

Tradeoff among Defense, Environment and Development Expenditure: Evidence from India

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Abstract

This paper is set out to find the relationship, if any, between Defense spending, Economic development spending and environment spending for India, and to discuss the policy implications of the empirical results. Since India has one of the largest defense budgets within the Asian countries as well as Quadrilateral Security Dialogue (Quad). The Quad is a strategic forum of informal nature. It comprises four nations, namely – India, Australia, USA and Japan. One of the primary objectives of the Quad is to work for a free, open, prosperous and inclusive Indo-Pacific region. This question has important implications for India's future economic well-being and political stability. Taking into account the difficulties present in previous military expenditure studies, an econometric model was specified and empirically tested using Indian data for 2010-2020. Results suggested that there is a positive linkage between military expenditure and economic development, but the relationship between military expenditure and environment cannot be concluded. The part of the empirical study tested the defense-development relationship for India using expenditures on health and education as development proxies. The empirical findings suggested that there are tradeoffs between military expenditures and development expenditure. However, there seems to be a positive relationship between military expenditures and education but has no clear picture for environmental spending compared to both defense expenditure and development expenditure.

Keywords: Defense, Economic Development, Environment, Health, Education

1. Introduction

The Indian Republic's defense policy has been continually guided by "Panchsheel" (Five principles of peaceful coexistence). However, maintaining a peaceful environment has required a high level of military spending. What makes India's military expenditures relatively high? Is it possible to draw inferences that high military expenditures are a requirement for India? To answer these questions, factors that are major reasons for high military expenditures are also discussed in this study. These include strategic factors, conflicts with terrorism, and disputes with neighboring countries, the military modernization program, and the economic environment of India.

This study builds on the assumption that military spendings effect on economic development and environment is context-specific. That is, defense spending may stimulate development in some situations and dampen it in others. Casual observation suggests that environmental degradation also rises at first

and then falls in the course of economic development. For example, the cities of the newly industrializing countries, be it Seoul, Bangkok or Mexico City, are far more polluted than they were 20-30 years ago. Their pollution levels are rising at rates that match or exceed those of economic growth, while cities in industrialized countries such as Japan, the USA and in Western Europe are cleaner today than they were 20-30 years ago (Theodore Panayotou, 1993).

In a similar way India is also more polluted than it was 20-30 years ago. The level of carbon emitted by India is getting higher day by day as the economic development is constantly happening at a faster pace than the developed countries such as the USA, Japan and other Western Europe nations.

The spending on the development activities by a developing country is less compared to what a developed nation spends for its development, yet developing countries like India compared to its other neighboring countries have faster development rate and higher spending on development activities. There is an increase in the expenditure ratio of the development and defense expenditure which has a positive impact on the economy.

At low levels of development both the quantity and intensity of environmental degradation is limited to the impacts of subsistence economic activity on the resource base and to limited quantities of biodegradable wastes. As economic development accelerates with the intensification of development and defense resource extraction and the take-off of industrialization, the rates of resource depletion begin to exceed the rates of resource regeneration, and waste generation rises in toxicity and quantity.

The defense spending of countries has seen a consistent increase for a long time in order to maintain the peace within and with other nations. Within economics, a number of specialized fields as sub-disciplines of economics have been established such as labor economics, public finance, monetary, environmental, industrial organization, institutional and development. Defense economics has emerged as a relatively new field of study within the sub disciplines of economics. Interest in defense economics began during World War II and has continued to the present day. (Theodore Panayotou, 1993).

In the concern of economic development and environmental benefit most of the world governments have firstly chosen to go with economic growth and development rather than environmental concerns. Even in the spending pattern of defense, development and environment the most of the spending is done on defense and developmental activities.

Only after having some world level conventions and concern upon the environment and climate change the world governments have started to focus on the environment side. Environmental conventions such as, Vienna Convention for the Protection of the Ozone Layer, Ramsar Convention for Wetlands, Convention on International Trade in Endangered Species for Protection of Wild Fauna and Flora, which is administered by UNDP (United Nations Environment Protection Programme), sustainable development goals, etc. These conventions and international programmes have paved the way for spending more on environmental activities.

The study uses descriptive analysis and correlation analysis to get an overview of the association between the 3 time series data namely defense expenditure, development expenditure and environmental expenditure. It then moves on to graphical comparison using charts. The comparison is done first using the actual figures and then using the rate of growth year on year.

2. Review of Literature

Karl R. DeRouen, Jr. (1995) examined the nexus between defense spending and economic growth in the Middle East. The OLS method is applied on the defense-growth model with externalities. The study reveals that the potential for peace dividends in Egypt and Syria is dependent upon higher allocations to non-defense government spending. For Israel, defense cuts alone can actually negatively impact growth in the short run. For Jordan, the defense sector is surprisingly productive and therefore cooperative regional ventures, and not defense cuts will help in attaining any potential peace dividends.

Theodore Panayotou (1993) empirically tests the hypothesis that an inverted U-shaped relationship exists between environmental degradation and economic development. Using cross section data from a sample of both developed and developing countries, the study confirms the U-shaped relationship. The translog functional form is used where deforestation is expressed as a function of income per capita and population density.

Ertugrul Tekeoglu (2008) investigates the relationship between defense spending and economic growth and defense welfare relationship (with health and education as proxies for welfare) for Turkey. The data was taken for the period 1969-2004. Results of a multiple regression showed a negative linkage between military expenditure and economic growth and existence of tradeoffs between military expenditures and welfare spending. There also seems to be a positive association between military expenditures and education.

Abu Nurudeen, Abdullahi Usman (2010) attempted to investigate the effect of government expenditure on economic growth. They have used a disaggregated analysis along with the co-integration and error correction methods. The results revealed that government total capital expenditure (TCAP), total recurrent expenditures (TREC), and government expenditure on education (EDU) have a negative impact on economic growth while higher government expenditure on transport and communication (TRACO), and health (HEA) lead to higher economic growth.

Susanne Oxenstierna (2016) investigates the development of Russian military spending owing to the slow and negative growth of the economy. The paper takes into account both internal as well as possible external factors hampering the growth of the Russian economy. The results reveal that defense still has a high priority in terms of a rising share of GDP while there is still a trade-off between defense and other spending in the budget, even though it is clear that other items such as health services, support to the economy and environmental protection are being reduced significantly. Nevertheless, Russia will have trouble restoring growth and keeping up its military ambitions as long as the economic system is not reformed and productive private economies cannot grow.

Zielinski, Fordham and Schilde (2017) investigate if economic growth and international threats influence military spending. A cross-sectional analysis with a lagged regression model has been used for military spending since World War II. The results show that economic decline has a much greater impact on military spending than economic growth. There was no apparent relationship between international threat and military spending in both short and long run.

Mani, Markandya et al. (2012) examine the key tradeoffs between economic growth and environmental sustainability for India. They have employed a Computable General Equilibrium (CGE) model. The comparisons made between the BAU scenario and the Green Growth scenarios show that a low carbon, resource-efficient, greening of the economy should be possible at a very low cost in terms of GDP growth. They conclude that the carbon dioxide reduction and the health benefits are greater than the loss of gross domestic product in both cases.

3. Results and Discussions

3.1 Data and Methodology

This study is based on 3 variables namely, defense expenditure, economic development expenditure and environmental expenditure for India for the period 2010-2020. All the data is taken from the Ministry of Finance, India and all the figures are actual budget values. The source of data is the Union Budget of India. The interim budgets are excluded. All the figures are in rupees crores. The variable ‘defense expenditure’ includes defense services, pensions, revenue expenditure and civil. The variable ‘economic development expenditure’ or just ‘development expenditure’ is a compilation of health expenditure, expenditure on education and AYUSH. The actual figures and the rate of growth year on year is contained in the appendix.

The study uses descriptive analysis and correlation analysis to get an overview of the association between the 3 time series data. It then moves on to graphical comparison using charts. The comparison is done first using the actual figures and then using the rate of growth year on year.

3.2 Descriptive Statistics

Descriptive statistics are used to get a rough overview of the data series. We can identify the range, mean, maximum and minimum values to get an idea of the extent of variation among the variables considered. Table 3.1 presents the descriptive statistics.

Table 3.1: Descriptive Statistics

<i>Defence</i>		<i>Development</i>		<i>Environment</i>	
Mean	294518.48	Mean	105559.4727	Mean	2105.843636
Median	285004.8	Median	101456.44	Median	2019.75
Standard Deviation	91061.83717	Standard Deviation	28022.86567	Standard Deviation	397.5065833
Sample Variance	8292258188	Sample Variance	785281000.3	Sample Variance	158011.4837
Kurtosis	-1.051413122	Kurtosis	-0.2241619	Kurtosis	-1.46592457
Skewness	0.440651426	Skewness	0.2710189	Skewness	-0.059142133
Range	272978.1	Range	96052.99	Range	1105.49
Minimum	180018.34	Minimum	59425.52	Minimum	1521.12
Maximum	452996.44	Maximum	155478.51	Maximum	2626.61

Source: Union Budget of India

From table 3.1, we can see that defense expenditure has the highest values for mean, standard deviation, maximum and minimum values followed by development expenditure and then by environmental expenditure. However, the range is highest for development expenditure. The low scale of values for environmental expenditure in contrast to the high scale of defense and development expenditure clearly shows the low proportion of the budget expenditure on the environment.

The results show that most expenditure is done on the defense sector to have peace in the South Asia region where India is the leading economy in budget and the fastest developing economy as we can see that the development spending has also consistently increased. However, the spending on the environment is on low levels compared to defense and development spending.

3.3 Correlation Analysis

We now move further to determine the existence of any association between defense, environment and development expenditure. We use correlation analysis for the same. Table 3.2 shows the correlation matrix.

Table 3.2: Correlation Matrix

	Defense	Development	Environment
Defense	1		
Development	0.971627055	1	
Environment	0.565326518	0.542532519	1

Source: Union Budget of India

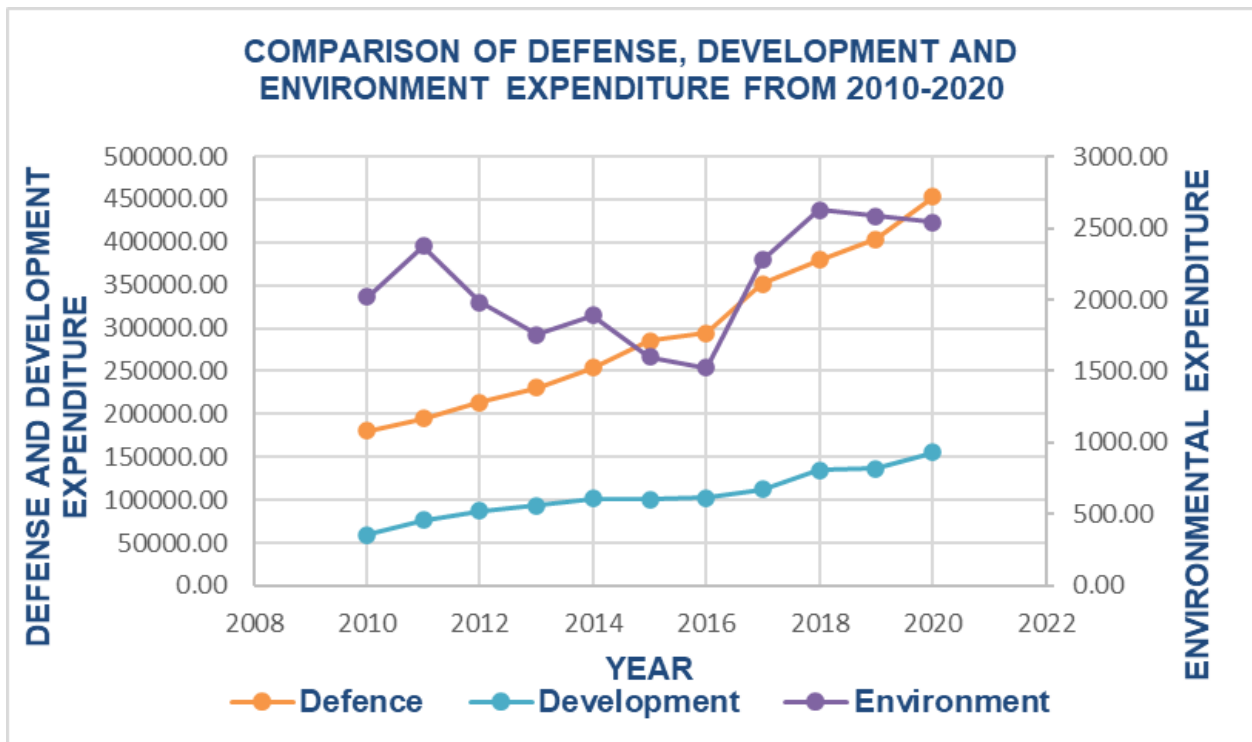
We can see from Table 3.2 that there is a high degree of positive association between defense expenditure and development expenditure, i.e., they tend to move together in the same direction. There exists a moderate positive correlation between defense and environmental expenditure and between development and environmental expenditure.

Thereby, between the period 2010-2020, we can expect the defense and development expenditure to show a similar pattern. This can be seen through the comparison charts contained in the next section.

3.4 Comparison among Defense, Environment and Development Expenditure

The comparison is first done using the actual figures of the 3 variables. This is given in Figure 3.1.

Figure 3.1: Comparison of Defense, Development and Environmental Expenditure from 2010-2020



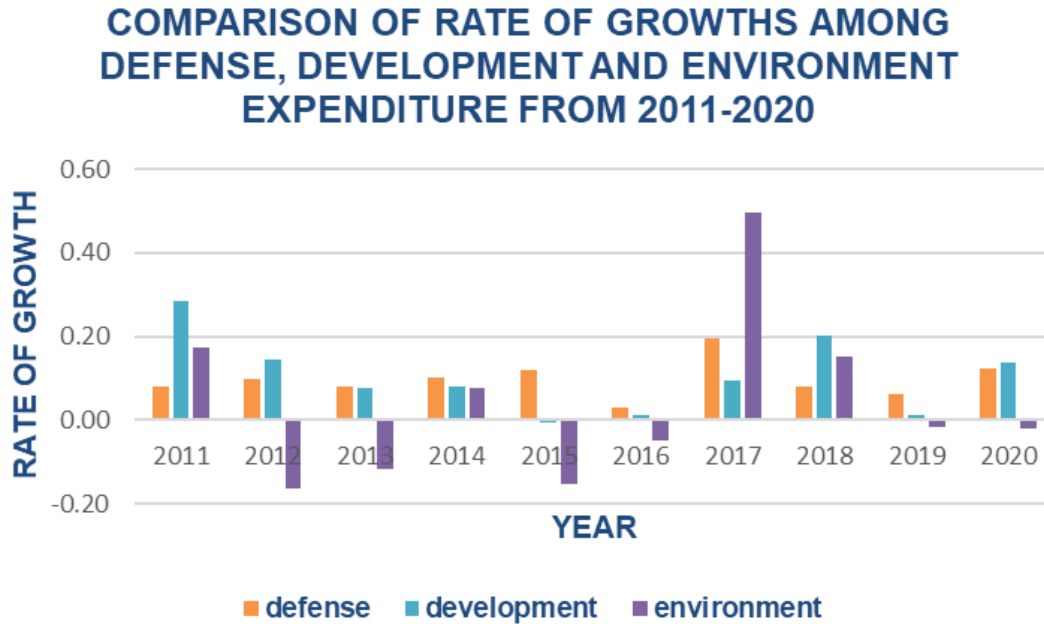
Source: Union Budget of India

In Figure 3.1, we have a primary vertical axis for defense and development expenditure and a secondary axis for environmental expenditure owing to the large deviation in values. The high correlation between defense and development is clearly visible through the upward sloping trend lines. However, there is no clear pattern for environmental expenditure.

As seen in the above chart, we can see that there is a positive correlation in the expenditure of defense and in the expenditure of development but there are a lot of ups and downs in the environment expenditure which shows how the government has been seeing the environment part. Although, after the year of 2017, we can see a steep increase in the expenditure of the environment because of the global conventions on solar energy and other climate change policies.

We next move on to compare the different expenditures using rate of growth. This is given in Figure 3.2.

Figure 3.2: Comparison of Rate of Growth among Defense, Development and Environmental Expenditure from 2011-2020



Source: Union Budget of India

We can infer from Figure 3.2 that the rate of growth of development expenditure has not remained constant. While the rate of growth of defense is nearly stagnant with 1, very low value for 2016. In contrast, environmental expenditure has seen even negative growth rates over the years.

The results of the analysis show there is a positive relation between the defense expenditure and development expenditure as they show consistent increase in the spending pattern. Whereas there is no clear relationship between the expenditure of defense and environment and development and environment as environmental expenditure is not consistent throughout the year as there are many negative growth ratios in so many years as we can see in the Figure 3.2. In the year 2012, 2013 and 2015, there is negative growth expenditure ratio, but there is a sudden increase in the year 2017 because of the policy implications of the move towards solar policies such as Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyaan (PM-KUSUM). The scheme aims to add solar and other renewable capacity of 25,750 MW by 2022.

The defense expenditure shows the consistent growth in Figure 3.1. There is a need to expand the military need to modern equipment and warfare strategy in order to maintain world peace in and around the South Asia as there are many disturbances from the neighboring countries, terrorism and war aggressions. The military expenditure has also shown that there is a correlation between the development expenditure and defense expenditure which leads to improvement in the development of the country's overall growth.

India is one of the main global economies as it commands the 3rd largest military and is one of the important members of Quadrilateral Security Dialogue (Quad). The Quad is a strategic forum of

informal nature. It comprises four nations, namely – India, Australia, USA and Japan. One of the primary objectives of the Quad is to work for a free, open, prosperous and inclusive Indo-Pacific region. The spending increases to have the biggest allies and to have maintain world peace and defend against terrorism which is one of the main problems in Asia pacific region.

The economic development trend in the analysis shows that the expenditure on Health and Education, which are the proxies of development, has been increasing, although the rate of growth in the expenditure is not constant.

4. Summary and Conclusions

Following the results of the analysis we can say that as the expenditure of defense and development is increasing, the expenditure on the environment is very volatile and discontinued as the focus is more on military spending and developmental activities. Another reason could be attributed to the fact that India being a developing economy, the environmental degradation is more compared to any developed country. The defense expenditure can be reduced to some factor and the focus of expenditure can be directed towards the environment and go hand in hand with development. Just as developmental activity is necessary, the conservation of the environment is also becoming necessary considering the climate change of the world.

Although the development expenditure sees a consistent growth, the COVID-19 pandemic has brought to light that no matter what the spending on development activity (Healthcare) is, it is not sufficient as there is still more room for improvement and betterment of the facility. Even the developed countries were hit badly which brought forward the shortcomings of the health care facilities. So, developing countries like India could slightly decrease defense expenditure and focus on developing health care facilities.

The reason for decreasing defense expenditure is that there has not been much aggression from the neighboring countries and the amount of terrorist activities have also reduced over the years. The increase in the defense expenditure had steeply increased in 2016 as the “One Rank One Pension” (OROP) was implemented, which increased the defense expenditure to an extensive level. However, it can be reduced in the years when the aggression from other countries is less and focus can be shifted more towards development and environmental expenditure to ensure a more holistic growth for the nation.

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Appendix

Actual Figures

Year	Defense	Development	Environment
2010	180018.34	59425.52	2019.75
2011	194605.80	76354.23	2371.24
2012	213673.28	87344.97	1982.09
2013	230642.11	93939.83	1753.37
2014	254133.31	101456.44	1889.69
2015	285004.80	101028.83	1599.24
2016	293919.76	102428.68	1521.12
2017	351549.83	112257.00	2277.89
2018	379702.34	134859.54	2626.61
2019	403457.27	136580.65	2585.57
2020	452996.44	155478.51	2537.71

Rate of Growth

Year	Defense	Development	Environment
2011	0.08	0.28	0.17
2012	0.10	0.14	-0.16
2013	0.08	0.08	-0.12
2014	0.10	0.08	0.08
2015	0.12	0.00	-0.15
2016	0.03	0.01	-0.05
2017	0.20	0.10	0.50
2018	0.08	0.20	0.15
2019	0.06	0.01	-0.02
2020	0.12	0.14	-0.02