2.95 years required to come back to equilibrium. Capital shows an insignificantly negative relation in the short-run with economic growth. The exchange rate depicts negative and significant with per capita GDP, which represents that if the exchange rate increases, it exerts the economy's pressure regarding payments of loans, same finding by Begović and Kreso (2017). The Labour force has a significant positive impact on economic growth in the short-run, like the finding of other researches (T. O. Apanisile & C. O. Okunlola, 2014; Bartik, 1991).

**Granger Causality test**

**Table 9. Granger Causality**

		<b>Independent</b>					
		LNGDP	LNCAP	LNLABOR	LNREER	LNDEF	LNDEV
<b>Dependent</b>	LNGDP	1	6.92 (0.01)	5.66 (0.02)	0.08 (0.77)	0.07 (0.78)	0.07 (0.79)
	LNCAP	3.54 (0.06)	1	6.29 (0.01)	4.51 (0.04)	9.21 (0.00)	7.64 (0.01)
	LNLABOR	0.13 (0.71)	6.31 (0.02)	1	0.63 (0.43)	0.57 (0.45)	2.15 (0.15)
	LNREER	1.28 (0.26)	3.63 (0.06)	2.50 (0.12)	1	4.19 (0.05)	1.16 (0.28)
	LNDEF	10.69 (0.00)	1.68 (0.20)	13.25 (0.00)	5.97 (0.02)	1	3.52 (0.06)
	LNDEV	1.75 (0.19)	0.18 (0.68)	0.98 (0.32)	1.42 (0.24)	0.85 (0.36)	1

According to the causality-test, LNCAP and LNLABOR cause the LNGDP significantly. However, LNREER, LNDEF and LNDEV do not significantly affect. On the other hand, LNGDP significant cause LNCAP and LNDEF but insignificant to LNLABOR, LNDEV and LNREER.

**CONCLUSION AND POLICY IMPLEMENTATION**

This research examines government spending concerning development and defence effect on Pakistan's economic growth from 1980 to 2015. The findings depict that defence spending positively and significantly influences economic growth in both the long run and the short run. This result indicates that in Pakistan, spending on defence provides a suitable condition for economic growth. Furthermore, in this study, the outcomes identified that the government's development expenditures, such as spending on health, education, infrastructure, play a progressive role in Pakistan's economy in

the long- and short-run. After these results, the study suggested that government defence expenditure is essential for developing the economy. The government should spend wisely concerning defence because defence results in a peaceful environment in the country, ultimately leading to prosperity in the economy. As far as the development expenditures are concerned, the government spends more on development projects related to education, health, and infrastructure because these projects directly increase economic growth.

The outcomes suggested to policymakers of government to spend the available resources properly for acute economic growth. Furthermore, the government should prioritize accessible resources for effective spending by way of proper governance. The government of Pakistan should continue sustainable projects like the Iran gas pipeline and Kala Bagh Dam projects. Additionally, the government should continue to develop an intra-regional infrastructure for enhancing economic development. Projects like CPEC should be launched in the upcoming future for sustainable growth in the economy.

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