



Relationship between Defence and Welfare Expenditure in India: An empirical study from 1981 to 2019

Biraj Dey¹ & Avijit Debnath²

ABSTRACT

In the literature, there are few studies analyze the relationship between defence expenditure and developmental expenditure. The study is proposes to address the relationship by incorporating annual time series data from 1981 to 2019. The autoregressive distributed lag (ARDL) bound testing co-integration approach confirms the valid long-run relationship between defence and developmental expenditure in India. The study finds that defence expenditure and development expenditure are interlinked. However, the nature of the linkage is not uniform over the time. It is observed that developmental expenditure affects defence expenditure positively in the short along with in the long-run but defence expenditure affects developmental expenditure negatively in the short-run, moreover, an increase in defence expenditure will outrage the short-run negative affect and in the long-run defence expenditure is also positively affect the developmental expenditure. Thus, policymakers should focus on this option to regulate the peace and harmony of the country by enplaning the awareness and vision, while alternating the vision, and stretch on the defensive mechanism will put the nation in a black hole in the short-run.

KEYWORDS: Defence Expenditure, Development Expenditure, Auto Regressive Distributed Lag Model, India.

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I. INTRODUCTION

Government Expenditure played an important role to stabilize the economy and it's also performing a set of functions for providing the basic amenities for the masses. However, providing the basic amenities like social and developmental expenditure government had to take an important decision of budgetary allocation. Moreover, the allocation of the budget depends on the developmental and defence expenditure of the government. If the developmental expenditure is increased at the cost of non-development expenditure such as defence expenditure this will crumble the protective measure of the nation on the other hand, if the non-development expenditure is increased at the cost of development expenditure like social and economic expenditure this will deteriorate the developmental aspect of the nation. Therefore, it's always been a nexus for the government to devote the resources towards strengthening the infrastructure of the economy or to stabilize the security of the nation.

The relationship between defence expenditure and economic growth have been empirically investigated by numerous studies [13], [4], [1], and [5]. However, these studies are one-sided in nature because they examined the relationship between defence expenditure and economic growth. Moreover, some studies also contributed in the literature and finds that there is bi-directional relationship exist between defence and developmental expenditure [14]. Finally, there have been a few studies especially, in India which emphases the two way relationships between defence and development expenditure in India. The present paper has made an attempt to investigate the two way relationship between defence expenditure and developmental expenditure in India.

¹ Corresponding Author: Biraj Dey, PhD Research Scholar, Assam University, Silchar, Ph:8011702080, Email: deybiraj@gmail.com

² Associate Professor, Assam University, Silchar.

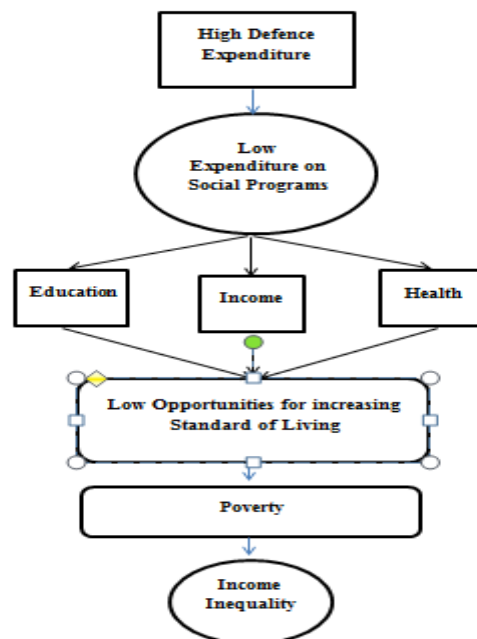
*Corresponding Author: Biraj Dey

II. A BRIEF REVIEW OF DEVELOPMENTAL EXPENDITURE IN INDIA:

The Gun-and-Butter argument postulates [15] that the government should choose whether to spend its money on 'butter' for its citizens or 'guns' which is the amount of money spend by the government for military defence. That is, the 'gun-and-butter' argument reasons that there is a trade-off between military expenditures and other government expenditures.

Numerous justifications may be made to shield the Guns or Butter Argument theoretically. From Butter viewpoint, if there is an increase in defence expenditure at the cost of social programs such as health and education. The low investment in social programs will create an adverse effect on human capital which ultimately leads to low capital formation and hence, in the long-run, the economy may suffer from low economic growth. Secondly, the additional burden of defence expenditure is more often carried out by the lower-income group because as the expenses on defence expenditure increases it will hinder the developmental and other welfare programs. Moreover, during economic slowdowns, the employment level of the country decreases and unemployment level increases and hence unskilled labor force may try to join the different religious armed forces and this will increase the defence expenditure of the country and on other destabilized the prospects of the country. Fourthly, an increase in military spending may enhance the utilization of violence as a method for social control, prominently against exchange associations and other populist social powers accordingly, it isn't surprising to observe that higher military spending implies more societal control and penance of democratic regards of the nation, which will create an atmosphere of a stagnant and autocratic form of nation.

Conceptual figure: 1.



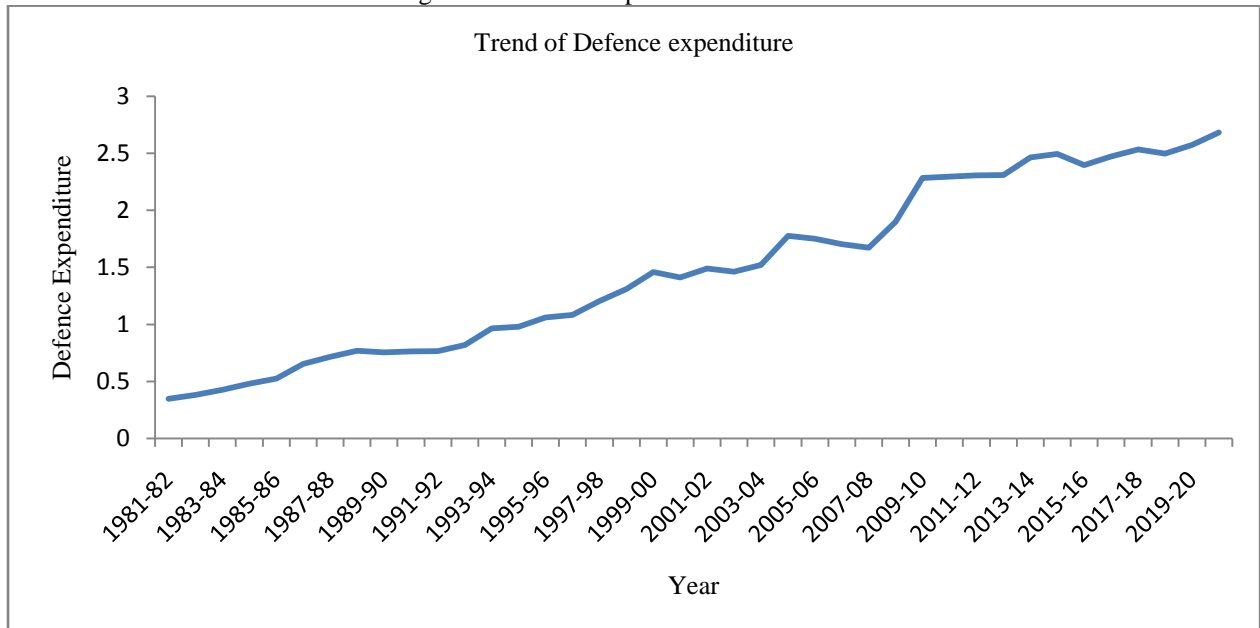
Source: Author's own research from different research papers

On the other hand, if there is a decrease in defence expenditure then it will directly impact the security of the country. It implies that the opportunity cost of committing the crime and criminal activities is decreasing across the nation [2]. The opportunity costs of criminal activity are warmly associated with the issue of informal social control, it has been found from the literature that areas with reduced levels of informal social control have been found to have higher rates of crime and lower levels of economic growth. Secondly, weak law and order is positively associated with the crime rate, implying that, in an area with a compressed size of police service and a low level of police activity will act as a key ingredient of destabilizing the economic prosperity. Thirdly, an increase developmental expenditure disregards the defence expenditure implies that the country is forming a relationship with bordering countries however in the case of India the situation is even pathetic with its bordering nation and hence if there is any decrease in defence expenditure then there is always a security threat from the neighboring countries.

III. (A). TREND OF DEFENCE EXPENDITURE IN INDIA

It is seen from the figure that Defence expenditure in India is positive though fluctuates over time. From 1981 to 1988 defence expenditure remain more or less stable but mid of the 20th due to the war on the Indo-Pakistan border,

Figure.2: Defence Expenditure in India



Source: Compiled from Handbook of Statistics on Indian Economy (RBI)

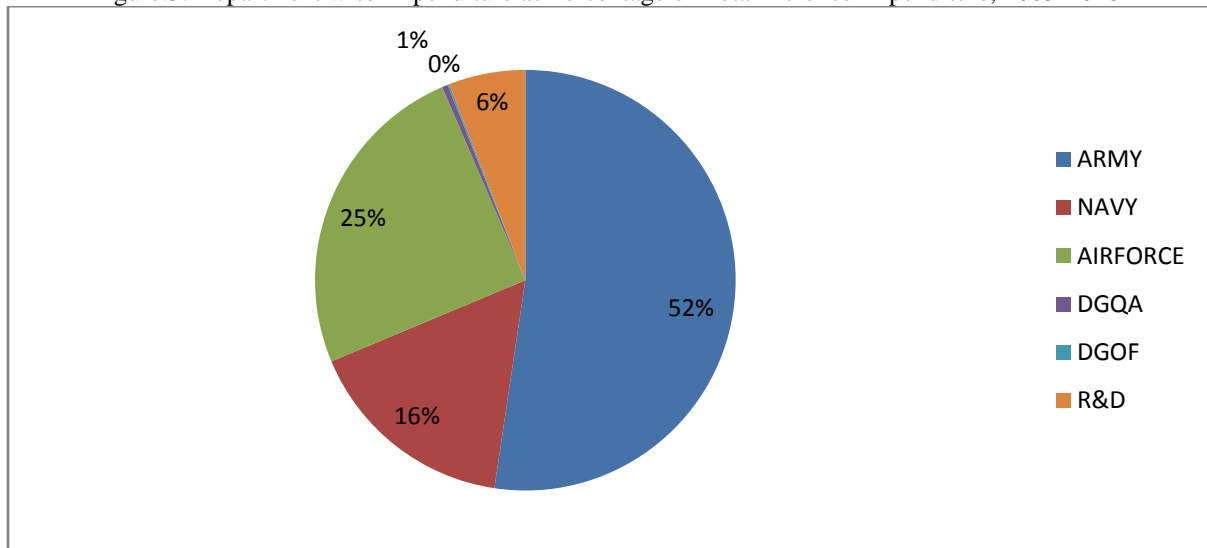
the defence expenditure is increased at a good pace up to 2005, thereafter, the country realizes the threat from its neighbouring nations and stress more importance on its defence expenditure, as a result, the expenditure on defence increases at a very significant rate. Moreover, after 2005 defence expenditure remains positive and increased at a sharp rate. Within this time frame, the government also prioritizes various regional defence agreements with other nations and starts importing various defence goods such as arms and ammunition which enhance and restructured the security of the country.

(B). DEPARTMENT WISE EXPENDITURE AS PERCENTAGE OF TOTAL DEFENCE EXPENDITURE:

According to MOD there are six broad categories of defence expenditure. These are army, navy air-force, Directorate General of Quality Assurance, Director General Ordnance Factories and Research and Development these expenditure accounts a major portion of total government expenditure in the nation. Figure presents distribution of department wise Average of decadal Expenditure of the government.

As we can see around fifty two percent of defence expenditure comprised of army expenditure while two five percent of defence expenditure comprised of air-force and sixteen percent of the expenditure comprised of navy expenditure respectively. As indicated earlier, these figures are average figure and therefore one might observe occasional fluctuations of these estimates from one year to another.

Figure.3: Department wise Expenditure as Percentage of Total Defence Expenditure, 2003-2018

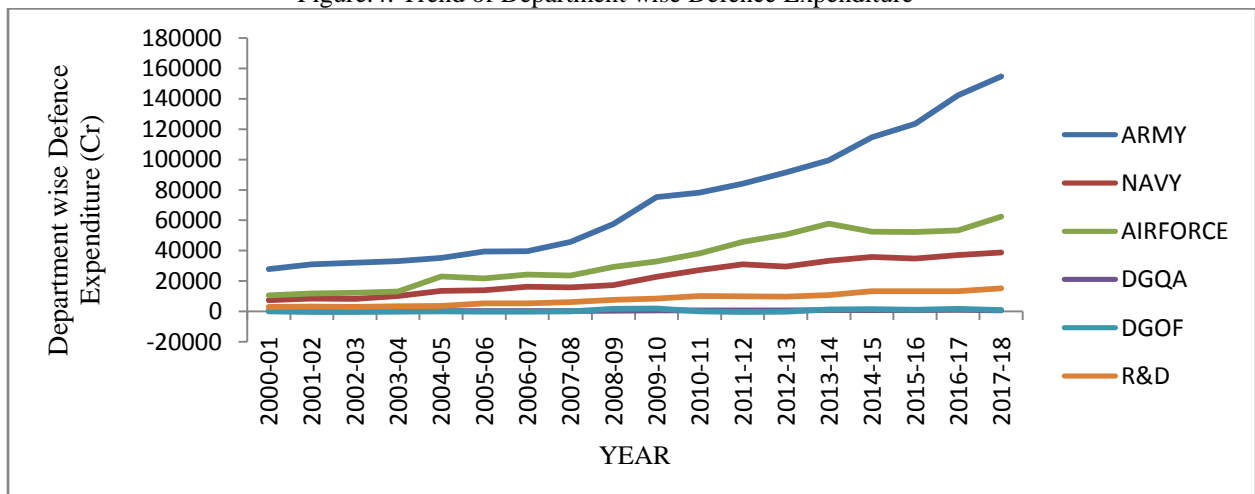


Source: Compiled from Ministry of Defence (MOD)

(C). TREND OF DEFENCE EXPENDITURE BY DEPARTMENT WISE:

In the last section we have seen the department wise distribution of defence expenditure such as army, navy air-force, Directorate General of Quality Assurance, Director General Ordnance Factories and Research and Development. But such analysis through pie diagram does not reveal the changing pattern of such death. Moreover analysis by pie diagram also fails to show fluctuations in department wise defence expenditure from one year to another. Therefore, in this section we have made an attempt to examine if department wise defence expenditure follows any pattern. To do this we have drawn a line diagram using department wise defence expenditure from 2001-18. (See, figure)

Figure.4: Trend of Department wise Defence Expenditure



Source: Compiled from Ministry of Defence (MOD)

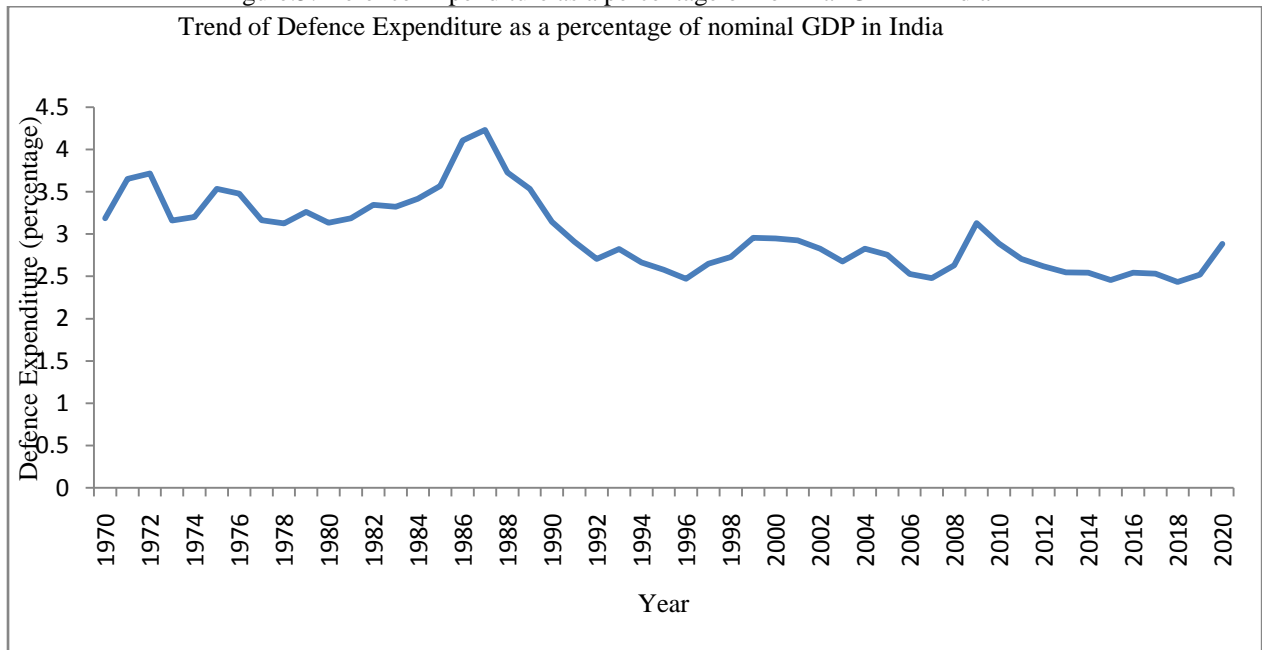
From the figure it is observed that trend of department wise defence expenditure does follow uniform pattern over time. For instance army expenditure is one of the dominated defence expenditure over the other expenditures in over the years of the century. In recent year's air-force expenditures are increasing at a steady pace and hover around second places. Similarly research and development and DGQA are stagnant over the years.

(D). TREND OF DEFENCE EXPENDITURE AS A PERCENTAGE OF NOMINAL GDP IN INDIA:

The defence budget appears to be fairly lackluster when examined as a percentage of India's Gross Domestic Product, despite a nominal year-on-year growth rate (GDP). The budget for overall defence was only 2.1% of

the estimated GDP at the time, as shown in the graph below. Since the early 1960s, this figure was the lowest. In actuality, during the past few years, India's defence spending as a percentage of its GDP has decreased.

Figure.5: Defence Expenditure as a percentage of nominal GDP in India
Trend of Defence Expenditure as a percentage of nominal GDP in India

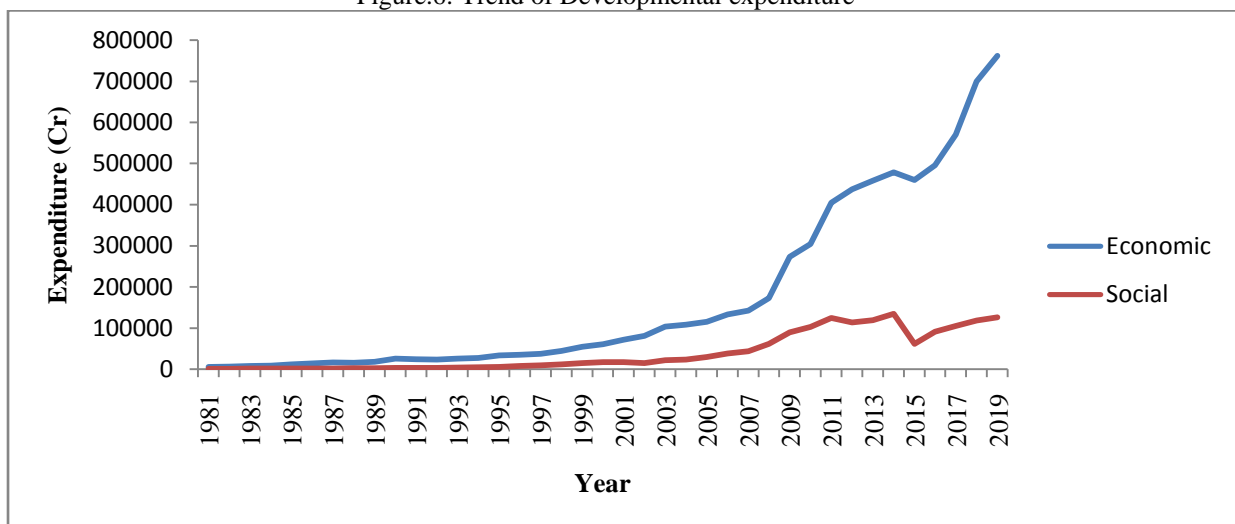


Source: Compiled from Handbook of Statistics on Indian Economy (RBI)

(E). DEVELOPMENTAL EXPENDITURE IN INDIA: SOCIAL EXPENDITURE AND ECONOMIC EXPENDITURE

Broadly developmental expenditure is divided into two categories Social expenditure and economic Expenditure. Social expenditure has been defined as the total of all expenditures incurred by the central and the state governments on promotional and protective measures.

Figure.6: Trend of Developmental expenditure



Source: Compiled from Handbook of Statistics on Indian Economy (RBI)

The Figure shows that the overall trend is positive for economic and social expenditure but the magnitude was not the same pattern rather it had ups and steep jumps over the period. The economic expenditure is more skewed than the social expenditure and it is because higher capital spending will create jobs “the best way to equip a person” and an investment of one rupee in infrastructure adds 2.5 rupees to the economy, compared with a slight loss from expenditures like direct cash payments. “Growth lifts all boats. Income transfers do only so much,”

IV. METHODOLOGY

Causality Test

The study hypothesized that the growth of defence expenditure is influenced by development expenditure, growth of developmental in turn, is influenced by growth in military expenditure. In this section, an attempt has been to specify the base structural equation model for investigating the hypotheses concerning the spillover effects of defence expenditure and developmental expenditure and vice versa.

$$DEV_t = a_0 + a_1 DEF_t + a'X' + u_t \tag{1}$$

$$DEF_t = b_0 + b_1 DEV_t + b'Z' + v_t \tag{2}$$

Where DEV is the developmental expenditure and DEF is the defence expenditure of India. X' is a set of control variables which may influence developmental expenditure, and Z' is a set of those which are supposed to influence defence expenditure.

V. DATA

The study used annual data spans over the time period 1981 to 2019. The estimation begins in 1981 due to a lack of suitable data prior to the 80s. The defence expenditure, developmental expenditure, capital expenditure of defence data are compiled from the Handbook of Statistics on Indian economy (various issues).

VI. EMPIRICAL ANALYSIS

Time-Series Properties

The first step of the analysis is to investigate the time series properties of the variables. If the data under analysis are non-stationary, the results of regression analysis obtained in a traditional manner would not be reliable. For this purpose, we use ADF-GLS estimators to check the stationary process of the data series. The results of the test are reported in Table 1.

Table: 1. The ADF GLS test results

Variables	Level	First difference
Defence expenditure	-0.12	-4.42***
Developmental Expenditure	-2.91	-4.79***
Economic Expenditure	-2.17	-5.58***
Capital Defence Expenditure (CAPE)	-1.77	-5.81***
GDP Deflator (GDPD)	-2.76	-8.22***
Social Expenditure	-0.96	-7.36***

Notes: ***,* Rejection of the null hypothesis of unit root at least at 1 and 10 percent level. Optimal lag length (not shown) is determined by AIC.

Results of the unit root tests in levels indicate that the computed t-statistics are less than the critical values at any conventional significance level for three variables, thus we do not reject the null hypotheses that variable has a unit root in levels. However, once the first differences of those variables are considered, the null hypothesis of unit root can be rejected. Thus, we have clear evidence that the variables under consideration are stationary but at first difference.

Testing For Co-Integration

Since the variables are integrated in different orders, we have used OLS-based autoregressive distributed lag (ARDL) approach to co-integration. The ARDL framework for Equations (1) and (2) are expressed as:

$$\Delta LnDEV_t = \beta_0 + \sum_{i=1}^p \beta_1 \Delta LnDEV_{t-i} + \sum_{i=0}^p \beta_2 \Delta LnDE_{t-i} + \pi_1 LnDEV_{t-1} + \pi_2 LnDE_{t-1} + \gamma_1 CAPE + \gamma_2 GDPD + \mu_t \tag{3}$$

$$\Delta LnDE_t = \beta_0 + \sum_{i=1}^p \beta_1 \Delta LnDE_{t-i} + \sum_{i=0}^p \beta_2 \Delta LnDEV_{t-i} + \pi_1 LnDEV_{t-1} + \pi_2 LnDE_{t-1} + \gamma_1 EE + \gamma_2 SE + \mu_t \tag{4}$$

Given these equations, to examine the presence of a long-run relationship between defence expenditure and development expenditure, we use F-test on the joint null hypothesis that the coefficients of the level variables are jointly equal to 0 [11].

Next, we estimate Equations (1) following the ARDL co-integration technique for the long-run estimates. We estimated the model keeping the different criteria, like R² criterion, Hannan Quinn Criterion, AIC Criterion and SBC Criterion, in mind to find the coefficient of the level of variables. The long-run and short-run results of all models were almost near to identical. Therefore, we present only the results of the model that were selected on the basis of AIC criterion as Monte Carlo experiment of [9] documented that AIC is superior to

other criteria, particularly when time span is less than 60 observations. The calculated F-statistics for the co-integration test are reported in Table II.

The critical values of F-statistics are reported together with calculated F-statistic in the same table.

Table.2: Bounds tests for the existence of a long-run relationship				
Dependent Variable	Calculated F-statistic	5% Critical Values		Conclusion
		I (0)	I(1)	
Development expenditure	5.44	3.62	4.16	Co-integration
10% Critical Values				
Defence Expenditure	6.72	5.59	6.26	Co-integration

Note: critical values for the DEV model is with intercept only whereas the same for the DE model is with intercept and trend.

The calculated F-statistic for Development expenditure model (model 1) is 5.44, which is more than upper bound critical value at five percent level of significance. Thus, the null hypothesis of no co-integration is rejected in the model, indicating presence of long-run co-integration relationships between the variables. Similarly, the calculated F- statistic for Defence Expenditure model is also greater than the upper bound value at 10% level of significance. Thus, the null hypothesis of no co-integration is rejected in both the cases, indicating presence of long-run co-integration relationships between the variables.

The long-run coefficients of these models using ARDL approach are estimated in the second step. The results are shown in Table 3.

Table.3: Long-run Coefficients estimating result			
Variable	Development Expenditure ARDL (10,8)	Defence Expenditure ARDL (1,1)	
Constant	-1.31 (1.88)*	2.49 (3.07)***	
Trend	-----	0.03 (2.86)***	
Defence Expenditure (DE)	1.75 (9.39)***	-----	
Development Expenditure (DEV)	-----	0.63 (4.17)***	
GDP Deflator (GDPD)	0.02 (1.85)*	-----	
Economic Expenditure (EE)	-----	-.20 (-2.21)**	
Capital Defence Expenditure (CDE)	-0.74 (-2.61)**	-----	
Social Expenditure (SE)	-----	0.06 (1.98)*	

Notes: Student's tests are in parentheses. *, **, ***Significant at 10, 5 and 1 percent level, respectively

It is evident in the second model that the coefficient of Development Expenditure is positive and statistically significant. This indicates that in the long-run incidence of development expenditure positively effects defence expenditure. Development expenditure can pass the positive impact on defence expenditure in a number of ways. For instance, an increase in development expenditure such as different types of training programs, roads, and bridge infrastructure will bring the border areas more concrete and secure and this will help the armed force to take command position in high altitude areas hence it will increase the defence investment of the country. Moreover, the increase in investment in developmental programs will also create a positive effect on human capital which ultimately leads to increase human capital formation and hence the country is sophisticated to use more hybrid and high levels of imported armed machines and technology from the neighboring countries for securing the nation from the threat. Therefore, in the long-run, the economy is alleviated from low economic growth and a high threat from bordering countries. Secondly, a statistically significant and negative sign of the coefficient of capital defence expenditure (CDE) indicates that an increase in capital defence expenditure dampens economic development.

In the second model, we find that the coefficient of Defence expenditure (DE) is positive and statistically significant. On the basis of co-integration test the study confirms the long run relationship between DE and DEV. This implies that increase defence spending affects Developmental expenditure positively in the long-run. Regarding control variable we find that the coefficient of economic expenditure is negative and significant. This shows as economic expenditure decreases with an increase in defence expenditure

and social expenditure increases with an increase in defence expenditure. This implies that social expenditure is a part of welfare expenditure of the government on the other economic expenditure includes development of roads and infrastructure of the economy. The negative and significant association between economic and defence expenditure implies the government is try to tradeoff between defence spending and economic expenditure in the long-run.

Estimation of the Short-Run Elasticity: Error Correction Model Results:

In the final step, we proceed to obtain the error correction representation of equations (3) and (4). Table 4 reports the short -run coefficient estimates obtained from the ECM version of the ARDL models.

Variable	ΔDE ARDL (1,1)	ΔDEV ARDL (10,8)
Constant	2.49 (3.43)***	-----
Trend	0.03 (2.99)***	-----
ΔDEV	0.39 (3.68)***	-----
ΔDE	-----	-4.15 (9.44)***
ECT_{t-1}	-0.46 (-3.27)***	-1.18 (-4.58)***
\bar{R}^2	0.39	0.60
F	5.69***	-----
J-B (Normality)		0.34

Notes: Figures within round bracket () are calculated student's t-statistics; figures within angle bracket [] are calculated Wald test statistics.

*, **, *** Significant at 10, 5 and 1 percent level, respectively

Since the diagnostic tests suggest that obvious non-linearity and misspecification are absent, and that the residuals show no signs of non-normality or heteroscedasticity, the following inferences can be drawn from the results: We can see that the equilibrium correction coefficients (ECM) assume negative sign and are highly significant in both the models. This again confirms the existence of the co-integration relationship among the variables of these models. The values of estimated ECM coefficient indicate that the deviation from the long-term growth rate in DE is corrected by 43 percent in the next year, and by more than 100 percent in the DEV model. Thus the speed of adjustment is relatively higher in the second model.

To understand the short-run dynamics, we conducted Wald test on the lagged coefficients of DE in the first model and lagged coefficients of DEV in the second model. Here, null hypothesis which states that lagged coefficients are jointly equal to zero is rejected in both the models. Therefore, there is evidence that these two variables (DE and DEV) are interrelated even in the short-run. However, the short-run results are exactly opposite in the signs for DEV model as compared to the long-run. In the short-run, DE is found to have negative significant impact on DEV, whereas the impact of DEV on DE is positive. These short-run and long-run dynamics between these two variables are presented in a simplified manner in table 5.

Causality Type	Conclusion	Direction of causation
Short- run Granger causality		
Short-run Granger causality Change in Development Expenditure does not affect defence expenditure ($\sum_{i=0}^8 \alpha_2 \Delta LnDEV_{t-i}=0$)	Reject	Positive
Change in Defence Expenditure does not affect development expenditure ($\sum_{i=0}^1 \alpha_2 \Delta LnDE_{t-i}=0$)	Reject	Negative
Long- run Granger causality		
Long-run Granger causality Change in Development Expenditure does not affect defence expenditure	Reject	Positive

Change in Defence Expenditure does not affect development expenditure	Reject	Positive
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Source: Compiled from results of Tables 3 and 4.

Here, we find that the null hypothesis that is change in Development expenditure does not affect defence expenditure in the short-run has been rejected. This is based on the Table IV in which it can be seen that F-statistic for the lagged defence expenditure is found significant. The positive sign of the coefficient of development expenditure implies that development expenditure affects defence expenditure positively in the short-run.

Looking at the other side of the coin, we find that the null hypothesis of DE does not affect DEV in the short-run is rejected. This rejection is based on the joint significance level of lagged coefficients of DE in table 4. Here, the sign of coefficient of DE reflects that DE affects developmental expenditure negatively. This is possible because in the short-run due to budgetary constraints there is a tradeoff between the expenditure however in the long-run with increases in defence spending the developmental expenditure is also increased.

VII. CONCLUSION

This study is an attempt to provide an empirical investigation of defence expenditure and developmental expenditure in India by using data from the period 1981–2019. The empirical results showed that there is a bi-directional relationship between defence and developmental expenditure. A change in developmental expenditure positively affects defence expenditure in the short as well as the long-run. While changes in defence expenditure will negatively affect developmental expenditure in the short-run, this is because the government is trying to tradeoff between defence and socio-economic expenditure in the long-run. Moreover, changes in defence expenditure will positively affect developmental expenditure in the long-run. The findings from this study may be used to ensure both the security of the country and that welfare expenditure is crucial for maintaining the peace and harmony of the citizens. Therefore, the government may have to take several steps to maintain the balance between the defence and developmental programmes.

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