

# Defence Expenditure & Human Development: Nexus revisited, a case study of India

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## Abstract

In the literature, there are a few studies that analyze the relationship between defence expenditure and human development in India. This study proposed to address the relationship by incorporating annual time series data from 1991 to 2019. The autoregressive distributed lag (ARDL) bound testing co-integration approach confirms the valid long-run relationship between defence expenditure and human development in India. The study finds that defence expenditure and human development are interlinked. However, the nature of the linkage is not uniform over time. It is observed that defence expenditure negatively affects human development in the short run. This is possible because, in the short run, due to budgetary constraints, there is a tradeoff between defence expenditure and developmental expenditure. An increase in defence expenditure at the cost of developmental expenditure will put pressure on unemployment and poverty, which will deteriorate the condition of the human development index of the country, but defence expenditure, affects human development positively in the long-run. Thus, policymakers should focus on this option to regulate the peace and harmony of the country by enplaning the vision, while alternating the vision and stretching on the defensive mechanism will put the nation in a black hole in the short-run.

**Keywords:** Defence Expenditure, Human Development Index, Auto Regressive Distributed Lag Model, India

For decades, countries' levels of welfare were measured in terms of economic growth or an increase in per capita gross domestic product (GDP). The per capita income was quite impressive in those days because it has been thought as an attractive single indicator for assessing economic performance. However overtime, picture and foundation of development was changed. The per capita had faced several weaknesses to measure the economic performance or prosperity of the economy. This criticism has come from some of the most respected economists of the 20<sup>th</sup> century, including various Nobel laureates Kuznets (1941),

Hicks (1948), Galbraith (1958), Samuelson (1961), Nordhaus and Tobin (1972), Haq (1990). Hence, it is highly essential to move to universal definition of human wellbeing. An alternative approach to development: The Human Development Approach. The human development concept was developed by economist Mahbub ul Haq. Haq believed that classically used measure of economic growth was

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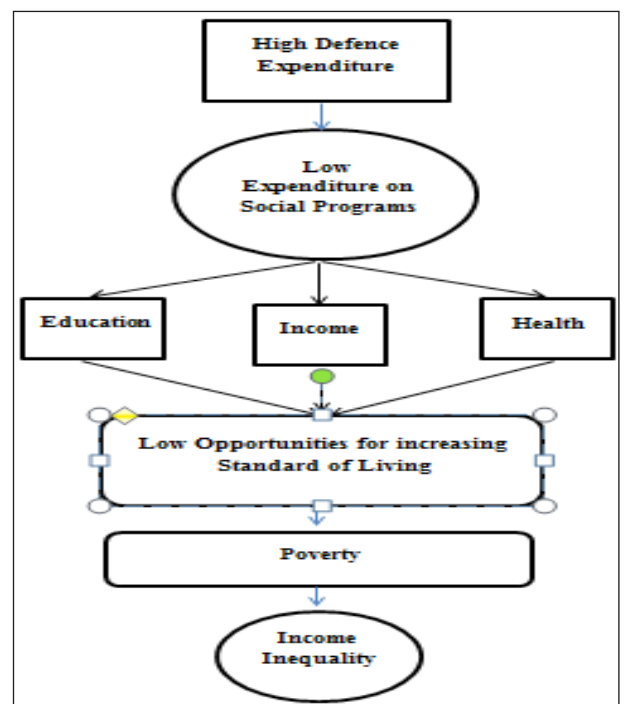


failed to reflect the true picture of human well-being, work with Amartya Sen and other gifted economists; in 1990 Dr. Haq published the first Human Development Report, which had been commissioned by the United Nations Development Program (UNDP). The Human development Index is single composite index to measure the health of the economy. The composite index is comprised of three dimension i.e., health index, education index and income index. Moreover, to enhance the countries well being it is quite essential for the government to increase the expenditure on these three dimensions. Therefore, government Expenditure played an important role to enhance the well being of the economy and it's also performing a set of functions for providing the basic amenities for the masses (S. Devarajan, 1997). However, to provide the basic amenities, such as expenditure on health and education, the government had to take an important decision on budgetary allocation. Moreover, the allocation of the budget depends on the developmental and non-developmental expenditure of the government. On the other hand, increasing non-development expenditure at the expense of development expenditure, such as education and health expenditure, will harm the nation's development. Therefore, it's always been a nexus for the government to devote resources towards strengthening the well-being of the economy or stabilizing the security of the nation.

**A Brief Review of Gun-and-Butter argument in India**

The Gun-and-Butter argument postulates that the government should choose whether to spend its money on 'butter' for its citizens or 'guns' which is money spent by the government for military defence (Kwon, 2021; Ochuko, 2021). 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 (Okwoche, 2022; Rudy, 2022). Secondly, the additional burden of defense spending is often borne by the lower-

income groups because the benefits of development programs are made for the poorest people in the country and any marginal abandonment in the program will hinder developmental needs (S. Deger & R. Smith, 1983). Moreover, during economic slowdowns, the developmental programs such as the budget allocated for MGNREGA is sacrificed by the health expenditure of the country (N. Rao, 2020) as a consequences 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 (Alabi, T. 2014) and to sort out the insurgency problem the government may increase the defence expenditure of the country (F. C. Onuoha, 2020).



Source: Author's research  
**Chart. 1: Conceptual Framework**

On the other hand, if there is a decrease in defence expenditure then it will directly impact the security of the country and the opportunity cost of committing the crime and criminal activities is decreasing across the nation (Becker, 1968). It means, if there is decrease in defence expenditure then it will encourage the incidence of kidnapping and armed robbery and as a result it will push criminal activities and behavior across the region (A. Michaels & Okolie, 2017). 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 (P. Ponsaers, 2008; L. Mauricio, 2007). 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 activities (P. Buonanno & D. Montoliob, 2008). Thirdly, an increase developmental expenditure disregards the defence expenditure will disrupt economic performance and regional instability. Moreover, if there is any decrease in defence expenditure then there is always a security threat from the neighboring countries (A. Ades & H, B. Chua, 1997).

## METHODOLOGY

### Causality Test

The study hypothesized that the unidirectional relationship between defence expenditure and human development Index in India. 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 human development Index and vice versa.

$$HDI_t = a_0 + a_1DEF_t + a'X' + u_t \quad \dots(1)$$

$$HEF_t = b_0 + b_1HDI_t + b'Z' + v_t \quad \dots(2)$$

Where HDI is the Human development Index and DEF is the defence expenditure of India. Is a set of control variables which may influence Human development index, and is a set of those which are supposed to influence defence expenditure.

### Data

The study used annual data spans over the time period 1990 to 2019. The estimation begins in 1990 due to a lack of suitable data prior to the 90's for the human development index. The defence expenditure data is compiled from Stockholm International Peace Research and foreign direct investment compiled from the Handbook of Statistics on Indian economy (various issues).

## 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 Augmented Dickey-Fuller –Generalized Least Square 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	Second difference
Defence expenditure	-3.38***		
Human Development Index	-0.77	-2.95	-5.44***
Foreign Direct Investment	-2.01	-7.17***	

*Source:* Calculated by authors.

*Notes:* \*\*\*, Rejection of the null hypothesis of unit root at least at 1 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 and second 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:

$$\Delta \ln HDI_t = \beta_0 + \sum_{i=1}^p \beta_1 \Delta \ln HDI_{t-i} + \sum_{i=0}^p \beta_2 \Delta \ln DE_{t-i} + \pi_1 \ln HDI_{t-1} + \pi_2 \ln DE_{t-1} + \gamma_1 FDI + \mu_t \quad \dots(3)$$

$$\Delta \ln DE_t = \beta_0 + \sum_{i=1}^p \beta_1 \Delta \ln DE_{t-i} + \sum_{i=0}^p \beta_2 \Delta \ln HDI_{t-i} + \pi_1 \ln HDI_{t-1} + \pi_2 \ln DE_{t-1} + \gamma_1 FDI + \mu_t \quad \dots(4)$$

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 (Pesaran *et al.* 2001).

Next, we estimate Equations (3 and 4) following the ARDL co-integration technique for the long-run estimates. We estimated the model keeping the different criteria, like R<sup>2</sup> 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 Liew (2004) 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

		1% Critical Values		
Dependent Variable	Calculated F-statistic	I (0)	I(1)	Conclusion
Human Development Index	13.40	8.74	9.63	Co-integration
		5% Critical Values		
Defence Expenditure	5.06	6.56	7.30	No Co-integration

*Note:* critical values for the HDI model and DE Model is with intercept and trend.

The calculated F-statistic for Human Development Index (HDI) model is 13.40, 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 less than the upper bound value at 5% level of significance. Thus, the null hypothesis of no co-integration is accepted in the cases, indicating absence 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**

Variable	Human Development Index ARDL (6,6)
Constant	-2.15 (-5.38)***
Trend	0.01 (4.45)***
Defence Expenditure (DE)	0.11 (7.04)***
Foreign Direct Investment (FDI)	-0.008 (-2.73)**

*Notes:* Student's t tests are in parentheses. \*, \*\*, \*\*\*Significant at 10, 5 and 1 percent level, respectively.

It is evident in the model that the coefficient of defence expenditure is positive and statistically significant. This indicates that in the long-run incidence of defence expenditure positively effects human development. Defence expenditure can pass the positive impact on human development in a number of ways. For instance, an increase in defence expenditure such as different types of training programs for forces, capital infrastructure on defence, pension schemes and manufacturing of arms and ammunition will bring the border areas more concrete and on the other it will create an employment opportunity and raise the standard of living for the masses within the nation. Moreover, the increase in investment in defence programs will also create a positive effect on human capital which ultimately leads to increase human capital formation (C. S. Saba & N. Ngepah, 2020) 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 attained a higher value in the human development index. Moreover, by turning into a control variable such as foreign direct investment, it is negatively affecting the human development index in India. This is due to the fact that developmental expenditure on education and health is mostly made up by the government and it is said to be affordable for all. However, an increase in foreign direct investment will prohibit the masses from being part of the developmental aspect, which will ultimately deteriorate the condition and, as a consequence, the human development is worse off.

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.

**Table 4**

Variable	ARDL (6,6)
Constant	-2.15 (-5.38)***
Trend	0.01 (4.45)***
$\Delta$ DE	-0.39 [-9.44]***
FDI	-0.0008 (3.02)**
$ECT_{t-1}$	-1.08 (-5.49)***
$\bar{R}^2$	0.77
F	6.57***
J-B (Normality)	0.34
$\chi^2$ ( heteroscedasticity)	0.67
$\chi^2$ ( functional from)	0.12

**Notes:** Figures within round bracket ( ) are calculated student's t-statistics; \*, \*\*, \*\*\* Significant at 10, 5 and 1 percent level, respectively. 2. Figures within angle bracket [ ] are calculated Wald test statistic.

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 the model. 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 over 100 percent in the next year.

To understand the short-run dynamics, we conducted Wald test on the lagged coefficient of defence expenditure in the model. Here, null hypothesis which states that lagged coefficients are jointly equal to zero is rejected in the model. Therefore, there is evidence that DE variable is interrelated even in the short-run. However, the short-run results are exactly opposite in the signs for model as compared to the long-run. In the short-run, DE is found to have negative significant impact

on HDI,. These short-run and long-run dynamics between these two variables are presented in a simplified manner in table 5.

**Table 5:** Causality result

Causality Type	Conclusion	Direction of causation
Short- run Granger causality		
Short-run Granger causality		
Change in Defence Expenditure does not affect Human Development Index	Reject	Negative
$\sum_{i=1}^6 \alpha_2 \Delta LnDE_{t-i} = 0$		
Long- run Granger causality		
Long-run Granger causality		
Change in Defence Expenditure does not affect Human Development Index	Reject	Positive

**Source:** Compiled from results of Tables 3 and 4.

Here, we find that the null hypothesis that is change in defence expenditure does not affect human development 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 negative sign of the coefficient of defence expenditure implies that defence expenditure affects human development negatively in the short-run. This is possible because, in the short-run, due to budgetary constraints, there is a tradeoff between defence expenditure and developmental expenditure. An increase in defence expenditure at the cost of developmental expenditure will put pressure on unemployment and poverty, which will deteriorate the condition of the human development index of the country.

**CONCLUSION**

This study is an attempt to provide an empirical investigation of defence expenditure and human development in India by using data from the period 1991–2019. The empirical results showed that there is a unidirectional relationship between defence expenditure and human development. A change in defence expenditure positively affects human developmental index in the long run, while, changes in defence expenditure negatively affects human developmental index in the short run this is because the government is trying to tradeoff

between defence and socio-economic expenditure in the short-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.

**Strength:** The study made a first attempt to check the association between non-developmental expenditure and human development in India by using Auto Regressive Distributed lag Model for the period of 1991-2019. The results of the model may tempt to verify the appropriate budgetary expenditure in the current policy.

**Limitations:** The length of the data is a limitation of this study. As a result, the results provided in this work are preliminary and should be regarded with safety and caution for future implications.

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