AN ANALYTICAL APPROACH TO DEFENSE EXPENDITURE AND ECONOMIC GROWTH IN INDIA

[1]Dr.G.Ganesan, [2]Anitha.K.M
[1]Former Professor and Head, , [2]Ph.D Research Scholar
[1]School of Commerce, [2] School of Commerce
[1]Bharathiar University, Coimbatore

Abstract: *The influence of defense expenditure on economic growth has been a considerable attention in defense literature. Earlier studies on Defense expenditure of various countries as well as studies in India have viewed differently in terms of impacts on growth of economy. Hence it is needed to investigate the expenditure for defense in India and to see that whether it or not would affect growth of the economy. To investigate the impact of Defense expenditure the cointegration test has been adopted to find the long run and short run relationship among economic growth, education expenditure, health expenditure and government expenditure. Johansen's Co-integration test and Keynesian model have been used to investigate the impact.*

Keywords: Defense expenditure, Economic growth, Government expenditure, Cointegration

Introduction

India has become the world's largest defense spending country in the world and it has outshone Russia, France, Japan and Saudi Arabia in the defense budget and with an expenditure of over Rs.3lakhs crore in 2016, but it stands behind the developed countries like United States, China and the United Kingdom. In the current scenario people live in the world where security is one of the most important things, for each country it is necessary to ensure internal and external security hence many countries have to allocate more money on defense expenditure.

Generally, a significant inconsistency in society, whether the defense expenditure has a positive and negative influence on economic growth and the effect of defense expenditure on the economy is a controversial area among researchers and economists. The very first empirical research on defense expenditure on economic growth is done by Benoit (1973, 1978), which suggested that the defense budget has a positive impact on economic growth. Followed by Benoit study many researchers have studied the nexus between defense expenditure and economic growth, which lead to a debate whether defense expenditure is favourable or detrimental to the country. Some researchers found an increase in the defense budget would assuredly strengthen the country's economy and some say that more investment in the defense budget would diminish the growth of the economy. Therefore, no clear-cut prediction of the direction of causation between defense expenditure and economic growth has been estimated.

Several researchers conducted many empirical studies and found that defense expenditure induced economic growth Cander (2003), Karagol (2005), Ozsoy (2008), Sheik (2013). The positive relationship between defense expenditure and economic growth is stimulated through the concept, if the country's foreign aid for defense spending compensated the budget appropriation for its armed forces so the sparing budget cut-off on the part of the civilian sector will be under control and also if the defense activities create spill-over characterised by a variety of public infrastructure. According to some researchers, a rapid expansion of defense expenditure entails a heavy financial burden on a country, and there is a negative impact between defense expenditure and economic growth Selami (2004), Husnain and Shaheen (2011), Khalid and Mustapha (2014), Nikalaidou (1999). Because, defense expenditure diverts often limited public funds from basic needs, such as medical care, education, and essential infrastructure, and also massive defense expenditure undermine private investment in non-military industries. A big military budget creates a military- dominated social milieu which is not conducive to a capitalist market economy (Lipow and Antinori 1995). However, some researchers have claimed that (Biswas and Ram (1986), Alexander (1990), Huang and Mintz (1991) there is no relationship between defense expenditure and economic growth.

Considering the fact there exist diametrically different opinions regarding the impact of defense expenditure on economic growth it is needed to check the aspects of defense expenditure on India. Such studies are limited in the Indian context, where Aviral and Tiwar (2010), Yildirim et.al (2006) have analysed in a different perspective. This study adopts the approach of Atesoglu (2002) and analyses the effect of defense expenditure on India's growth levels. This study departs from the previous studies concerning the impact of defense expenditure on India's growth levels as follows: first it utilizes the new macroeconomic theory along with the multivariate cointegration technique of Johansen (1991).

This paper is designed as follows: section 2 introduces the new macroeconomic model that provides the new rationale of estimating the relationship between the defense sector and growth. Section 3 presents the empirical results with their economic implications. Finally, section 4 is devoted to the concluding remarks.

Data and Empirical estimation:

The data of Defense expenditures are taken from the Stockholm International Peace Research Institute (SIPRI) and the data of Gross Domestic Product and other variables were taken from Reserve Bank of India (RBI) annual report and World development bank for the period of 1988-2015. To know the growth of the variables Compound annual Growth rate has been used. All the variables are stated in logarithmic forms to reduce the problem of heteroskedasticity, because it compresses the scale in which the variables are measured. In this research, a recent technique, the Johansen's co-integration test has been adopted to examine whether the variables under consideration share a common stochastic trend or

not to explore the nature of long-run interrelationship among them. The basis of the Johansen Cointegration test Vector autoregressive (VAR) model is adopted with an order k with a (n*1) vector of the endogenous variable in an error correction form. The optimal lag length of the VAR model is based on information criteria such as the Akaike Information Criterion (AIC), Schwarz's Bayesian information criterion (SBIC) and the Hannan- Quinn information criterion (HQIC).

Model Description:

The Keynesian economic theory states that during the recession period the economic output of a country is substantially influenced by total spending in the economy. According to the Keynesian theory the change in total spending impacts production, employment, and inflation in the economy. Every bit the same way Military Keynesianism is the view that the government should increase defense spending in order to increase economic development. Many countries have recognized through Military Keynesianism that the demand for increasing government spending to offset the fall in consumer demand in the economy and also agreed that a boost in defense spending will be the best means to provide the stimulation.

A clear apprehension of the defense spending and economic growth relationship around the globe has been considered through the basis of Military Keynesianism theory and has derived new models in the context from analysing in a highly structured way. Atesoglu (2002, pp. 56-57) outlined a simpler version of the new macroeconomic model for Romer (2000) and Taylor (2000) with an extension for defense expenditure. The empirical equation is derived from the augmented Keynesian model that also includes defense expenditures as a separate variable:

$$Y_t = C_t + I_t + X_t + GE_t + DE_t + HE_t + EE_t \quad (1)$$

Where Y_t is real aggregate output, C_t is real consumption, I_t is real investment, X_t is real net exports, GE_t is real non-defense government expenditure, DE_t is real defense expenditure, HE_t is real health expenditure, EE_t is real education expenditure

$$C_t = a + b(Y_t - T_t) \quad (2)$$

$$T_t = c + dY_t \quad (3)$$

$$I_t = e - f R_t \quad (4)$$

$$X_t = g - h Y_t - iR_t \quad (5)$$

Where T_t is real taxes, R_t is real interest rates and a, b, c, d, e, f, g, h are positive parameters. Equation (1) is the definition of real income, equation (2) is the consumption function, equation (3) is the tax function, equation (4) is the investment function, equation (5) is the net export function. The extension of $C_t + I_t + X_t$

is formulated as the total economic growth and structures as GDP is common and therefore $GDP_t = C_t + I_t + X_t$ (6)

Empirical result:

Unit root test

The Augmented Dickey Fuller test (Dickey and Fuller, 1979, 1981) has been used to test the stationarity of the time series variables used in the study. The table 1 reports the result of the ADF test of the variables Gross Domestic product, Defense expenditure, Government expenditure, Health expenditure and Education expenditure. All the test variables are transformed into logarithmic form to avoid the heteroskedasticity problem. The findings of the ADF test indicated that all the variables are stationary at first difference and it is characterized as integrated of order I(1).

Table 1. Augmented Dickey Fuller test

Variables	t-stat	Intercept
Gross Domestic Product	-10.45308	0.0000 ***I(1)***
Defense Expenditure	-5.128852	0.0003 ***I(1)***
Govt expenditure	-3.437557	0.0191 ***I(1)***
Health expenditure	-6.764924	0.0001 ***I(1)***
Education expenditure	-3.445487	0.0237 ***I(1)***

Source: Authors' calculation

Cointegartion test

Since it has been determined that the variables under unit root test are integrated of order 1, then the cointegration test is performed. The testing hypothesis is the null of non-cointegration against the alternative hypothesis that is the existence of cointegration using the Johansen (1988) maximum likelihood procedure. The first step of cointegration analysis is Ordinary Least Square regression method which is used to calculate the regression coefficients which generated the series of estimated residuals of the variables. The result of the OLS is presented in Table 2 which determines that the coefficient of defense expenditure is 0.268575 which represents the short-run elasticity of Gross Domestic Product, and the R-square value is 0.968947.

Table 2 Ordinary Least Square regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.273338	0.523621	13.89046	0.0000

LDE	0.268575	0.019215	13.97742	0.0000
LEE	0.066620	0.063774	1.044620	0.3152
LGE	-0.232461	0.186814	-1.244342	0.2353
LHE	-0.099053	0.311549	-0.317936	0.7556

R-squared	0.968947	Mean dependent var	8.555362
Adjusted R-squared	0.959393	S.D. dependent var	0.163854
S.E. of regression	0.033019	Akaike info criterion	-3.753355
Sum squared resid	0.014173	Schwarz criterion	-3.506029
Log likelihood	38.78019	Hannan-Quinn criter.	-3.719252
F-statistic	101.4106	Durbin-Watson stat	2.518115
Prob(F-statistic)	0.000000		

Source: Authors' calculation

The residuals series of the variables is generated to examine whether the cointegration test is valid or not. The Augmented dickey fuller test is adopted to check the stationarity of the residual series and the results is given in table 3. The result of the Augmented Dickey Fuller test for the residuals determines that the p-value is 0.0010 which is lower than the 5 per cent significance level and the results also depicts that the residual series are I(0) and the variables are cointegrated.

Table 3 Residual check- Augmented Dickey Fuller Test

		t-Statistic	**Prob.***
Augmented Dickey-Fuller test statistic		-5.077675	0.0010
Test critical values:	1% level	-3.886751	
	5% level	-3.052169	
	10% level	-2.666593	

*MacKinnon (1996) one-sided p-values.

Following the detection of the cointegration relationship between Gross domestic product, Defense expenditure, Government expenditure, Health expenditure, Education expenditure, an Error Correction Model is applied to investigate the short-run and long-run dynamics of the cointegrated variables. The result of Error Correction model in the table 4 measures the long run of the variables D(LDE), D(LEE), D(LGE), D(LHE), Residuals where D(LGDP) is the dependent variable. The coefficient value of Government expenditure is having a negative value and all other variable are in positive effect.

Table 4 Error Correction Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.003496	0.020060	-0.174286	0.8648
D(LDE)	0.268667	0.161975	1.658693	0.1254
D(LEE)	0.193165	0.071190	2.713387	0.0202
D(LGE)	-0.122078	0.234978	-0.519529	0.6137
D(LHE)	0.053395	0.250261	0.213358	0.8350
Res-1)	-1.583189	0.304225	-5.203998	0.0003

R-squared	0.716166	Mean dependent var	0.029778
Adjusted R-squared	0.587150	S.D. dependent var	0.043394
S.E. of regression	0.027882	Akaike info criterion	-4.051084
Sum squared resid	0.008552	Schwarz criterion	-3.757009
Log likelihood	40.43421	Hannan-Quinn criter.	-4.021852
F-statistic	5.551008	Durbin-Watson stat	2.391213
Prob(F-statistic)	0.008568		

Source: Authors' calculation

A Johansen cointegration model is fitted to the data to find an appropriate lag structure. Table 5 represents the results of Johansen cointegration tests. The Trace test indicates that there are 4 cointegrating equations at 0.05 level and the Maximum eigenvalue test indicates 2 cointegrating equations at 0.05 level. It is clear from the Trace statistics and Maximum eigenvalue that there exist a positive cointegration relationship between gross domestic product, defense expenditure, government expenditure and health expenditure in India. Therefore the result indicates that the null hypothesis is rejected at 1 per cent and 5 per cent levels. This implies that the results of the unrestricted cointegration rank test confirmed a long- run relationship between economic growth and defense expenditure in India.

Table 5 Johansen Cointegration Test

Cointegration test (Trend assumption Linear deterministic trend[restricted] Lags interval [in first difference] 1 to 3)					
Unrestricted Cointegration Rank Test (Trace)					
H_0	**H_1**	**Eigenvalue**	**Trace statistic**	**0.05 Critical Value**	**Prob.****
None *	At most 1	0.940518	119.0632	69.81889	0.0000
At most 1 *	At most 2	0.903396	73.90994	47.85613	0.0000
At most 2 *	At most 3	0.716018	36.51584	29.79707	0.0072

At most 3 *	At most 4	0.617418	16.37433	15.49471	0.0368
At most 4	At most 5	0.060664	1.001319	3.841466	0.3170
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)					
H_0	**H_1**	**Eigenvalue**	**Max-Eigen statistic**	**0.05 Critical Value**	**Prob.****
None *	At most 1	0.940518	45.15326	33.87687	0.0015
At most 1 *	At most 2	0.903396	37.39410	27.58434	0.0020
At most 2	At most 3	0.716018	20.14151	21.13162	0.0683
At most 3 *	At most 4	0.617418	15.37301	14.26460	0.0333
At most 4	At most 5	0.060664	1.001319	3.841466	0.3170
*denotes rejection of the hypothesis at the 0.05 level ** MacKinnon-Haug-Michelis (1999) p-values					

Source: Authors' calculation

Conclusion:

In the defense economics literature, the issue of defense expenditure and economic growth has been an extended debate without reaching a clear cut agreement. According to the study India's defense expenditure stimulates economic growth in the short-run and it also accelerates the growth of investments in the country. Though the relationship of defense expenditure on economic growth, health expenditure and education expenditure are positive, the relationship with government expenditure is negative and remains controversial. It means that for every added input to the defense sector, a significant level of inputs is dragged off from the budget of the civilian sector, such as health expenditure, education expenditure and government expenditure, which are equally important for the country's development. So the government should be careful in resolving its insurgency and terrorist problems, without making the country's well-being at a stake condition. Apparently this study provides the presence of positive relationship between India's defense expenditure and economic growth, whereas the impact of defense expenditure on the other sectors is in a conflict situation. So it suggested to the Indian government to equip its country in peace building, conflict transformation, community development and war-free without affecting the civilian sectors.

References:

Alexander, W.R.J. (1990) "The Impact of Defense Spending on economic Growth: A Multi: Sectoral Approach to Defense spending and Economic growth with Evidence from developed economies", Defense Economics. Vol.2, pp.39-55.

H. Somez Atesoglu (2002), "Defense spending promotes aggregate Output in the United States- Evidence from Cointegration Analysis", Defence and Peace Economics, Vol.13(1), pp.56-60.

Aviral Kumar Tiwari, A.P.Tiwari (2010), "Defence Expenditure and Economic Growth Evidence from India", Journal of Cambridge Studies., Vol.,5(2-3), pp.,117-131.

Benoit,E. (1973), " Defense and Economic growth in Developing countries". Boston: Lexington Books.

Benoit.E. (1978), "Growth and Defense in Developing Countries, Economic Development and Cultural Change, Vol.26., pp.271-287.

Biswas.B and Ram.R (1986), " Military expenditures and economic growth in less developed countries: an augmented model and further evidence", Economic Development and Cultural Change, Vol.,34(2), pp., 361-372.

David Romer (2000), " Keynesian Macroeconomics without the LM curve", Journal of economic Perspective, Vol.14(2), pp:149-169.

Dickey.D.A and Fuller ,W.A.(1979), " Distribution of the estimators for autoregressive time series with a unit root", Journal of the American Statistical Association, Vol.,74, pp.427-431.

Dickey.D.A and Fuller ,W.A.(1981), "Likelihood ratio statistics for autoregressive time series with a unit root" Econometrics, Vol.49(4)., pp.1057-1072.

Eftychia K. Nikolaidou "Defence Spending and Economic Growth: A Case Study of Greece and comparison with Spain and Portugal (1960-1996)" Thesis, Middlesex University.

Erdal Karagol (2005), "Defence Expenditure and External debt in Turkey", Defence and Peace Economics, Vol.16 (2), pp. 117-125.

Huang. C. and MintZ. A (1991), "Defence expenditures and economic growth: the externality effect", Defence Economics, Vol.3(2), pp.35-40.

Jonathan Lipow and Camille.M.Antinori (1995), " External Security Threats, Defense Expenditures and the Economic Growth of Less- Developed Countries", Journal of Policy Modeling, Vol.17(6), pp. 579-595.

Masoud Ali Khalid, Alhaji Bukar Mustapha "Military Expenditure and Economic Growth in the Case of China: using ARDL Approach", International Journal of Development and Emerging Economics, Vol. 2, No.1, pp.22-36, March (2014).

Muhammad Iftikhar Ul Husnain, Farzana Shaheen (2011), "Defense Expenditure- Growth Nexus- Empirical Evidence from selected South Asian Countries", Interdisciplinary Journal of Contemporary Research Business, Vol.3, no.4, pp.163-171.

Muhammad Ramzan Sheik, Imran Sharif Chaudhry, Muhammad Zahir Faridi (2013), "Defence Expenditure and External Debt: Evidence from Pakistan and India", *Pakistan Economic and Social Review,* Vol.51, no.2, pp.159-177.

Omur Candar(2003), "Military Expenditure and Economic Growth in Turkey", Thesis, The Institute of Economics and Social Sciences of Bilkent Univeristy.

Onur Ozsoy (2008), "Government Budget deficit, Defence expenditure and Income Distribution: The case of turkey", *Defence and Peace Economics,* Vol. 19(1), pp.61-75.

Selami Sezgin (2004) "An empirical note on external debt and defence expenditures in Turkey", Defence and Peace Economics, Vol.15(2), pp.,199-203.55

Yildirim, Julide and Nadir Ocal (2006), " Arms Race and Economic Growth: the Case of India and Pakistan", Defense and Peace Economics, Vol.17(1), pp. 37-45.

Annexure:

Year	GDP	Defense Expenditure	Government Expenditure	Health Expenditure	Education expenditure
1988	3211.14	133.41	12.20	0	0
1989	3223.84	144.16	12.15	0	0
1990	3361.76	154.26	11.86	0	0
1991	3284.07	163.47	11.64	0	0
1992	3515.84	175.82	11.47	0	0
1993	3627.64	218.45	11.56	0	0
1994	3799.59	232.45	10.97	0	0
1995	3762.43	268.56	11.08	4.01	0
1996	4153.77	295.05	10.86	3.89	0
1997	4030.30	352.78	11.59	4.24	10.7
1998	4317.19	398.97	12.52	4.29	14.7
1999	4421.13	470.71	12.8	4.02	17.6
2000	4394.32	496.22	12.56	4.26	17.4
2001	4678.15	542.66	12.36	4.49	16.2
2002	4297.52	556.62	11.89	4.40	15.1
2003	4763.24	600.66	11.43	4.29	12.6
2004	4766.34	758.56	10.93	4.22	12.7
2005	5029.96	805.49	10.87	4.28	14.2
2006	5237.45	855.1	10.33	4.24	14
2007	5569.56	916.81	10.01	4.22	13.8
2008	5554.42	1142.23	10.64	4.33	14.3
2009	5577.15	1417.81	11.59	4.37	15.3
2010	6068.48	1541.17	11.43	4.27	16.6
2011	6305.40	1709.13	11.08	4.33	16.3
2012	6413.64	1817.76	10.94	4.38	16.4
2013	6589.52	2034.99	10.29	4.52	16.5
2014	6686.32	2223.7	10.44	4.68	16
2015	6686.32	2467.27	10.33	4.70	15.4
Mean	**4761.66**	**817.65**	**11.35**	**3.23**	**10.21**
SD	**1139.584**	**700.8668**	**0.759576**	**1.908299**	**7.299616**
Skewness	**0.349635**	**0.978075**	**0.137917**	**-1.12843**	**0.646644**
Kurtosis	**1.876729**	**2.714805**	**2.119282**	**2.313347**	**1.558678**
CAGR	**-0.507**	**-0.93999**	**0.174029**	**-0.13754**	**-0.2961**

Note: * The values of gross domestic product and defense expenditure are in billions, government expenditure, education expenditureand health expenditure are in share of percentage to gdp.

*The health expenditure data is collected from RBI and available only from 1995, the education expenditure data is collected from UNESCO andavailable only from 1997.

Source: Compiled and calculated from various websites.