International Journal of Statistics and Applied Mathematics

ISSN: 2456-1452
Maths 2023; 8(2): 01-08

https://www.mathsjournal.com
Received: 01-12-2022
Accepted: 05-01-2023

Bhola Khan
Department of Economics,
Yobe State University,
Damaturu, Nigeria

Corresponding Author:
Bhola Khan
Department of Economics,
Yobe State University,
Damaturu, Nigeria

Effects of developmental and non-developmental expenditure on economics growth of India: An error correction model approach

Bhola Khan

DOI: https://doi.org/10.22271/maths.2023.v8.i2a.938

Abstract
In this article attempt is made to establish the relationship between the developmental and non-developmental expenditure in India and its influence over the economic growth. For this, secondary data are used for the period of 1991-2021 and sourced from various state finance reports, Ministry of Statistics and Programme Implementation, and World Bank, Indian Public Finance Statistics, and annual budget allocation. To check the long-run and short-run relationship among the variables Autoregressive Distributed Lag (ARDL) model, Bound Test and Error Correction Model techniques have been used. The ARDL estimates indicate that in the long-run development expenditure having positive impact over the economic growth, however, it is statistically insignificant. While population growth rate having negative impact over the economic growth. Further, Error Correction Model (ECM) estimates revealed that there is an existence of short-run relationship among the variables too and it is very sensitive, its adjustment rate is about 80 percent and statistically significant at 5 percent level. Therefore, it is suggested to the government to focus more on the short-run goals rather long-run issues because if the problems are address immediately at the time when it arises then it would also assist to achieve the long-run sustainable economic growth.

Keywords: Economic growth, development expenditure, non-development expenditure, error correction model

1. Introduction
Government expenditure playing a pivotal role for the economic growth in a developing country like India. As economic activity are increases, the government responsibility increases, and further it leads to higher governmental expenditure to meets the needs of the country. There are two types of public expenditure such as developmental and non-developmental expenditures. Generally, developmental expenditures are related to create infrastructure such as education, health, road, transportation and many more while non-developmental expenditures are related to the salary of the employees, maintained law and order, administrative activities in the country**.** Further these expenditures are categorise into the capital expenditures and recurrent expenditures and therefore capital expenditures are related to investment into the health, education and other infrastructure activities while recurrent expenditures are related to purchase of goods and services by the government.
In 1991, the percentage share of development expenditure in India was 38.86 percent which was declined 31.22 percent in 2000 while the percentage share of non-development expenditure was 61.14 percent in 1991 and increased 68.51 percent in 2000 while the economic growth rate was about only 1.06 percent. However, the share of developmental expenditure has been started rising from 2006 and it was 40.19 percent and the percentage share of non-development expenditure was 62.84 percent (IPFS) [1] and economic growth rate was about 8.06 percent. Moreover, in 2015 the percentage share of developmental expenditure was 45.44 percent and the non-developmental expenditure was 54.56 percent of the total public expenditure while the economic growth rate was about 8.00 percent (World Bank, 2015).

[1] Indian Public Finance Statistics and Annual Budget Allocation (Various Edition).

However, in 2021 the share of developmental and non-development expenditures was 63.1 percent 28.0 percent respectively and correspondingly the economic growth rate of the country was 8.68 percent (World Bank, 2021) which are showing that as the government responsibility increases, public expenditures are increased and further it leads to the higher economic growth. Therefore, one may conclude that the public expenditure and economic growth are almost positively related. Moreover, the objective of this study is to establish the relationship between the developmental expenditure, non-developmental expenditure and economic growth in India. To fulfil the objective, we defined five independent variables such as developmental expenditure, non-developmental expenditure, other expenditure, inflation rate, and population growth rate while Gross Domestic Product (GDP) we took as proxy of economic growth as dependent variable. To identified the gap in literature one need to relook into to available literature in to the area of the research. Therefore, we thoroughly did the literature survey into the literature review section.

Table 1: Developmental and Non-Development Expenditure and Others 1991-2021 (In Crores)

Year	Development Expn.	Non-Development Expn.	Others Expn.	GDP	Inflation	Pop Growth
1991	63,370	22,600	5,272	13,67,171	13.87	2.12
1992	74,588	27,143	6,915	14,40,504	11.79	2.10
1993	80,567	32,104	6,664	15,22,344	6.33	2.07
1994	89,388	38,020	7,241	16,19,694	10.25	2.04
1995	1,04,348	49,556	7,650	17,37,741	10.22	2.01
1996	1,14,819	55,380	7,385	18,76,319	8.98	1.97
1997	1,32,008	62,095	8,666	1,957,032	7.16	1.94
1998	1,45,268	71,767	11,100	2,087,828	13.23	1.91
1999	1,64,504	86,474	15,383	22,54,942	4.67	1.87
2000	1,87,297	1,10,206	16,386	2,348,481	4.01	1.84
2001	2,23,966	1,23,979	18,214	24,74,962	3.78	1.82
2002	2,34,582	1,45,359	21,454	25,70,935	4.30	1.79
2003	2,46,150	1,60,391	24,393	27,75,749	3.81	1.74
2004	2,86,473.0	1,85,152.0	81,803.0	54,80,380	3.77	1.69
2005	3,30,044.1	1,90,020.6	41,616.8	59,14,614	4.25	1.62
2006	3,92,165.0	2,11,872.4	53,242.9	63,91,375	5.80	1.54
2007	4,64,462.0	2,33,232.8	54,629.6	68,81,007	6.37	1.48
2008	5,67,086.2	2,54,981.4	60,265.2	70,93,403	8.35	1.43
2009	6,37,731.1	3,07,547.0	70,051.7	76,51,078	10.88	1.40
2010	7,20,354.7	3,57,287.4	81,087.6	83,01,235	11.99	1.39
2011	8,52,405.6	4,01,059.4	98,147.3	87,36,329	8.91	1.37
2012	9,72,256.5	4,46,878.9	1,15,119.4	92,13,017	9.48	1.34
2013	10,76,452.2	5,04,548.4	1,25,144.0	98,01,370	10.02	1.31
2014	13,25,989.2	5,66,467.4	1,33,326.0	1,05,27,674	6.67	1.25
2015	15,84,006.2	6,29,349.3	1,46,873.2	1,13,69,493	4.91	1.19
2016	18,31,163.8	7,10,365.1	1,66,686.4	1,23,08,193	4.95	1.19
2017	18,77,392.3	8,25,774.0	2,21,432.9	1,31,44,582	3.33	1.16
2018	21,00,801.6	9,44,483.7	2,92,428.1	1,40,03,316	3.94	1.09
2019	21,63,340.6	10,05,162.7	3,26,499.3	1,45,69,268	3.73	1.03
2020	25,26,682.7	11,21,918.6	3,57,811.8	1,35,12,740	6.62	0.96
2021	29,11,409.0	12,87,898.6	4,23,784.1	25,41,00,400	5.13	0.80

Source: States Finance Reports, Reserve Bank of India.

2. Literature Review

Literature is the most important part of any ideal research. It gives the idea to draw the gap from the past literature. Therefore, in this section we reviewed some important studies done by the eminent scholars in the relevant areas so that we can be able to draw the gap in literature.

S. Fan, P. Hazell & S. Thorat (2000) [16] have reported that how to allocate public funds efficiently so that it helps to enhance both growth and poverty alleviation in the rural areas. They employed an econometric model on government expenditure to get the effects of it on productivity and poverty reduction and trade-off between two of them. The study reported that the investments in rural roads and agricultural research and development have great impact over the economic development.

Fan, S. & Rao, N. (2003) [4] are reported the trends in government expenditure in developing economy and to advance an analytical framework to determining the differential impacts of various public expenditures on economic growth. They pointed out that the government expenditure in various parts of the world does not allocate equally to all sectors. However, all types of government expenditure except health are found statistically insignificant in Latin America. In Asia, expenditure over agriculture, education, and defence are having growth promoting effects. While in African continent, the public spending on agriculture and health are strong in accelerating the economic growth.

Another important study is conducted by Mohammad, S.M., Mohammad, A. P.P. & Chandan, L.R. (2014) [9] and they used secondary data for the period of 10 years. They applied linear regression techniques to get the appropriate results. Out of six variables, health, exports, and imports are rightly explained by the development expenditure however expenditure on health is negatively related with development expenditure while exports and imports are positively related with development expenditure. Therefore, they recommended that the government needs to pay serious attention over the exports.

Prasetiya, F., & Pangestuty, F.W. (2012) [13] have rightly pointed out the effect of government expenditure on economic growth and rural poverty in Indonesia. They used data from 32 province for 3 years. For this purpose, they used

simultaneous equation model. Their analysis indicates that the public spending on education and health sectors are having significant impact over the economic growth and both sectors are also having a significant impact over the number of rural poor. While expenditure on infrastructure is not having significant impact on economic growth and eradicating poverty. Therefore, based on the findings, they suggested that the government need to pay more attention over the expenditure on education and health.

Vijay L.N. Gangal & Honey Gupta (2013) [18] are aimed to see the effects of government expenditure on economic growth in India for the period of 15 years. They used annual data of public expenditure and GDP. The study used ADF Unit Root test, Cointegration test and Granger Causality test techniques. Findings of the study revealed that there is linear stationarity in both variables that indicates the long run equilibrium and there is positive impact of government expenditure on economic growth. Another finding revealed the unidirectional between public expenditure to Gross Domestic Product (GDP). Therefore, the study advised that the economic growth is an important factor for economic development of a country and therefore the government needs to increase budgetary allocation on public expenditure that leads to the economic development.

Nugroho, P.E. (2017) [12] analysed both the direct and indirect effects of various public development expenditure to increase the agriculture productivity and reduced poverty by increasing wages, price stability and increasing non-agriculture employment. The study used simultaneous equation and three- stage least squares technique to analyse the provincial level panel data for the period of 10 years. The findings of the study revealed that to enhace the agriculture productivity and to eradicate poverty, the government of Indonesia should give highest preference to increase spending on both agriculture and education sectors. The findings suggests that there are limited trade-offs between their effects on agriculture output and poverty eradication.

Seshaiah, S.V., Koti Reddy, T. & Sarma, I.R.S. (2018) [17] are investigated the impact of general public expenditure on Gross Domestic Product (GDP) Growth in India for the period of 1981-2016 with the used simple linear regression analysis technique. The results revealed that the all explanatory variables are having positive and significant impact over the GDP. Another results of post reform dummy variable shows that a positive and statistically significant impact of the general government expenditure over the Gross Domestic Product. Therefore, the study recommended that there is a need to increase more development expenditure on infrastructure to achieve higher economic growth.

N. Eswaran, & A. Selvamurugan (2018) [3] have examined the development expenditure and non-development expenditure of center only. The study found that the development expenditure helping not only for economic growth, but it also reducing the poverty level in the country. The study revealed that the non-development expenditure is a non-productive sector that not generating any revenue and further it is a burden over the government.

Jovi Varghese M.S. (2019) [6] reported that the impact of government expenditure over the economic growth of India. The study employed three macroeconomic indicators for representing the economic growth of India such as GDP, GNI, NNI. The regression analysis technique is used on the secondary data. The finding indicates that there is an existence of statistically significant relationship between to total and sectoral government expenditures and each of the macroeconomic indicators. Therefore, the study advised that public expenditure has leading impact over the economic growth.

Priya, R. & Prashant, K.P. (2021) [21] are examined the effects of development spending (DS) on human development index (HDI) and Gross State Domestic Product (SGDP) in the low income state (LIS) for the period of 22 years for seven low income states. For this they used panel unit root test and co-integration test are employed over DIS, GSDP, and HDI. The study revealed that the share of development spending in recent years for low income states is higher than the major states. It also shows long-run relationship between development spending, human development index and Gross State Domestic Product (SGDP). Therefore, the study advised that the increase in health, education, and skill development spending are associated with better health outcomes, higher human development index, and poverty eradication.

Muna, Y. Hussein (2022) [10] has tried to analyze the public spending and economic growth in Iraq through the real Gross Domestic Product Index with and without oil. For the analysis, the study employed panel cointegration and Ganger casualty techniques to find the dynamic relationship between variables for the period of 29 years. The findings shows that the joint integration test showed that there is no long run and short run relationship between government spending and real output with oil. While it also showed the existence of long-run and short-run relationship between government spending and real output without oil.

Mohammed, A., Haider, H.I. & Javaid, A.D. (2022) [8] are reported that the impact of development and non-development expenditure on the emission of Corban dioxide (Co_2) in India for the period of 1980-2018. The study used Asymmetric Autoregressive Distributed Lag Model (ARDL) and advance econometric techniques to examined the nexus between Co_2 emission and non-development expenditure, national income, energy consumption and population growth. The findings of the study suggest that there is short-run and long-run relationship and it is statistically significant relationship among Co_2 and the explanatory variables. Based on findings, the study advised that the government phase out fiscal benefits to pollution prone economic activities and therefore spend the money saved on pollution reduction efforts.

Dim, K. C. Okafor, Tochukwu G., Eneh O., & Amahalu, N. N. (2022) [2] have examined the relationship between public expenditure and economic development in Nigeria for the period of twenty two years (1999-2020). The study relied on secondary data and for the analysis it employed Augmented Dickey-Fuller (ADF) test and Ordainary Least Square regression (OLS) techniques. The findings revealed that the education expenditure having a positive but insignificant impact over the per capita income. Another finding of the study is that the security expenditure has positive however significant impact over the per capita income at five percent level. Based on finding, the study advised that there should be fiscal framework that would further support the economic growth and leads to achieve sustainable public finance.

Based on the above literature review, one can concludes that the all studies are tried to established the relationship between public expenditure and economic development and all the studies did justice with their objectives with the different variables, methodology with different data sets. However, the current study tried to add some more information into the existing literature. Therefore, the current study made an attempt to fill two major gap which are given following: one, we used five explanatory variables to study the association

between economic growth and the publica expenditure and the second important contribution of the study is to check short-run relationship among the variables and for this the study employed Error Correction Model (ECM). Based on the gap in literature, one can identified the objective/s of the study which are given below.

3. Objective of the Study

The main objective of the study is to explore the relationship between the economic growth and developmental expenditure, nondevelopment expenditure and other independent variables in India during the study period.

The specific objective/s of the study are given as follow:

- To study the impact of Development and Non-Development Expenditure on the economic growth of India.
- To examine the impact of other expenditure, inflation and population growth over the growth rate of India.
- To highlights the direction of causality between economic growth, development expenditure, non-development expenditure, other expenditure, inflation and population growth.

The objective/s of the study assits to set the hypotheses and further to test them via various statistical tools and techniques. The hypotheses of the study are given below.

Hypotheses

H_{o1}: Development and Non-development expenditure does not have affect the economic growth.

H_{o2}: Other expenditure, inflation and population wroth does not have any impact over the economic growth.

H_{o3}: There is no short-run and long-run relationship between dependent variable and independent variables.

4. Methodology

Use of specific method of the specific problem is help to achieved the objective/s of the study. Therefore, in this study fist we define Autoregressive Distributed Lag Model (ARDL) with unrestricted Error Correction Model (ECM) and then determine optimal lag structure with lag length criteria then after one can employed the Descriptive Statistic Test, Augmented Dickey-Fuller Test for stationarity, Breusch-Godfrey LM test for Serial Correlation**,** Breusch-Pagan-Godfrey test for Heteroskedasticity, CUSUM test for stability and Normality Test for residuals. After running all the pre-diagnostic tests, we run the Bound test for the long-run relationship among the variables and then we employed Error Correction Model (Restricted VAR Model) to check the speed of adjustment. For this purpose we specified our functional model (eq.1) and then we converted it into the econometric model (eq.2) and for the ARDL ECM we define another equation (eq.3). The functional model specification, econometric model, and ARDL ECM equations are given below.

Model Specification

GDP= F (DevExp, Non-DevExp, OthrsExp, Infl, PopGr) (1)

Where,

GDP = Exchange Rate

DevExp = Developmental Expenditures

Non-DevExp = Non-Developmental Expenditures

Othrs = Other Expenditures

Infl = Inflation Rate

PopGr = Population Growth Rate

Econometric Model Specifications

$$GDP_t = ß_o + ß_1 DevExp_t + ß_2 Non\text{-}DevExp_t + ß_3 OthrsExp_t + ß_4 Infl_t + ß_5 PopGr_t + U_t \quad (2)$$

Other variables remain as defined in equation (1) above one can transformed the econometric model in equation 1 into ARDL ECM specification, as well as taking partial logarithms to achieve a common unit of measurement gives the estimable ARDL ECM model in equation 3.

$$\Delta \ln GDP_{t-1} = \alpha + \alpha_{12} \ln DevExpi_{t-1} + \alpha_2 \ln Non\text{-}DevExp_{t-1} + \alpha_3 \ln OthrsExp_{t-1} + \alpha_4 \ln Infl_{-1} + \alpha_5 \ln PopGr_{t-1} + \sum_{i=0}^{n} \beta 1\, \Delta \ln DevExpi_{t-1} + \sum_{i=0}^{n} \beta 2\, \Delta \ln Non\text{-}DevExp_{t-i} + \sum_{i=0}^{n} \beta 1\, \Delta \ln OthrsExpi_{t-1} + \sum_{i=0}^{n} \beta 1\, \Delta \ln Infl_{t-1} + \sum_{i=0}^{n} \beta 1\, \Delta \ln PopGri_{t-1} + ECM_{t-1} + \varepsilon t \quad (3)$$

Where,

Δ is the difference operator, n is the lag length, ECM is the speed of adjustment $\mathcal{E}$ is the serially uncorrelated error term and ln* is the natural log. Other variables remain as previously defined.

Results and Its Analysis

Before the estimation of Ordainary Least Square Estimator, Bound Test and ARDL Error Correction Model (ECM), we have to run some pre-diagnostic tests and that are given below.

Pre-Estimation Tests

This one specifically covers the Augmented Dickey-Fuller Test for stationarity, Breusch-Godfrey LM test for Serial Correlation**,** Breusch-Pagan-Godfrey test for Heteroskedasticity, CUSUM test for stability, and Normality test for residuals.

After the descriptive statistics, it is necessary check the stationarity into the data sets, before applying further econometrics tools and techniques, so that the inference will not be affected. Therefore the study used the Augmented-Dickey Fuller Unit Root Test on the data sets.

Stationarity (Unit-Root) Test

To check the stationarity into to the time series data the study employed Augmented Dickey-Fuller Unit Root Test. Because most of time-series exhibit non-stationarity trends in their level form, which often poses a serious problem to econometric analysis and it may lead to spurious result if the precautionary techniques are not employed.

Table 2: Augmented Dickey-Fuller Unit-Root Test Statistics

Variables	Test	@ Level	@ First difference	@ Second difference	Equation Specification	Equation Specification
GDP	ADF	-	-3.478844 (0.0656)	-	Intercept & Trend	I (1)
DevExp	ADF	-	-	-7.660967 (0.0000)	Intercept & Trend	I (2)
Non-DevExp	ADF	-	-5.621585 (0.0006)	-	Intercept & Trend	I (1)
OthrsExp	ADF	-	-5.294810 (0.0010)	-	Intercept & Trend	I (1)
Inflation	ADF	-	-7.021391 (0.0000)	-	Intercept & Trend	I (1)
PopGr	ADF	-	-2.936706 (0.0559)	-	Intercept & Trend	I (1)

P-values at 5% statistical significance
Source: Author's Calculation.

To get the appropriate estimates, the study employed the ADF Unit Root test which was developed by Dickey and Fuller (1981) [1]. The estimates are presented in Table 2 The estimates advised that five variables are found to be stationary in their first level and one variable is found stationary at I (2). Therefore, the results suggest that out of six, only five variables are integrated of order one i.e. they are all I (1s) and one is integrated of order two. This outcome satisfies the condition for conducting cointegration test.
For the checking of autocorrelation, heteroscedasticity, stability and Normality tests, the study employed the auto correlation, Breusch-Godfrey Serial Correlation LM Test**,** Breusch-Pagan-Godfrey and the Cumulative Sum (usually known as CUSUM) parametric stability test respectively and Normality tests for residuals.

Auto Correlation Test
For the auto correlation, Lagrange Multiple (LM) test is applied to identifying the presence or absence of auto correlation so that it can be prevented from spurious result. Therefore, we run a Breusch-Godfrey Serial Correlation LM test and the results of it is given in below table 3.

Table 3: Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.176707	Prob. F(1,11)	0.6823
Obs*R-squared	0.379447	Prob. Chi-Square(1)	0.5379

Source: Author's Calculation.

Table 3 shows that the value F-statistic and the probability value of observed R^2 and they are about 3.86 and 0.06 respectively which revealed that the probability value of observed R^2 is more than the critical value at 5 percent level. Therefore, one can concluded that the estimate model is not affected from the problem of autocorrelation and it gives a green signals to do further tests for the study with the adopted model.

Heteroskedasticity Test
To check the variance of error terms is constant or not, the study employed Breusch-Pagan Test and the estimates of it are given in below table 4.

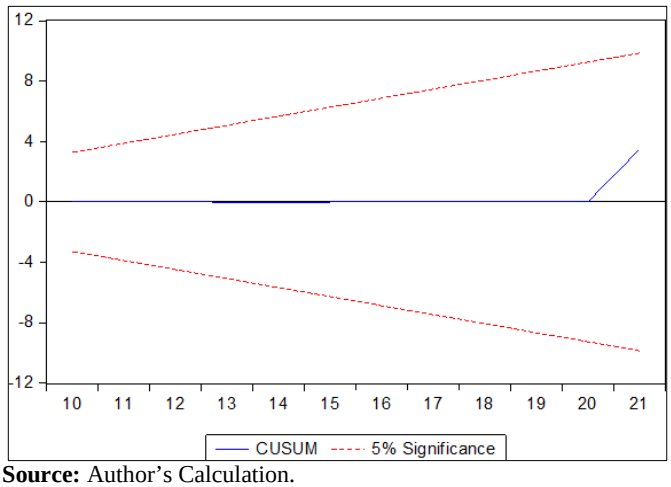
Table 4: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	3.520006	Prob. F(11,12)	0.0202
Obs*R-squared	18.32177	Prob. Chi-Square(11)	0.0744
Scaled explained SS	6.221601	Prob. Chi-Square(11)	0.8582

Source: Author's Calculation.

Table 4 revealed that the probability value of observed R^2 is about 81 percent and it is more than the 5 percent therefore one can reject the null hypothesis that there is no heteroscedasticity in the model. Thus, we can conclude that there is absence of heteroskedasticity in the model and therefore the model is reliable to run further tests.

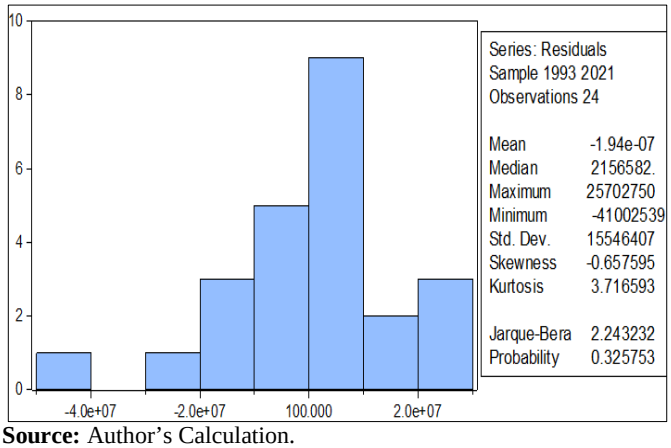
Stability Tests
For checking the stability of the long-run coefficients alone with the short-run dynamics we applied the cumulative sum (CUSUM) test and the result is given in the below figure 1.



Source: Author's Calculation.

Fig 1: CUSUM Test

Normality Test (CUSUM Test)
A graphical illustration of cumulative sum (CUSUM) is presented in the above Figures 1. The plots of the Cumulative Sum of Square is within the boundaries, and, therefore the statistics prove that the coefficients are stable. The model appears to be stable and properly specified.



Source: Author's Calculation.

Fig 2: Time-Series Normality Test

The study relied on time-series data for its analysis, therefore, it is important to test whether the data sets are normally distributed or not. To detect the normality of each variable we employed the probability of the Jarque-Bera statistic. From figure 2, it is evident that the probability value of Jarque-Bera is statistically insignificant. Therefore, one can concludes that the data sets of the taken variables are not normally

distributed. Consequently, the hypothesis which states that all the variables are not normally distributed is rejected. Therefore, the variables are logged for performing the further tests and drawing inferences.

After the conducting of all the pre-diagnostic tests, now, therefore, we are able to run ARDL regression and the ARDL regression results are given in the below table 5.

Table 5: ARDL Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.25E+08	2.82E+08	2.928494	0.0126
D (Development(-1))	90.84628	140.1366	0.648269	0.5290
D (Non Development(-1))	1847.156	601.4656	3.071091	0.0097
D (Others(-1))	-1584.610	484.7963	-3.268609	0.0067
D (Inflation(-1))	-2088711.	2881864.	-0.724778	0.4825
D (Pop(-1))	2.07E+08	3.40E+08	0.609370	0.5536
GDP (-1)	-36.80326	9.873291	-3.727558	0.0029
Development (-1)	219.8812	147.9910	1.485774	0.1631
Non Development (-1)	-1304.400	553.1561	-2.358105	0.0362
Others (-1)	2727.945	712.9647	3.826199	0.0024
Inflation (-1)	531052.8	2334001.	0.227529	0.8238
Pop (-1)	-3.75E+08	1.32E+08	-2.831925	0.0151
R-squared	0.899386			
Adjusted R-squared	0.807157			
F-statistic	9.751627			
Prob (F-statistic)	0.000219			

Source: Author's Calculation.

Table 5 results reveals that the development expenditure having having positive relationship with economic growth in both short and long-run but in the short-run it is affecting economic growth more than the long-run. However, they are statistically insignificant in both long-run and short-run. This results are supported by the results of Mohammad, A. Haider, H.T. & Javaid A., D. (2022) [8] and Seshaiah, S.V., Koti Reddy, T. and Sarma, I.R.S. (2018) [17].

Non-development expenditure is having positive and statistically significant impact on economic growth at 1 percent level in the long-run while in short-run its having negative impact over the economic growth. However, it is statistically significant at 5 percent level. Moreover, this results are absolutely different from the previous studied which are undertaken into the literature review section.

The impact of population growth rate over the economic growth is positive in the long-run but statistically insignificant. However, in the short-run it is having negative impact over the economic growth but is statistically significant at 1 percent level.

The value of coefficients of determination is about 89.93 percent which are showing that independent variables are showing 89.93 percent variation in the dependent variable and the probability value of F-statistic is significant at one percent level which is also showing that the estimated model is highly specified model.

To verify the ARDL regression results, Now, therefore, we can run Bound test (Wald test and the result of it is in given below table 6.

Table 6: Bound Test (Wald Test)

Test Statistic	Value	Df	Probability
F-statistic	8.344032	(6, 12)	0.0010
Chi-square	50.06419	6	0.0000
Null Hypothesis: C(6)=C(7)=C(8)=C(9)=C(10)=C(11)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(6)		2.07E+08	3.40E+08
C(7)		-36.80326	9.873291
C(8)		219.8812	147.9910
C(9)		-1304.400	553.1561
C(10)		2727.945	712.9647
C(11)		531052.8	2334001.
Restrictions are linear in coefficients.			

Source: Author's Calculation.

Since we employed unrestricted intercept and no trend with 6 explanatory variables, the lower bound value for the k=6 is 2.45 percent at 5 percent significance level and upper bound value for the k=6 is 3.61 percent at 5 percent significance level and the calculate value (table 6) of F -statistics is having 8.34 percent and it is more than the table value 3.23 percent. Therefore, we can reject the null hypothesis of long-run relationship between the GDP and other independent variables. It means there is no long-run relationship among the variables.

Since table 6 results revealed that there is no long-run relationship among the variables. Therefore it is important to check the short-run relationship between them and for this, one can employed the Error Correction Model (ECM).

Error Correction Model

After running of ARDL model for th long and short run relationship among the variables, the study employed and Error Correction Model as an alternative way to check short-run equilibrium relationship among the variables. It shows the dynamic error analysis of the cointegrated variables. The estimates of the ECM are reported in table 7. Here, the model is regressed on the first differences for five variables, two difference for one variable plus the lagged value of the residuals from the cointegrating equation.

Table 7: Error Correction Model (ECM)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8079937.	20536766	0.393438	0.6995
D (GDP (-1))	-39.27407	14.89758	-2.636272	0.0187
D (Development (-1))	174.7041	127.3137	1.372233	0.1902
D (Non Development (-1))	-115.2348	463.8957	-0.248407	0.8072
D (Others (-1))	171.9913	732.1639	0.234908	0.8175
D (Inflation (-1))	3086153.	3451015.	0.894274	0.3853
D (Pop (-1))	-37883683	3.68E+08	-0.102831	0.9195
ECT (-1)	-0.800087	0.402321	-1.988727	0.0511
R-squared	0.704245			
Adjusted R-squared	0.566226			
F-statistic	5.102525			
Prob (F-statistic)	0.003945			

Source: Author's Calculation.

The differenced variables' coefficients represent short-run effect of these variables on the economic growth in India during the 1991-2021. The results in table 7 show that the ECM model has a higher coefficient of determination. This can be seen from the R-squared of about 0.704245 (70.42%) percent and the adjusted R-squared of about 0.566226 (56.62%) percent. The R-squared showing the variations in the dependent variable by the independent variables. Moreover, the probability value of F- Statistics is significant at 1 percent level. Therefore, one can argued that data set is quite well fitted in the model and it is highly specified.

Furthermore, The value of Error Correction is -0.800087 and it is also statistically significant at 5 percent level. The negativity of the ECT_{t-1} signals that the system is stable enough and is capable of converging to the short-run equilibrium after some shocks in the system. Meaning that, if it is away from the equilibrium state then it is the system who make automatically into the equilibrium and the equilibrium restoration rate is about -80 percent that is very high.

Therefore, the ECM results proved that the increase or decrease in development expenditures, non-development expenditures, other expenditures, inflation rate, and population growth rate will increase or decrease to the economic growth of India. However, increase or decrease in the development and non-development expenditure is leads to increase or decrease in the economic growth in India. This means the public expenditures are played an important role to determine the economic growth in India during the period of 1991-2021.

5. Conclusion and Recommendations

Based on the findings of the study, one can concludes that the data sets are free from serial correlation and heteroscedasticity. While residuals are normally distributed, and the model adopted for the estimation is quite stable. We also use Autoregressive Distributed Lag (ARDL) Model to check the long-run relationship among the variables and it is verified by the Bound Test and furthermore, the Error Correction Model (ECM) run to check the short-run relationship among the variables, which are seen in the table 5, 6, and 7 respectively. The Bound test results revealed that there no long-run relationship among the variables. However, the Error Correction Model results revealed that there is a short-run relationship among the variables and the system is tend to correct disequilibrium automatically into the equilibrium at the rate of -80 percent and it is very desirable and sensitive. Therefore, based on the findings of the study, it is recommended that the government need to focued in short-run public expenditure and use these expenditure judiciously so that its impact will be more realistic over the economy and economic growth rather focus in the long-run in some cases. Since, non-development expenditure is having negative impact over the economic growth in short-run, therefore it is advise to the government to reduce the non-developmental expenditure in the short-run and increase developmental expenditure. Furthermore, since population growth rate is having positive impact over the economic growth in the long-run. Therefore, it is recommended that the government must have increase the budgetary allocation over the training and skills related activities so economy can be benefitted from demographic dividends. Finally, the study's finding advised to the government that there is need to check and balance over the public expenditure and used judiciously so that it can have positive impact over the economic growth.

6. Acknowledgement

I hereby acknowledging all the published and unpublished articles which I used during this work. Finally, I also express my sincere thanks to all my colleagues, students and others, those who helped me during this work directly or indirectly.

7. Conflict of Interest

The author/s declares no conflict of interest.

8. Funding

Not Applicable.

9. References

1. Dickey DA, Fuller WA. Likelihood ratio statistics for autoregressive time series with a unit root. Econometrica: Journal of the Econometric Society. 1981;49(2):1057-1072.
2. Dim KC, Okafor TG, Eneh O, Amahalu NN. Effect of Public Expenditure on Economic Development of Nigeria, International Journal of Management Studies and Social Science Research. 2022;4(1):113-130.
3. Eswaran N, Selvamurugan A. Study on Central Government's Developmental and Non-Developmental Expenditure with Special Reference to Selected Variables, International Journal of Advances in Social Sciences. 2018;6(1):57-64.
4. Fan S, Rao, N. Public spending in developing countries: trends, determination, and impact; c2003. p. 1-51 DOI: 10.22004/AG.ECON.16080.
5. Indian Public Finance Statistics (IPFS) Various Reports; c2010-11.
6. Jovi Varghese MS. Impact of Government Expenditure on the Economic Growth of India. International Journal of Scientific Development and Research. 2019;4(3):174-179.
7. Ministry of Statistics and Programme Implementation, constant prices; 2004-2005.
8. Mohammad A, Haider HT, Javaid AD. On the environmental effects of development and non-

development expenditure in India: Evidence from an asymmetric ARDL model, An International and Comparative Review. 2022;31(6):835-859.
9. Mohammad SM, Mohammad APP, Chandan LR. Impact of development expenditure on economic development of Pakistan, International Journal of Manangement & Information Technology. 2014;10(2):1850-1857, DOI: 10.24297/Ijmit.V10i2.642.
10. Muna YH. Analyzing and measuring the long-term balance relationship between changes in government spending and real growth in Iraq for the period 1990-2018. International Journal of Professional Business Review. 2022;7(2):1-24.
11. Muritala Taiwo, Taiwo Abayomi. Government Expenditure and Economic Development: Empirical Evidence from Nigeria, European Journal of Business and Management. 2011;3(9):18-28. www.iiste.org
12. Nugroho PE. Government Expenditure, Agricultural Productivity, and Poverty Reduction in Indonesia: A Simultaneous Equations Approach; Journal of the Graduate School of Asia-Pacific Studies. 2017;34(34):39-54.
13. Prasetiya F, Pangestuty FW. Linkages Between Public Sector Expenditure on Economic Growth and Rural Poverty of Indonesia. 2012;2(3):2347-2353.
14. Stanly Joseph P, Prarthna P. An Analysis of Revenue and Capital Expenditures in India. Tiruchirappalli, Tamil Nadu, India. 2017;11:84-92
15. Ranjan P, Panda PK. Pattern of Development Spending and Its Impact on Human Development Index and Gross State Domestic Product in Low-income States in India, Journal of Development and Policy and Practice. 2021;7(1):71-95, DOI: 10.1177/24551333211047358.
16. Fan S, Hazell P, Thorat S. Government Spending, Growth and Poverty in Rural Indian, Economics; c2000.
17. Seshaiah SV, Koti Reddy T, Sarma IRS. General Government Expenditure and Economic Growth in India: 1980-81 to 2015-16. Theoretical Economics Letters. 2018;8(4):728-740. https://doi.org/10.4236/tel.2018.84050.
18. Vijay LN Gangal, Honey Gupta. Public Expenditure and Economic Growth A Case Study of India, Global Journal of Management and Business Studies. 2013;3(2):191-196.
19. World Bank, https://www.macrotrends.net/countries/IND/India/inflation-rate-cpi>Indiainflation Rate 1960-2022, Retrieved 2022-12-30.
20. World Bank, https://www.macrotrends.net/countries/IND/India/youth-unemployment-rate'>India Youth Unemployment Rate 1991-2022. www.macrotrends.net, Retrieved 2022-12-30.
21. Priya RI, Sarkar AM, Abraham LE, Kesharvani PR, Unnikrishnan P. COVID-19: urban middle class survey highlights need for people's agency in policy making. The Hindu Centre for Politics & Public Policy; c2022.