DEFENCE EXPENDITURE AND ECONOMIC GROWTH IN SELECTED SAARC COUNTRIES

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In the Name of Allah, the most Gracious, the most Merciful

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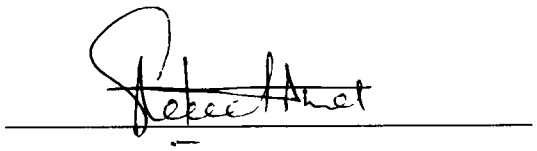

Shakeel Ahmed

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DEDICATION

I dedicate my research work to my loving parents and sister
who brought me up with love
and affection and whose favourable prayers have
enabled me to complete this work.

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All kind of 'Hamad' is for ALLAH S.W.T., Who made me able to complete this research. Who gave me courage and blessed me with light of hope to continue my work in all circumstances.

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ABSTRACT

The issue of causal relationship between defence expenditure and economic growth is of immense importance. A large number of studies have been conducted on this subject but their results are mixed regarding the causal direction. The present study re-examines the causal nexus between defence expenditure and the economic growth for four selected South Asian Association for Regional Cooperation (SAARC) countries over a period of 27 years (1988-2014) by making use of latest panel unit root and panel cointegration tests. In particular, the study considers Pakistan, India, Bangladesh and Sri Lanka on the basis of availability of data. It is important to note that these countries are net importers of arms and ammunition and make heavy defence expenditure. Most of the existing studies on this subject used first generation of panel unit root and panel cointegration tests that assume that all cross sectional units are independent. However, this is clearly a very restrictive assumption; keeping in view the geographical nature of the selected countries is concerned. So the first generation tests may mislead and cannot provide the true picture of the relationship between defence expenditure and economic growth. This study makes use of second generation panel tests for unit root and cointegration which do not assume this restrictive assumption of cross sectional independence and thus provide more robust findings. In particular, Pesaran's (2004) cross-sectional dependence (CD) test is used to investigate dependence among cross sectional units. After confirmation of cross sectional dependence, CIPS panel unit root test proposed by Pesaran (2007) is applied to test each variable for a possible unit root. For cointegration, Westerlund (2007) panel cointegration tests are employed. The long run coefficients are determined by using Dynamic Ordinary least square

(DOLS) and, lastly, Panel Vector Error Correction Method (PVECM), is used to analyze the causal direction between economic growth and defence expenditure. The empirical results suggest that a unidirectional causal effect exists and runs from defence expenditure to economic growth in short run and a bidirectional causality exists between the two in the long run for four selected SAARC countries.

Key Words: Defence Expenditure; Economic Growth; Second generation unit root and cointegration tests

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CONNOTATION

2SLS:	2 Stage Least Square
3SLS:	3 Stage Least Square
ADF:	Augmented Dicky Fuller
AEDB:	Alternate Energy Development Board
ARDL:	Autoregressive-Distributed Lag
ASEAN:	Association of South East Asian Nations
AWACS:	Airborne Warning and Control System
AWC:	Air Weapon Complex
BAF:	Bangladesh Air Force
BMTF:	Bangladesh Machine Tools Factory
CADF:	Cross sectional Augmented Dicky Fuller
CAS:	Centre for Airborne Systems
CAS:	Centre for Airborne Systems
CD:	Cross sectional Dependence
CENTO:	Central Treaty Organization
CIA:	Central Intelligence Agency
CIPS:	Cross Sectional IPS
CVRDE:	Combat Vehicles Research and Development Establishment
DE:	Defence Expenditures
Defexpo:	Defence Export
DESTO:	Defence Science & Technology Organization
DOLS:	Dynamic Ordinary least Square
DRDO:	Defence Research and Development Organization
EC:	Error Correction
ECM:	Error Correction Modeling
EG:	Economic Growth
EME:	Electrical and Mechanical Engineering
FATA:	Federally Administrated Tribal Areas
FIML:	Full Information Maximizing Likelihood
FMOLS:	Fully Modified OLS
GMM:	Generalized mean of Moments
HIT:	Heavy Industries Texla
IDEAS:	International Defence Exhibition and Seminar
IDS:	Integrated Defence Systems
IGLS:	Iterated Generalized Least Square Regression
IISS:	International Institute for Strategic Studies
IMF:	International Monetary Fund
IPS:	Im, Pesaran and Shin
ITSLS:	Iterative Three Stage Least Square
JVP:	Janatha Vimukthi Peramuṇa (People's Liberation Front)
KRL:	Kahuta Research Labortries
KS:	Karachi Shipyard
LDE:	Log of Defence Expenditure
LEG:	Log of Real GDP as proxy of Economic Growth
LNDE:	Log of Non Defence Expenditure

LTTE:	Liberation Tigers of Tamil Eelam
MSME:	Ministry of Micro, Small and Medium Enterprises
MULTIMOD:	Multi region econometric Model
MW:	Maddala and Wu
NDC:	National Development Complex
NDE:	Non Defence Expenditure
NESCOM:	National Engineering and scientific commission
NGO:	Non-Government Organization
NLS:	Nonlinear Sequential Model
NRC:	National Research Council, Sri Lanka
OECD:	Organization for Economic Co-operation and Development
OJT:	On Job Training
OLS:	Ordinary least Square
PAC:	Pakistan Aeronautical Complex
PMG:	Pooled Mean Group
POF:	Pakistan Ordnance Factories
PVAR:	Panel Auto Regressive
PVECM:	Panel Vector Error Correction
R&D:	Research and Development
RWA	Rolling Window Approach
SAARC:	South Asian Association for Regional Cooperation
SATUMA:	Surveillance And Target Unmanned Aircraft
SEATO:	Southeast Asia Treaty Organization
SIPRI:	Stockholm International Peace Research Institute.
SPD:	Strategic Planning Directorate
USSR :	United State of Soviet Republic
VAR:	Vector Auto Regressive
VECM:	Vector Error Correction Model
WDI:	World Development Indicators.

Chapter 1
INTRODUCTION

1.1 Background of the Study

Defence of a country remains a supreme priority for its government. Every country tries to avoid the war conditions but once it is started there is no other choice but wining it. Preparing herself for the war conditions is a difficult and time consuming task. Hence a country starts to raise her defence expenditure. Due to rise in defence expenditure by one nation the other nations feel insecure, which ultimately compel them to raise their defence expenditure too. In this way the rise in defence expenditure leads to the danger of insecurity. Hence the defence expenditures prove to be a paradox of security in the present world.

Different hypothetical approaches have been used in the literature to investigate the relationship between defence expenditure and economic growth. A few focus on the social benefits from the defence research and development expenditures. Gold (2005) and Benoit (1973) is of the view that modernization of the society is actually a dividend of defence expenditure

If the security issues of a country are resolved then whether these defence expenditures will cease to exist? This may not necessarily happen due to the following reasons.

First, any country produces arms and ammunition not only for its own security but she exports them to other countries for their security as well, which produces a positive impact on exporting country's balance of payment (Mustafa, 2004).

Second, the Research and Development (R&D) of defence sector are ultimately used by the private sector and in this way the research & development of military improves physical quality of life index.

Third, defence sector is probably one of the largest employment providing sector in these countries especially in such circumstances when unemployment is one of the major problems. (Grobar, 1989)

Fourth, political motives may also influence defence expenditure the military forces may not directly involved in administrative affairs yet they have a significant hold on government policies. In this way the military intervention leads to rise in defence budget (Ayesha, 2007).

Fifth, the defence expenditure on the civil development projects play a vital role in the development of infrastructure in the country. For example, the strategic roads, irrigation, communication, civil aviation, civil defence, etc. in these developing Asian countries. (Kennedy, P.M. 1983)

The study examines the relationship between defence expenditure and economic growth in four selected countries of South Asian Association for Regional Cooperation (SAARC). These four countries has been chosen keeping in view the availability of data on defence expenditure.

An Overview of Defence expenditure and economic growth Nexus

A prominent increasing trend in the defence expenditure can be seen from the last two decades in these developing economies. Pakistan's Defence expenditure has increased to Rs.863 billion for 2014, compared to last year's Rs. 777 billion. In India it is Rs. 3050 billion for 2014 while it was Rs. 2778 billion in 2013. In Sri Lanka it increased from Rs. 237 billion to Rs. 241 billion for the same period. In Bangladesh this budget increased from 142 billion Takka to 156 billion Takka. (Stockholm International Peace Research Institute SIPRI Year book 2014). These defence expenditures are supported under the umbrella of security threat but there may some other factors which may drive this white elephant in the developing nations. Defence Economics

which is an emerging branch of economics has developed a thought of war led development policy among the poor nations. As a result the increasing trend of defence expenditures can be traced out particularly in South Asian countries

Theoretically the production possibility curve shows how much one good has to be scarified to produce the other good in the economy under full employment conditions. The classic example to illustrate the production possibility frontier is the butter versus guns choice. That is more guns (more security), less will be the butter and consumer products. Furthermore, defence expenditure take away the due share of investment in the capital goods and economic growth opportunity is reduced due to increased defence share.

Economic growth is possible in a society having security, feasible environment for investment, rule of law, good governance, etc. This shows that security from external, as well as internal threats is essential for the economic growth. Insecure environment may lead to decrease in the local as well as foreign investment, mobility of labor, and capital inflow. A change in the political and defence strategy of the neighbor country may lead the other country to alter the strategic positions and the defence expenditure as well (Benoit, 1973).

In the present age where the race of arms is in its full swing particularly in south Asia, the economists paid less attention to this burning issue. Though a number of studies are available which focus on the groups of the countries (e.g. Benoit, 1973; Deger, & Smith, 1983; Deger, 1986; Chowdhury, 1991; Heo, 1998) but the results of the studies are cannot be generalized for a particular direction of the causal relationship between defence expenditure and economic growth. As the arms race have a deep concern with resource allocation in a complex and competitive

scenario and many studies have been made to understand this interdependence, yet Asian and particularly south Asian countries have not received the due attention.

1.2 Problem Statement

Many studies have been carried out to analyze the impact of defence expenditure on the economic growth in Asian Countries. (e.g. Joerding, 1986; Lacivita, 1991;Tahir, 1995; Dakurah, 2001; Karagol, 2003; Kollias, 2004; Dunne, 2005; Hirnissa, 2009; Hou, 2009; Anwar 2012; Odehral, 2012;Shahbaz, 2012; Wijeweera, 2012; SriniVasan, 2013; Khalid, 2014; Ali 2015; Khalid, 2015; Shah, 2015; Ogbokor, 2015). The problem in these studies is that the results are MIXED. This inconsistency is composed of four different hypothesizes i) Defence is growth neutral, ii) Defence causes growth, iii) Growth causes defence and iv) Defence and growth have bidirectional causality.

The Study by Aslam (2007), Khan (2000) and Biswas (1986) evidence that defence expenditure neither stimulate nor retard the economic growth. While some studies suggest that defence expenditure causes economic growth (Aizenman, 2006; Benoit, 1978; Rothschild, 1977; Looney, 1983). The studies done by Harris (1988), Looney (1990) Anwar (2012), Dakurah (2001) and Ogbokor (2015) find that economic growth causes defence expenditure. While Abu-Bader (2003), Lacivita (1991), Tahir (1995), Heo (1998) and Khilji (1997) found a feedback effect between defence expenditure and economic growth.

The inconclusiveness of the findings of different studies may be due to difference in data length, difference in countries having different socio economic structure, difference in period and the difference in methodology used. Each hypothesis has different policy implication for the

policy makers. That is why it is very important to investigate the issue for SAARC countries. Enabling what exactly the causal direction exist in south Asian countries.

A very few cross sectional studies have been done on ASEAN countries. The problem in these studies is that they have assumed cross sectional independence. While, the countries may have cross sectional dependence in a specific region because in a particular region the defence expenditure of the hostile country stimulates the endangered country to keep a balance of power in the region like in the case of India and Pakistan (Tahir & Sajid, 1996).

The defence expenditure in the selected SAARC countries increased dramatically. Indian race for arms created the misbalance of power in the region and stimulated the defence expenditures of endangered countries. The studies done by Pradhan (2007) and Hassan et al. (2003) for the SAARC countries are prior to this sudden increase impaired with short data span. So there is intense need of studying this sleeping volcano.

Some recent studies (e.g. Wijeweera, 2009; Anwar, 2012; Shahbaz, 2013; Khalid, 2014; Shah, 2015; Ali, 2015) shed light on the relationship between defence expenditure and economic growth in case of individual countries but a panel study for SAARC countries is missing which is quite surprising.

1.3 Research Objectives

The settled objectives of the study are described as under:

First and foremost objective of the study is to investigate the existence of relationship between defense expenditure and economic growth in the selected SAARC Countries. In particular, this study tests the validity of four possible complementary hypotheses (i.e. i- Defence

is growth neutral, ii- Defence causes growth, iii- Growth causes defence and iv- Defence and growth have bidirectional causality).

Once it is established that there exists a causal relationship between defence expenditure and economic growth then the next question is to know the impact of causal variable on the regressand both in short as well as in the long run.

To devise policy recommendations on the basis of empirical findings.

1.4 Research Questions

The study is an attempt to answer the following research questions:

- Does any causal relationship exist between defence expenditure and economic growth in selected SAARC countries?
- If yes, then what is the direction of causality between defence expenditure and economic growth?
- What are their short as well as long run impacts?

1.5 Organization of the Study

The rest of the study is organized as follows;

Chapter 2 provides the historical perspective of the defence expenditures in the South Asian countries. Chapter 3 briefly reviews the literature available on the defence expenditure and economic growth causality nexus. Chapter 4 sheds light on the research methodology and the econometric techniques. Chapter 5 describes the features of the collected data and the empirical results of the analysis. The conclusion, Policy recommendations and limitations of the study are presented in chapter 6

CHAPTER 2

HISTORICAL PERSPECTIVE OF DEFENCE EXPENDITURES

2.1 Chapter Introduction

The South Asian region has a history of animosity among member countries. There were wars between India and Pakistan. There are long standing disputes between countries which need to be resolved. There is terrorism which has jolted the region with shocks. The countries of the region eye each other with suspicion and accuse each other of sponsoring and promoting terrorism. The countries of the region are caught in the cobweb of distrust, deceit and hostility that they are forced to allocate huge resources for defence.

Justification of defence expenditure of each country is presented under historical perspective separately in the following section describing the issues and conflicts as a plausible reason of continuous increasing defence expenditure in these countries.

From the very first day the man remained trying to acquire different goods. Sometimes this acquisition of goods and things compelled him to attack on the others. This created the sense of protection for themselves and their ownership. By the time the individuality converted into the societies due to their common interests. These common interests were to be protected as well. The groups converted into societies and societies converted into countries. Similarly the personal interests transformed into the national interests and then the idea of national defence was created.

Whenever a country strengthens her by acting upon the policy of "First offence is the best Defence" then it creates the sense of insecurity in the other nation. Ultimately the second nation compelled to improve her defence. In this way all the countries started to increase their defence expenditure.

2.2 Historical Perspective of Pakistan

Since its inception in 1947, Pakistan has been in a constant state of animosity with India. In fact Pakistan got its independence with a baggage of hostility from British India and to secure its independence she has to make higher allocations towards defence budget. Various phases in the history of the country explain the cause of higher defence expenditure. Indian invasion in Kashmir in 1948 awoke the sense of insecurity and Pakistan was compelled to keep her forces stand by for an ever unseen threat from the hostile neighbor. So Pakistan kept on spending on her defence requirements by curtailing other development expenditures. Pakistan was attacked in 1965 with an objective to dismember Pakistan but due to strong resilience in the face of adversary, the objective could not be achieved by India. However, in 1971 India successfully achieved its objective by dividing Pakistan and carving Bangladesh out of it. Since then every move on part of India is taken with suspicion in Pakistan. With announcement by Prime Minister Z.A. Bhutto that we will eat grass but will build nuclear weapon set the direction for the coming events to unfold. Economic prosperity would be meaningless if the country could not maintain its independence. (Rehman, 1999)

The occupation of Afghanistan by the Soviet Union added to Pakistan's sense of insecurity and she had to make alliance with the United States of America (USA) for its survival and adding more resources to its defence needs. The Soviet Union pulled out of Afghanistan in 1988. Pakistan was left alone by USA to face the consequence of ravages of war in Pakistan.

The World Bank and International Monetary Fund (IMF) developed a pressure on Pakistan to reduce its defence spending. The financial aid was linked with reduced military

expenditures but in vain. In 1998, Pakistan detonated its nuclear devices in Chagi[1], the USA imposed sanctions against Pakistan but could not deter her from perusing the path of nuclear deterrence against foreign invasion. Pakistan is determined to safeguard its geopolitical and military interest and has been doing so at the cost of reduced economic growth.

The military mindset gives priority to defence needs than economic growth. So huge allocations were made for defence expenditure and multipurpose projects were undertaken with military needs in mind. The downside effect of this policy has decreased economic growth but now Pakistan is able to meet most of its defence needs from indigenous resources. At the same time she is exporting its surplus defence output to other countries.

At the time of independence of Pakistan in 1947 all arms and ammunition producing factories fell in Indian Territory. The Kashmir issue in 1948 awakened the sense of building the defence industry in Pakistan. The R&D departments established under the umbrella of Strategic Planning Directorate (SPD[2]) have led towards the self-dependency and economic growth through import substitute and export promotion. Under the command of Chief Executive of Pakistan General Prevez Musharaf Pakistan defence industry initiated the biannual exhibitions in 2000 under the title of International Defence Exhibition and Seminar (IDEAS[3]). The exhibitions held in 2000, 2002, 2004, 2006, 2008, 2010 and 2014 successfully achieved its targets. The concept of IDEAS successfully attracted the attention of many leading defence industries and services.

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[1] According to the Tehsils & Unions division in District Chaghi it is the largest district of Pakistan. Chaghi or Chagi is situated in the northwest corner of province Balochistan, Pakistan.

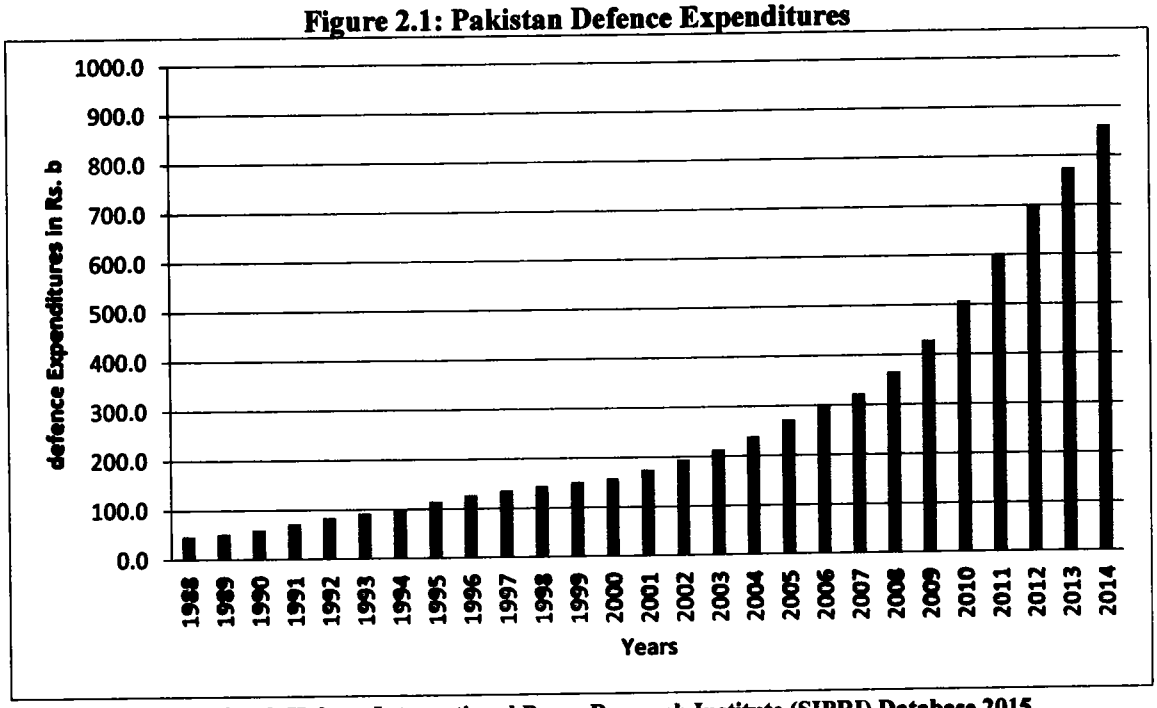
[2] Research and Development Departments under SPD are listed as National Engineering and scientific commission (NESCOM), which is further composed of National Development complex (NDC), Air Weapon Complex (AWC), Defence Science & Technology Organization (DESTO), Electrical and Mechanical Engineering (EME), Heavy Industries Taxila (HIT), Kahuta Research Laboratories (KRL), Pakistan Aeronautical Complex (PAC), Pakistan Ordnance Factories (POF), Surveillance And Target Unmanned Aircraft (SATUMA), Integrated Defence Systems (IDS), Karachi Shipyard (KS) and many others

[3] The International Defence Exhibition and Seminar IDEAS are proved to be the best defence industry for promotion and procurement of military and defence related technology.

Following are the glimpses of the spill over dividends of Pakistan's Defence budget. Alternate Energy Development Board (AEDB) and the renewable energy are the projects of Electrical and Mechanical Engineering (EME) College which were specially started for SiaChen soldiers and now the solar water heater are being used in private sector. The role of FWO and many more are examples of such defence dividend in private sector.

A brief review of Pakistan's Defence Expenditure is shown in Figure 2.1

Figure 2.1: Pakistan Defence Expenditures



Source: Stock Holmes International Peace Research Institute (SIPRI) Database 2015

The figure shows a sharp increase from 2000 and onward in the defence expenditures of Pakistan where her defence budget raised 441% during last 14 years. The nonlinear trend shows an increasing rate of growth in defence expenditures of Pakistan. Pakistan has 617000 active troops, 513000 reserved and 304000 paramilitary troops generating a sum of 1434000 out of 55,770,000 labor forces[4]. Not only this but on job training (OJT) and the fringe benefits reaped

[4] International Institute of Strategic studies (IISS) 2012, pp. 367-370

by defence related persons are far better in this severe situation. But this OJT is merely useful in other sectors and the huge cost of fringe benefits may slow down economic growth.

2.3 Historical Perspective of India

India got independence in 1947 from formal British colonization. The birth of independent state was not without pangs. As a consequence of historical process, the subcontinent was divided into two parts, India and Pakistan. Although there are cultural similarities between the two nations, yet they felt strongly opposed to each other which resulted into three major wars and numerous small engagements. This has led to an arm race leading to the acquisition of nuclear technologies and missiles technologies besides importing huge armament from abroad. The Indo China war of 1962 took India by surprise and its forces were beaten badly by the Chinese Army. This sense of insecurity on part of India against a foreign aggression necessitated allocation of large sum of money to meet defence needs. (Lubna, 2007 and Calvin, 1984)

India did not recovered fully from the shock of nuclear detonations by Pakistan when Kargil created a situation for both countries to go to a full fledge war. Had the sanity not prevailed it would have resulted into a nuclear war. The risk of total annihilation and destruction has forced India to make arrangements for the dismemberment of Pakistan and allocating heavy budget for the cause.[5]

A continuous cause of conflict in India and Pakistan in the form of Kashmir issue never let them reduce their defence budget. Both countries claimed to the area as their territory and fought for it right from their independence in 1948.

[5] Subir Bhaumik. "Guns, drugs and rebels". India-seminar, (2009)

After Independence, most of the ordnance factories fell to India. She further not only maintained those industries but established new ones to be benefited by their spillovers. In India there are 52 defence related research organization including Centre for Airborne Systems (CAS) and Combat Vehicles Research and Development Establishment (CVRDE) are working under Defence Research and Development Organization (DRDO). All these have stimulated Indian defence budget. India imported even sophisticated arms and ammunition from abroad and established new R&D centers. Thus a process started which has not ended to present date.

India developed an emerging market in the region under the shield of security threat and holds defence exhibitions on bi-yearly bases under the title of "Defexpo India[6]".

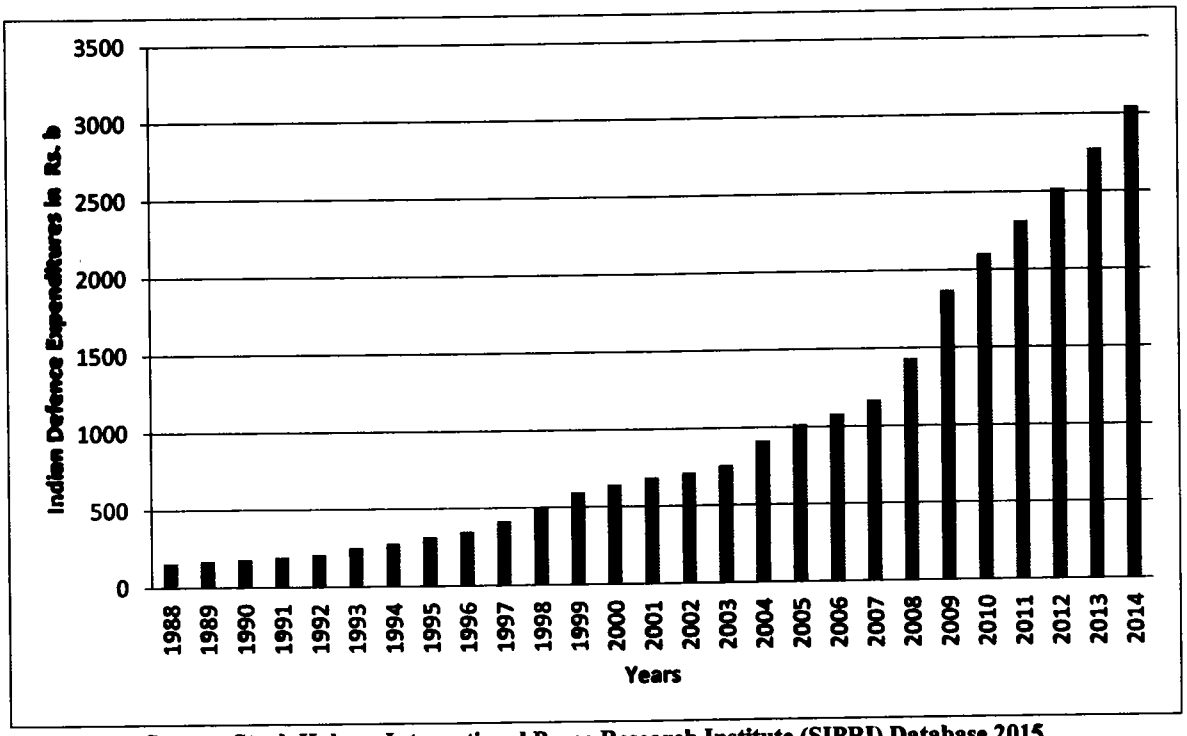
Currently the Indian troops make the world's third largest army having Active personnel 1,325,450 and Reserve personnel 1,155,000[7] which also has pushed its defence expenditure in the upward direction.

Keeping in view of her declared and undeclared borders India developed a doubt of insecurity. So following the policy of first offense is the best defence she has started to raise her defence budget. A significant increase of 21.6% in the defence budget can be seen in1999 and 2009respectively. It again jumped in 2008 and 2009 when a rise of 22.9% and 30.5% in defence budget was observed due to allocating huge budget for defence R&D. The statistics shows that the Indian defence budget has been increased 1831% over the observed period[8].

[6] DEFEXPO is an International Ministry of Micro, Small & Medium Enterprises (MSME) Sub Contracting & Supply Exhibition for DEFENCE - AEROSPACE & HOMELAND SECURITY.
[7] IISS 2012, pp. 243–248
[8] Stock Holmes International Peace Research Institute (SIPRI) database 2015

Following figure presents an overview of Indian Defence expenditure

Figure 2.2: Indian Defence Expenditures



Source: Stock Holmes International Peace Research Institute (SIPRI) Database 2015

The figure shows that Indian defence budget increased at an increasing rate from 1988 to 2014. The Indian defence budget suddenly jumped in 2009 when its defence expenditure raised from Rs. 1436 b to Rs. 1874 b. Overall trend shows a significant rise in defence budget of India accompanying 375% increase from 2000 to 2014.

2.4 Historical Perspective of Sri Lanka

In the south most of the Asia, Sri Lanka appeared as a peaceful country. The benefits of peace and stability for her citizens could not be proved long lasting as she faced threats from various sources both within and from outside of Sri Lanka. As national security is foundation of freedom of any nation, guarding against threats to national security is the basic duty of any

government. Sri Lankan government is fully aware of this and has chalked out strategy to deal with internal and external threats to its security and is allocating a big chunk of resources to safeguard its freedom and prosperity of the people.

After independence, national security was not the primary concern of the government of Sri Lanka (Ceylon). It had excellent relationship with other countries within and outside the region and was a non-aligned country not having military ties either with USSR or USA. Hence the attention given to build military resources was at its minimum. Sri Lanka has maintained only a ceremonial military and there was very little attention on Defence Apparatus of the country. Sri Lanka was not compelled to build and maintain a large military force as she has learnt from the attempted coup in 1962 which created fears that a strong military force could hijack the democracy as had happened in Pakistan, a neighboring country. This led to a reduced funding for the armed forces and recruitment was practically curtailed to limit the defence forces role in the affairs of the country.

In 1971, the JVP (Janatha Vimukthi Peramuṇa) started its insurgency. As Sri Lanka has not strengthened its military so she was not in a position to counter insurgency within its resources. The forces from India and Pakistan took control of main installations with weapons coming from Britain and USSR. The insurgency was curtailed successfully but left deep scars on national psyche. People wanted a strong army capable of dealing with all sorts of internal turmoil and external threat. In 1972 Ceylon was declared as Sri Lanka. The defence was the priority of the government as demanded by the general public and realized by politicians and statesmen of the country.

A viable national security policy was envisaged with goals and objectives to be met from within its resources. Too much allocation for defence needs create economic imbalance and lead to poverty thus ruining the basic of national security and too little would make the country vulnerable against internal and external threats. So a policy was designed keeping in view national cohesion, political and economic stability, counter terrorism and effective response to outside threats.

In late 1970s, the terrorism imposed on Sri Lanka by Tamil separatist groups in North and East became largest ever threat to its sovereignty. The riot between Sinhalese and Tamils in 1983 took the whole country in its grip. The attacks by Liberation Tigers of Tamil Eelam (LTTE) created deep sense of insecurity among the masses. Due to this whole development process was derailed. (Taraki, 1994)

The government of Sri Lanka strengthened its positions by inducting specialized units like Commando Regiments and Special Boat Squadron of the Navy into its fold. The LTTE killed hundreds of civilians in bomb blasts that occurred in streets and markets of the country. The economic institutions also heavily suffered and there was military everywhere in the streets, bazaars, at check points and outside government buildings. The country was at a serious war with the militants. Sri Lankan troop's strength was observed at 259200 personals including 98200 reserve active troops.[9]

In 2006, LTTE closed Maavilaru Sluice[10] Gate preventing flow of water to thousands of people for consumption and agricultural use. This led to another campaign by the Sri Lankan

[9] International Institute of Strategic Studies (IISS) 2010 pp. 370-371
[10] Eastern parts of Sri Lanka are supplied with water through a water channel named as Mavil Aru meaning Mother River.

force which was resisted by Tamil Tigers. The campaign went on and Tamil Tigers were eventually defeated in 2009.

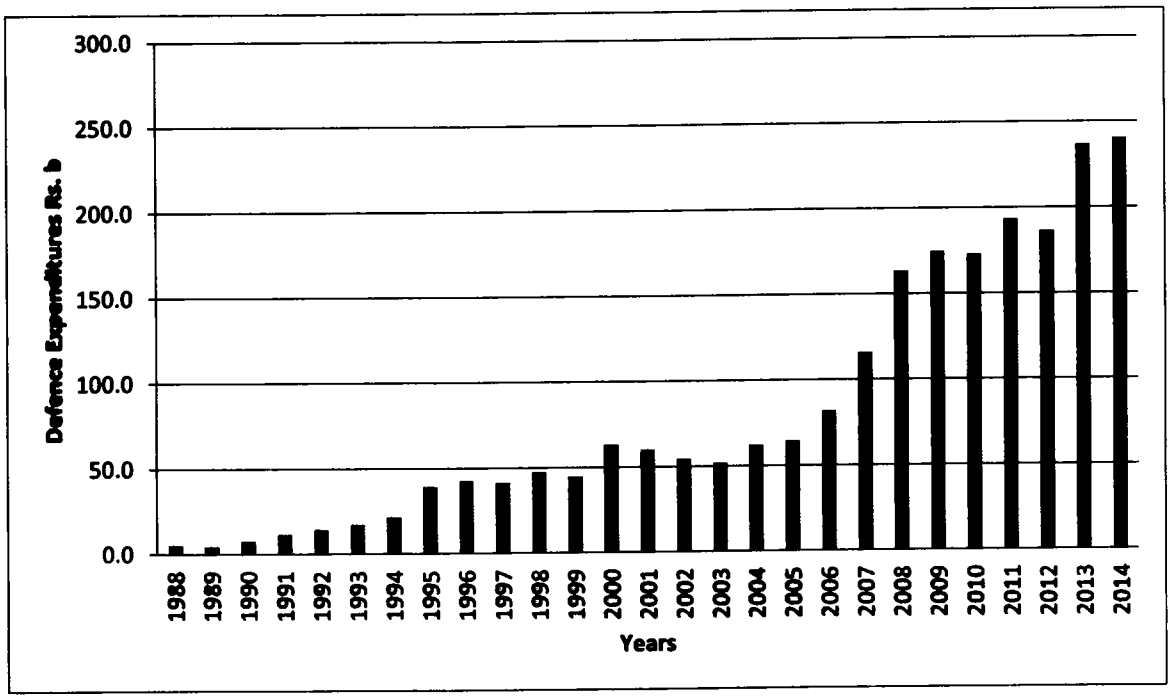
Sri Lanka learned that she had to build and maintained its defence forces in a condition of preparedness. This requires allocation of resources for military needs. Though the country after the demise of Prabhakaran is safe but it has potential dangers due to its past experiences. A divided society with hatred has created a situation where the possibility of re-emergence of terrorism, chances of ethnic divisions and communal aggression, emergence of other extremist groups, growth of organized criminal groups, interference from outside of the country in domestic affairs and threats of propaganda looks imminent (Wijeweera, 2012) .

Sri Lanka developed its arms industry as National Research Council (NRC) Sri Lanka, which is also engaged in defence related research and their fruits are being enjoyed by private sector (Hitch, & McKean, 1967).

Figure 2.3 shows a varying increase in the Sri Lankan defence budget over a period of 26 years. This may be due to Sri Lanka fought four main civil wars under the title of EELAM[11] wars I-IV starting from 1983. Eelam wars II (1990-95) compelled Sri Lanka to raise her defence expenditures. As the second Eelam war started in 1990, it gave a positive shock to the Sri Lankan defence budget and was recorded 65.4% increment. Another significant increase in defence expenditure can be observed in 2008 when her defence budget shoot 41%. Four phases of Eelam wars completed in 2009 leaving scars on the pages of Sri Lankan history

[11] The civil war between Sri Lankan government and LTTE are named as Eelam wars.

Figure 2.3: Sri Lankan Defence Expenditures



Source: Stock Holmes International Peace Research Institute (SIPRI) Database 2015

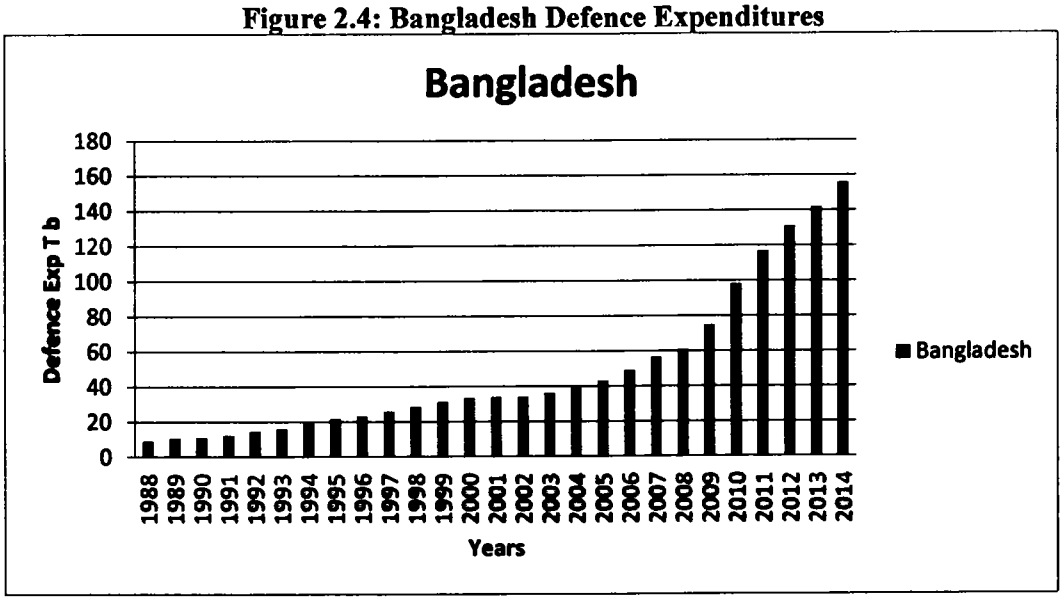
2.5 Historical Perspective of Bangladesh

In March 1971 Major Zia ur Rehman and Lieutenant Abu Usman defeated the Pakistan army and a political leadership announced an independent country named Bangladesh. A country which came into being as a result of military insurrection was in dire need of military support to sustain its freedom. Bangladesh got assistance from India to make this revolt possible. Whereas on one side, Pakistan got favor from USA under Hennery Kissinger's recommendations and India was supported by USSR to reduce USA influence in subcontinent. In July 1971 Bangladesh Sector Commanders Conference decided to organize its own forces and not to depend upon Indian aid. Bangladesh force was organized in eleven sectors and three commands (Jayoti,S.G, 1974 and bengalrenaissance 2015).

The troop's strength of Bangladesh (i.e. 400,000 Active personnel, 2,280,000 Reserve personnel) proves to be a huge burden on its economy. [12]

Following the tracks of India and Pakistan, Bangladesh developed its arms industry under the title of Bangladesh Machine and Tools Factory (BMTF), BAF Aeronautical Center and Khulna Shipyard. Though benefits of these arms producing industries to civilian sector are far less as compared to their budget allocated, yet are important as they produce defence import substitutes to some extent. Figure 2.4 present a brief picture of Bangladesh defence expenditures from 1988 to 2014.

Figure 2.4: Bangladesh Defence Expenditures

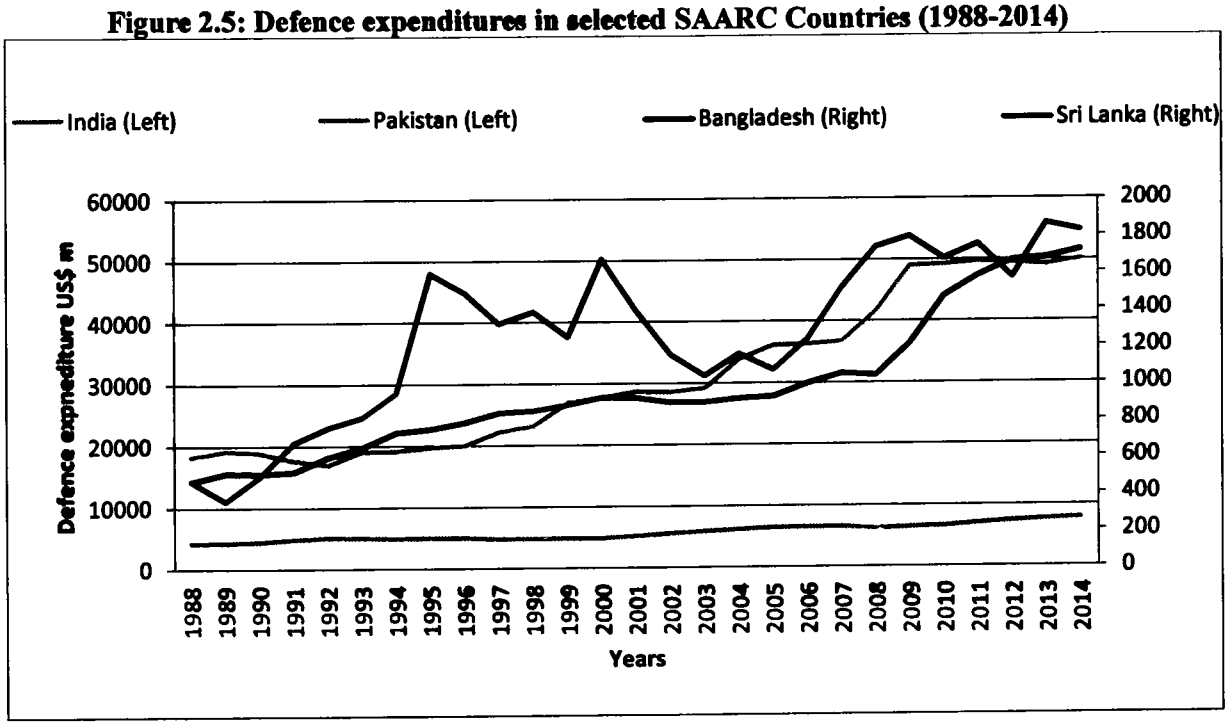


Source: Stock Holmes International Peace Research Institute (SIPRI) Database 2015

A significant nonlinear increasing trend in defence expenditures of Bangladesh can be observed after 2006 when her defence budget raised 14.9%. This increment further jumped in 2009 and 2010 when defence expenditure took a rise of 23% and 31% respectively. In this way the defence budget of Bangladesh rose 1613% over a period of 26 years. Figure 2.5 describes defence expenditures of SAARC countries in the local currency units.

[12] International Institute of Strategic Studies (IISS) 2012.

Figure 2.5: Defence expenditures in selected SAARC Countries (1988-2014)

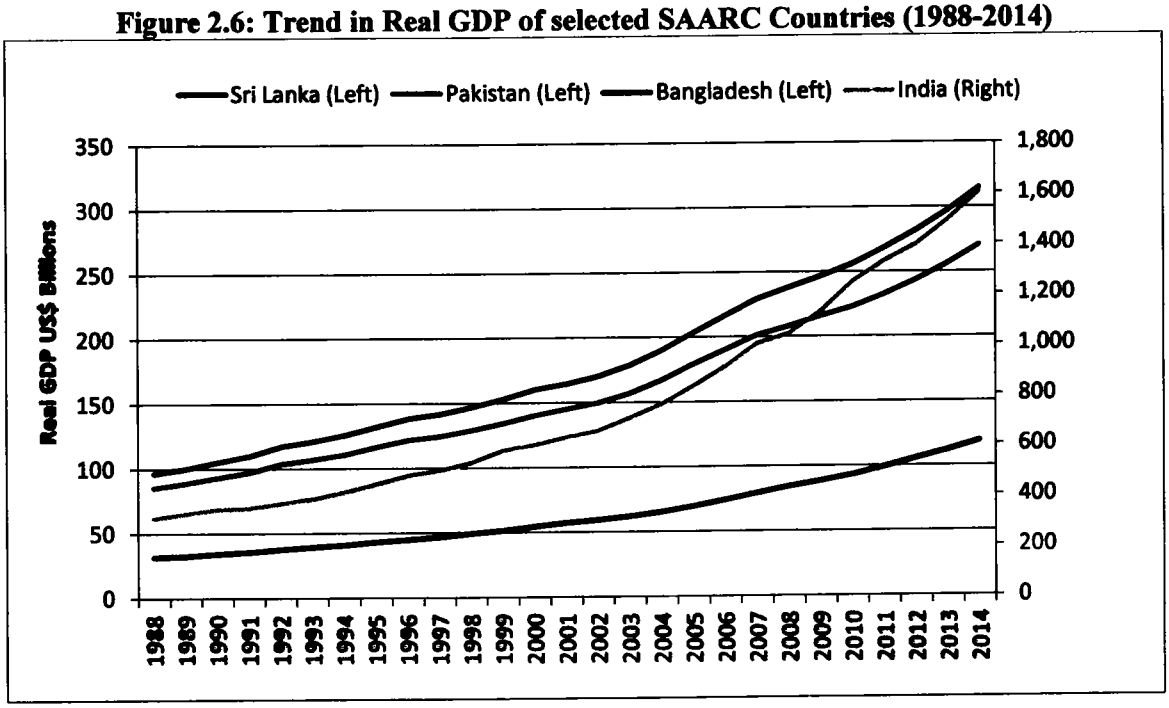


Source: Stock Holmes International Peace Research Institute (SIPRI) Database 2015

Defence expenditures in US million dollars for India and Pakistan are illustrated on the left secondary axis while the Sri Lanka and Bangladesh are graphed on right secondary axis. From the graph Indian defence expenditure can be observed rising from US $ 18119 million to US $ 49999 million which is 175.9% increase in 26 years. In case of Pakistan the graph shows a gradual increase in her defence expenditures rising from US $ 4185 million to US $ 7790 million (86.1%) over a period of 26 years. A similar situation can be observed in case of Sri Lanka when her defence expenditure rose from US $ 475 million to US $ 1825 million (283.9%) in the same duration. The defence expenditure of Bangladesh was US $ 474 million which rose up to US $1719 million with an increase of 262.3%. The figure depicts a continuous increase in the defence expenditures from 1988 to 2014.

The comparison of real GDP of the selected SAARC countries is shown in figure 2.6.

Figure 2.6: Trend in Real GDP of selected SAARC Countries (1988-2014)



Source: World Development Indicators (WDI) Database 2015

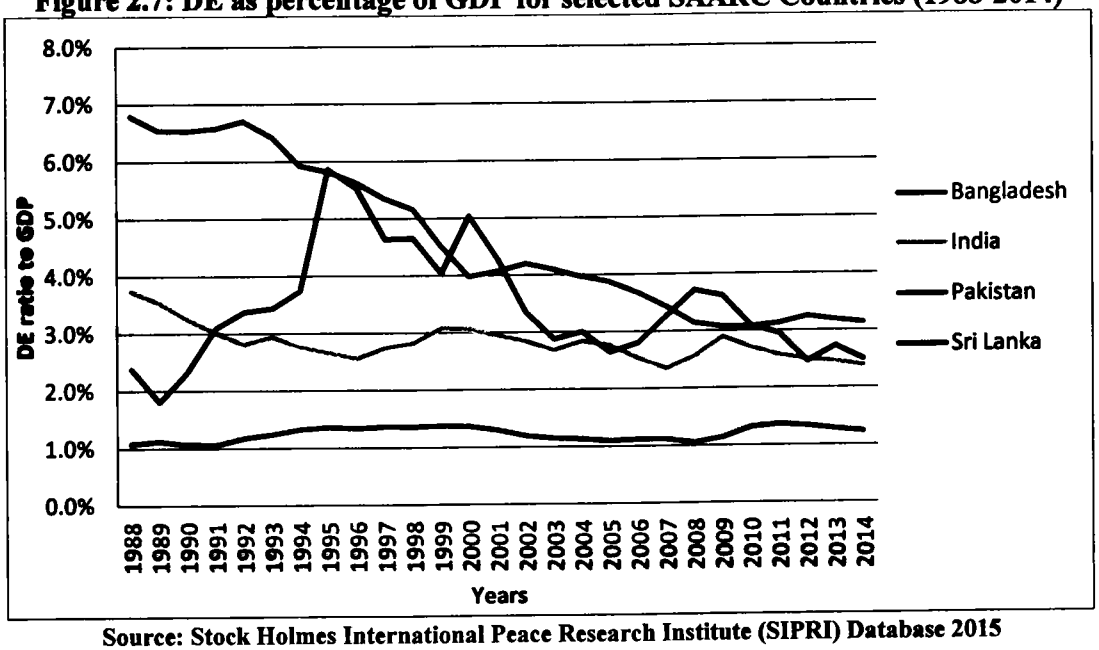
Figure 2.6 describes that real GDP of Pakistan increased from US $ 53.18 to 151.6 billion with an average growth rate of 4.26% from 1988 to 2014. In 2014 GDP growth rate for Pakistan remained 5.41%. In India the real GDP rose from 313.25 billion to 1600 billion dollar and the GDP growth rate remained 7.42% in 2014. The average growth rate of Indian GDP was observed 6.61% during the same period. In Case of Bangladesh the real GDP rose from 31.58 to 118.95 billion dollars accompanying 5.13% growth rate on the average and 6.12% during the last year. The similar trend can be seen in Sri Lanka where with an average growth rate of 5.36% her real GDP increased from US $ 11.1 billion to US $ 44.07 billion over the same period. Its GDP growth rate during last year was observed at 7.37%[13].

[13] Calculation are made on the bases of data taken from WDI 2015.

Simultaneous increase in real GDP and defence expenditure in selected SAARC countries are investigated in this study. The results in chapter 5 uncover a correlation between two. The results show there runs a unidirectional causality from defence expenditure to economic growth in short run. In long run a feedback effect is found between defence expenditure and economic growth. It confirms the spill over hypothesis in short run and in long run the enhanced economic growth is secured by allocating more to defence expenditure. The results support the hypothesis that defence causes growth at the initial stages and in the developing countries defence expenditure are worthwhile to establish strong grounds for development. The defence departments in these countries are responsible to increase the research and development. The fruit of this R&D is ultimately reaped by the civil sector leading towards increase in the investment. NESCOM, DRDO, NRC and BMTF initiated the number of research programs and now are being utilized by the civil sector. Once the nation moves on development path defence sector would receive its due share from the enhanced prosperity. In long run research and development of the country create opportunity not only to achieve self-sufficiency in the production sector but also to export its produce improving balance of trade.

The comparison of defence expenditures as the ratio of GDP is presented in the following figure.

Figure 2.7: DE as percentage of GDP for selected SAARC Countries (1988-2014)



Source: Stock Holmes International Peace Research Institute (SIPRI) Database 2015

Figure 2.7 describe the comparison of defence expenditures as the percentage of GDP for selected SAARC countries. A significant drop in defence expenditure as percentage of GDP can be observed in the case of Pakistan. It dropped from 6.8% to 3.1% of GDP from 1988 to 2014. While in India it dropped from just 3.7% to 2.4% during the same period. Sri Lankan defence expenditure can be seen varying between 1.8% and 5.9%. It increased up to 5.9% in 1995 and afterward reaching at 2.5% with many fluctuations. Defence expenditure to GDP percentage for Bangladesh remain somewhat steady varying between 1.0% to 1.4% during the same period and ending at 1.2% in 2014.

3.1 Chapter Introduction

This chapter reviews the existing most relevant literature on the defence expenditure and economic growth. Different studies are grouped on the bases of their results and reviewed in section 3.2. The studies which focus on South Asian countries are discussed in section 3.3.

3.2 Four Hypotheses Explaining Defence expenditure and economic growth Nexus

Many studies for developed countries has created a fallacy of positive relationship between defence expenditure and economic growth but this is true for the nations who already have adopted a war lead economic growth policy and those countries are the net exporters of the arms and ammunition. While, the countries who are net importers are not falling in the same category. They make heavy expenditures on imports and divert the scarce resources to this non-developing sector. Actually the propaganda of war lead economic growth and economics of defence is playing a role of advertisement for the arms exporting countries. Hence the Asian developing countries are in dire need of investigating their defence expenditure and economic growth relationship.

During the last two decades many researchers have tried to find the relationship between defence expenditure and economic growth using different macroeconomic models and econometric techniques. Those studies used different macroeconomic theories to understand the conclusions and relationship of defence, political and economic indicators. These studies have been made on single country level and as well as cross country level.

Empirical literature on defence expenditure and economic growth can be summarized in four main hypotheses as described under the following subsections.

3.2.1 Defence Expenditure Causes Economic Growth

Benoit, was the first who took initiative to examine the relationship between defence spending and economic growth in 1973 and later in 1978. He took sample of 44 low developing countries including India, South Korea, Mexico, Israel, United Arab Republic, and Argentina. By using OLS estimation technique he found relationship between defence expenditure and economic growth. He found a directly proportional link between the two. Later, many other studies such as Aizenman & Glick (2006), Benoit (1978), Rothschild (1973), Looney & Frederickson (1983), Leontif & Duchin (1983) and Lim (1983) were done and findings supported that defence expenditure caused economic growth.

Deger & Smith, (1983) confirmed the classical point of view using the data for 28 countries for the period of 1965-73. They found that defence expenditure affected growth negatively. 3SLS technique was used for analysis. Deger (1986) confirmed his own findings with Smith in 1983 by using the OLS estimation technique with the same period data. Mansoob, & Dawood, (2007) were of classical view that "defence expenditures in Pakistan and India are diverting scarce resources away from social development spending."

Bayoumi *et al* (1993) explored the effects of decreased defence budget for the world countries over a time span of 10 years (1983-1992) by using the MULTIMOD[14] estimation technique. They concluded that the decrease in defence budget stimulated the economic growth.

Brumm (1997) using the data of developing countries for the period of 1967-82 concluded that the defence spending and GDP growth were oppositely related, though the relation was weak.

[14] Multi region econometric Model is used to know the effects of industrial country's policies on the rest of the world

Landau (1996) studied the relationship between defence expenditure and GDP growth in 17 countries for a period of 1950-1990. He concluded that relationship is nonlinear that is initially defence expenditure slow down the economic growth and then it allows faster growth. Some empirical studies (like Looney 1989 and 1990) also confirmed the significance of defence expenditure in resources allocations to the military in a country's budget.

Saleem & Hassan, (1992) concluded that budget allocated to military could be used in a better way in civil development process rather to keep a white elephant. They used Iterative Three Stage Least Square (ITSLS) method for estimation for the period of 1971 – 1988 in Pakistan.

Khilji & Akhtar, (1997) tried to explore the effects of defence spending on the economic growth in Pakistan by using Full Information Maximizing Likelihood (FIML) method over a period of 1972–1995 (i.e. 23 years). They found a positive relationship between defence expenditure and the economic growth though significance of the result was questionable according to their own statement. Further some important factors has been ignored which influence the defence expenditure in Pakistan.

The above discussion is supported by a number of routes, which ultimately concluded that the defence expenditure caused the economic growth. This is a separate question whether the impact is positive or negative. If these different channels are arranged then three main channels can be traced out through which the defence expenditure causes the economic growth. These channels are (a) Spin-off effects (b) Resources allocation and (c) Creation of new resources. (Anwar et al, 2012)

In an economy where the aggregate supply is greater than the aggregate demand and effective demand is absent due to which markets remain unclear then an additional demand can be generated by the defence and military sector. This increased demand is generated due to the enhanced employment level in the economy by using the capital stock. In this way a multiplier effect is generated which affect the national income in small time period and in longer run as well. This causes the growth in a positive manner. (Deger, 1986)

The modernization, research and development in the defence sector produce a spill over positive effects in the society. Better education, training, discipline, following the instruction, use of technology and medical care and hygiene lead the economy towards increased growth. (Benoit, 1973)

By following the guns vs. butter idea the defence expenditure may affect the economic growth in a negative way. As the defence expenditure increases the resources are allocated more towards the non-productive sector and opportunity cost of the defence starts to increase. The capital share forgone for defence purpose reduces the investment and hence the multiplier effect works in negative direction (Bayoumi et al., 1993)

Due to defence expenditure in the economy an inflationary effect is produced. This stimulates the profits of the producers tending investors to invest more and the growth is stimulated through creation of new resources. If inflationary trend continues then savings might decrease leading to less investment and ultimately less economic growth.

These three channels show that military expenditure has direct as well as indirect effect on growth. The direct impact of defense spending on growth through the spin-off and

reallocation of resources and the indirect impact of defense on growth is through the creation of new resources.

The neoclassical school of thought has focused the supply side of national income in the economy while the Keynesians followed the demand track. The supply side studied the impacts of modernization of the society, positive externalities from infrastructure developed by military projects and the technological spin-offs due to better R&D. On the other hand, the demand side encompasses crowding-out effect on investment, exports of private and civil sector. It can take away the due share of budget on education and health. On the above mentioned grounds the neo-classical school of thought concludes that there is a positive relationship between defence expenditure and economic growth and Keynesians argue for a negative impact on economic growth. To overcome the problem some studies merged the neoclassical and Keynesian model (i.e. Demand and supply side models of defence expenditure) to design an aggregate production function. (e.g. Smith, (1980); Khilji, (1997); Deger, (1983 and 1986) to study the positive direct effect and negative indirect effects. Although these models provide better picture yet are criticized as they are not based on theory and nonrealistic factors.

3.2.2 Economic Growth Causes Defence Expenditure

Harris (1988) and Looney & Frederiksen (1990) concluded that military spending is stimulated by economic growth. A growing economy must be protected as well.

Harris, (1988) studied the impact of defence expenditure on other economic indicators. The study for five ASEAN countries (i.e. Indonesia, Malaysia, Philippines, Singapore and Thailand) in early 1960s found that there was a positive relationship between defence expenditure of current year and economic growth of previous year.

The idea that defence spending causes growth is based on the assumption that the defence expenditure are before the economic growth. Economic growth is prior to defence expenditure is another dimension explored by Joerding (1986). As discussed in the above paragraph whether defence expenditure stimulate or retard the economic growth, the reverse hypothesis can also be developed as whether economic growth cause the defence expenditure or not. It is possible that a country which is economically growing would like to protect its prosperity by strengthening its defence against external threats and start to allocate a significant share in the budget to the defence. On the other hand it is also possible for a country with high economic growth rate that it divert the defence share to its capital formation and more productive industries. The idea is supported by Harris (1988) and Looney & Frederiksen (1990).

3.2.3 Defence Expenditure and Economic Growth are Interrelated

Khilji and Mehmood (1997) argue that there is bidirectional causality between the defence expenditure and the economic growth. Abu-Bader (2003) is also of the view that there is bidirectional causality.

Heo (1998) analyzes the relationship among the military expenditures, technological change, and economic growth in the East Asian countries for a period of 1961-90. He uses the Non-Linear Sequential (NLS) technique and concludes that the relationship between growth and defence can go either way.

Tahir (1995) studies the causality of defence expenditure of India and Pakistan and concludes that there exists a bidirectional relationship. He used Co-integration technique and Error Correction Modeling (ECM) for this purpose.

In some cases, the above discussed two hypotheses go side by side and both forces can feedback to each other. Defence expenditure may develop the infrastructure in the country and

economic growth is possible in secured economy, good governance and rule of law. Any insecurity in the economy may cause to discourage the investors to invest, immobility of labor, brain drain and capital flight. If the neighbor country changes its military expenditures then the other country will have to alter the defence position. Hence to continue the economic progress path a country is to provide security and peace with the help of increased defence expenditure.

Thus high economic growth stimulates the defence expenditure. In this way either of two variables causes the other resulting in bidirectional causality. This hypothesis is confirmed by Abu-Bader (2003), Lacivita (1991), Chang (2001), Tahir (1995), Heo (1998) and Khilji (1997).

3.2.4 Defence Expenditure is Growth Neutral

According to Khan (2000) and Biswas (1986) the defence expenditure has no affect upon economic growth. Both defence expenditure and economic growth are independent.

Aslam (2007) by using Iterated Generalized Least Square Regression (IGLS) estimation technique for a period of 1972-2000 for 59 developing countries concludes that a reduction in defense expenditure may not increase other public programs expenditures in developing countries.

Some studies argue that the relationship between defence expenditure and economic growth is spurious. Dunne (2005) found no causal relationship between defence expenditure and economic growth while studying the economic growth and defence expenditure in Turkey and Greece.

Dakurah et al. (2001) studied causal relationship between defence expenditure and economic growth for 62 countries. They also concluded that the results could not be generalized for all the countries

Chowdhury, (1991) examined the relation between defence expenditure and economic growth for Egypt, Israel and Syria. He concluded that the relationship cannot be generalized across countries for the period of 1961-87 using Granger Causality Test.

In the presence of number of studies the results cannot be generalized. This variation of the results may be due to number of reasons. There may be difference in time period of the sample data, different socio economic situation and difference in econometric techniques.

Results of the previous studies are inconsistent and South Asian countries have not received due attention on this issue, thus this study will be helpful to understand the contribution of defence expenditure for economic growth.

The main studies on defence expenditure and economic growth causality are summarized in the following Table 3.1.

Table 3.1: Summary of Main Studies on Defence expenditure and economic growth causality

Author	Period	Countries	Methodology	Result
Joerding (1986)	1962-1977	57 LDC	Granger Causality	DE --- EG
Lacivita (1991)	1961-2002	21 countries	Granger	DE ↔ EG
Chen (1993)	1950-1991	China	Granger	DE ---- EG
Kusi (1994)	1971-1989	77 developing countries	Granger causality	DE ←?→EG
Tahir (1995)	1965-1990	Pakistan, India	Co-integration , error-correction	DE ↔ EG
Dakurah(2001)	1975-95	62 developing countries	Granger Causality	DE→ EG (13 countries) EG → DE (10 countries) DE --- EG (18 countries)
Chang. T (2001)	1952-95	Taiwan, China	Granger Causality	DE ↔ EG (Taiwan) EG → DE(China)
Abu-Bader (2003)	1975-98	Egypt, Israel and Syria	cointegration, Granger Causality, VEC model	DE ↔ EG
Karagol(2003)	1955–2000	Turkey	Cointegration Analysis	DE → EG
Kollias (2004)	1961-2002	European Union Countries	fixed panel models, random coefficient model, VAR model	DE ↔ EG
Dunne (2005)	1960-1996	Greece and Turkey	VAR, Granger	DE ---- EG

Yildirim (2005)	1989-99	Middle east countries	GMM	DE→ EG
Anwar (2012)	1998-2010	Pakistan	Granger	EG → DE
Jalil (2012)	1988-2008	India, Pakistan	ARDL	DE → EG
Odehral (2012)	1950-2009	7 EU countries	Granger causality , VAR, VECM	DE ←?→EG
Ali (2015)	1980-2013	Pakistan	2SLS	DE → EG
Darshana (2015)	1988-2012	Southern European countries	Granger	DE → EG (low income countries) DE --- EG (High income countries)
Khalid (2015)	2002-2010	67 developing countries	GMM	DE → EG
Ogbokor (2015)	1990-2014	Namibia	Granger	EG → DE
Shah (2015)	1988-2013	India, Pakistan	Johanson cointegration, Granger causality	DE → EG

Notes: DE=Defence Expenditure, EG=Economic Growth → (unidirectional causality), ↔ (bidirectional causality), ---- (no causality), ←?→ (results cannot be generalized)

Table 3.1 shows that the studies on defence expenditure and economic growth causality nexus have mixed results and some studies on group of countries have even concluded that the results cannot be generalized. The existence of mixed result is further investigated in the South Asian countries.

3.3 Defence expenditure and economic growth in South Asia

During the 70's, researchers paid due attention to understand the defence expenditure and economic growth nexus. Many studies focused on the issue all over the world using their relevant countries and time period. An increasing trend can be observed in this field during the last decades. The studies which particularly investigate the issue in South Asia are summarized in the following table.

Table 3.2 Defence expenditure and economic growth in south Asian Countries

Author	Period	Countries	Methodology	Result
Chen (1993)	1950-1991	China	Granger	DE ---- EG
Tahir (1995)	1965-1990	Pakistan, India	Granger	DE ↔ EG
Khan (2000)	1973-1996	ASEAN	VAR, Granger	DE ←?→ EG
Chang (2001)	1952-1995	Taiwan, China	Granger	DE↔EG(Taiwan) EG → DE(China)

Hassan (2003)	1980-1999	SAARC	VAR, Granger	DE → EG
Yildirim (2005)	1987-1997	Middle east	GMM	DE→ EG
Pradhan (2007)	1970-2005	SAARC	Granger Causality	DE ←?→ EG
Hirnissa (2009)	1965-2006	ASEAN 5	ARDL, DOLS	DE ←?→ EG
Hirnissa (2009)	1971-2006	ASEAN 5	ARDL, RECM	DE ←?→ EG
Hou (2009)	1960-2006	India	ARDL, ECM, OLS	DE → EG
Wijeweera(2009)	1976-2007	Sri Lanka	VAR	DE → EG
Anwar (2012)	1998-2010	Pakistan	Johansson cointegration, Granger	EG → DE
Shahbaz (2012)	1971-2009	Pakistan	ARDL, RWA, VECM	DE → EG
Wijeweera(2012)	1976-2007	Sri Lanka	OLS	DE → EG
SriniVasan(2013)	1973-2012	India	Johnson cointegration, VECM	EG → DE
Khalid (2014)	1980-2011	India	ARDL, Granger	EG → DE
Kalim (2014)	1976-2012	Pakistan	Johnson cointegration, OLS	DE → EG
Saroja (2014)	1975-2013	Sri Lanka	Johnson cointegration, Granger	DE → EG
Fiaz (2014)	1973-2012	Pakistan	OLS, ECM	DE → EG
Haseeb (2014)	1975-2010	Pakistan	ARDL	DE → EG
Jalil (2015)	1988-2008	India, Pakistan	ARDL	DE → EG
Ali (2015)	1980-2013	Pakistan	2SLS	DE → EG
Khalid (2015)	2002-2010	67 developing countries	GMM	DE → EG
Shah (2015)	1988-2013	India, Pakistan	Johansson cointegration, Granger	DE → EG

Notes: DE=Defence Expenditure, EG=Economic Growth → (unidirectional causality), ↔ (bidirectional causality), ---- (no causality), ←?→ (results cannot be generalized)

The above table shows that in the South Asia SAARC countries have not received their due attention. Most studies are either single country or two country based. Hassan (2003) used the data ranging from 1980 1999 which is too short to find any significant result for the issue on hand. Then second prominent study on the SAARC countries is done by Pradhan (2007). He studied defence expenditure in the SAARC countries but the result could not be generalized. The reason may be that the data about defence expenditure of Maldives, Bhutan and Nepal is not available for the complete time span. The breaks in the data set may be a reason of non-generalized results. Further the study is prior to sudden rise of Indian defence expenditure after

2007. So this study is an attempt to fill the gap with extended data and more recent innovative methodology.

The studies in the south Asian region used variety of variables depending upon the models. But the two main variables under consideration were economic growth and the defence expenditure. Economic growth is measured by a number of proxy variables in different studies. Like real GDP, GDP growth Rate and per capita income. While, defence expenditure directly and in the logarithmic form, as a ratio of national income and as a ratio of government expenditures served as proxy of defence burden. Tahir (1995), Chowdry (1991), Hirnissa (2009) and Shahbaz (2005) used a bivariate model to study the relationship between two. Shah (2015) developed a multivariate model by introducing non defence expenditure as a control variable to study the relationship of defence expenditure and economic growth. On the basis of the Shah (2015) model the current study also focus these three variables.

CHAPTER 4

RESEARCH METHODOLOGY

4.1. Chapter Introduction

This chapter explains the methodology used in the study to explore the causal relationship between defence expenditure and economic growth. It includes the detail of estimation methods along with the use of relevant data and its sources.

4.2. Econometric Model Used in the study

The study make use of reduced augmented Keynesian demand side in which defence expenditures are introduced as additional explanatory variable. Atesoglu (2002) and Halicioglu (2004) derived this reduced model from Keynesian structural model. This model is used in studies like Smith (2004) and Wijeweera (2012) .

$$LEG_{it} = \eta_i + \delta_{it} + \beta_{1t} LDE_{it} + \beta_{2t} LNDE_{it} + \varepsilon_{it}$$

where $i = 1,2,3, \ldots N$ for each country in the panel and $t=1,2,3,\ldots,T$ refers to the time period; LEG, LDE and LNDE are the natural logarithms of real GDP, defence expenditure and Non-defence expenditure respectively. The study examines the causal relationship between the defence expenditure and economic growth; one additional variables is also used to avoid omitted variable biasness that can occur if one uses bivariate set up. Similar variables are used by Dakurah (2001), SHahbaz (2005), Hirnissa (2009) and Shah (2015).

4.3. Variable Construction

The study focus on the causal relationship between defence expenditure and economic growth and upon the hypothesis of economic growth of the country is the function of government expenditure where the government expenditure are divided into defence expenditure and nondefense expenditure. In the model real GDP data is used as the proxy of economic growth. So the variable EG contains the data of real GDP in the model. DE refers to the defence

expenditure of the government. The military expenditure of the government are used for the purpose. The study examines the relationship between these two variables, yet to avoid omitted variable biasness, nondefense expenditure (NDE) is also brought under study. Here the government final consumption expenditure are used as proxy of non defence expenditure.[15]

4.4. Research Methodology

The study is an attempt to trace out the relationship between defence expenditure and economic growth. For ease, we have divided the methodology into following five basic steps.

Step 1: Testing for cross-sectional dependence

Step 2: Testing for presence of possible unit root

Step 3: Testing for existence of possible cointegration

Step 4: Estimating long run parameters (if cointegration is found in Step 3)

Step 5: Testing for Causal direction

Each of the steps outlined above is discussed in the detail in the following subsections:

4.4.1. Step 1: Testing for Cross Sectional Dependence

In the first step, the study uses Pesaran's cross sectional dependence (CD) test to test if all cross sectional units (i.e. countries) are independent or not. Mostly the existing studies assume that all cross-sectional units are independent. Obviously this is a very restrictive assumption, failure of which may lead to wrong inferences. That is why it is very important to test for the cross sectional dependence. If the null of cross sectional independence is rejected then one should use the test which takes into account the dependence of cross-sectional units, else one can go with the conventional tests for the integration.

[15] System of National Accounts 1993

We have preferred Pesaran (2004) CD test over Spatial correlation test devised by Moran (1948) and Langargian Multiplier method of Breusch and Pagan (1980) as the sample size is small. The Pesaran CD test is based upon the pair wise correlation coefficients and not upon their squares used in breusch and Pagan's LM test. The mathematical expression for the Pesaran CD test is as follows:

$$CD = \sqrt{\frac{2T}{N(N-1)}\left(\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{\rho}_{ij}\right)} \quad (1)$$

Where, N is number of countries and T is number of years (i.e. time period).

4.4.2. Step 2: Testing for Presence of Unit Root

It is very important to test the stationarity of data through unit root test. The unit root test determines the order of integration for the cointegration test. There are many tests available for panel unit root test. The most prominent tests are Levin and Lin(1993), Levin et al.(2002), Maddala and Wu (1999) Breitung (2000) and Im et al (2003) also known as IPS.

In this study, Pesran (2007) panel unit root test is preferred over Maddala and Wu (1999) the reason is that the Maddala Wu (1999) is from the first generation panel unit root tests. Pesaran (2007) introduced Cross-Sectionally Augmented IPS (CIPS) test, a second generation test which successfully address the issue of cross-sectional dependence of the data. He considerd the following Cross-Sectionally Augmented Dickey-Fuller (CADF) regression, estimating the OLS method for the i^{th} cross-section in the panel:

$$\Delta y_{it} = \alpha_i + \rho_i y_{i,t-1} + c_i \overline{y}_{t-1} + \sum_{j=0}^{k} d_{ij}\Delta\overline{y}_{t-j} + \sum_{j=1}^{k}\delta_{ij}\Delta y_{i,t-j} + \varepsilon_{it}, \quad (2)$$

Where $\overline{y}_{t-1} = \left(\frac{1}{N}\right)\sum_{i=1}^{N} y_{i,t-1}$ and t_i *(N,T)* is the t-statistic of the estimate of ρ_i in the above equation used for computing the individual ADF statistics. More importantly, Pesaran

proposed the following CIPS statistic that is based on the average of individual CADF statistics as follows:

$$CIPS = \left(\frac{1}{N}\right)\sum_{i=1}^{N} t_i(N,T). \quad (3)$$

The critical values for CIPS for various deterministic terms are tabulated by Pesaran (2007).

4.4.3. Step 3: Testing for Existence of Cointegration

Cointegration test can be applied after determining the order of integration in step two. There are a number of cointegration test like Pedroni (1999) , Kao (1999), Westerlund (2007), Hanck (2007) , Banerjee (2006), Gengenbach (2006), Gutierrez (2008), Fachin (2007) and Tam (2007). We applied Westerlund Cointegration test which is a second generation cointegration test. While studying the cross sectional data traditional tests assume the cross sectional independence, whereas there is a possibility of cross-sectional dependencies among the countries. These countries may not be independent on the geographical location grounds and arms race among the countries bases. While in Westerlund (2007) cointegration test, this assumption is addressed.

Westerlund cointegration test is applied on the following equation:

$$LEG_{it} = \eta_i + \delta_{it} + \beta_{1t} LDE_{it} + \beta_{2t} LNDE_{it} + \varepsilon_{it} \quad (4)$$

where $i = 1,2,3, \ldots N$ for each country in the panel and $t=1,2,3,\ldots,T$ refers to the time period; LEG, LDE and LNDE are the natural logarithms of real GDP, defence expenditure and Non-defence expenditure respectively. η_i shows country effect and δ_{it} shows time effect. ε_{it} stands for the estimated residuals. Here ε_{it} describes the deviations from the long-run relationship. The function of ε_{it} is described as under

$$\hat{\varepsilon}_{it} = \hat{\rho}_i \hat{\varepsilon}_{it-1} + \hat{\upsilon}_{it} \quad (5)$$

In this study Westerlund (2007) cointegration test is used to examine the relationship between real GDP and Defence expenditure in selected SAARC countries. The Westerlund (2007) Test focuses on the null hypothesis of no cointegration. As discussed before the problem of common factor restriction may arise in the data. So Westerlund (2007) test is a better method to check the error correction term is zero in error correction model. Hence if null hypothesis of no error-correction is rejected then it means the null hypothesis of no cointegration is rejected. The error-correction tests assume the following data-generating process:

$$\Delta LEG_{it} = \acute{\delta}_i d_t - \alpha_i\left(LEG_{it-1} - \acute{\beta}_i X_{it-1}\right) + \sum_{j=1}^{p_i} \alpha_{ij}\Delta LEG_{it-j} + \sum_{j=0}^{p_i} \gamma_{ij}\Delta X_{it-j} + \varepsilon_{it} \quad (6)$$

Where d_t are the determining components, LEG_{it} is the log of GDP and X_{it} is the set of exogenous variables, (i.e. defence expenditure and non defence expenditure) and $-1 < \alpha_i < 0$.

Westerlund (2007) is composed of four different tests. Two tests are panel test with null hypothesis of no cointegration in the whole panel. The other two tests are grouped mean test with a null hypothesis that at least one cross-section unit has no cointegration.

In the test P_τ and P_α statistics tells panel is simultaneously cointegrated or not. While G_τ and G_α statistics describe that at least one element in the panel is cointegrated. Westerlund (2007) test addresses various forms of heterogeneity and also give p-values which are robust against cross-sectional dependencies via bootstrapping.

4.4.4. Step 4: Estimating Long Run Parameters

Westerlund (2007) test only traces out the cointegration between variables in long run. To estimate the coefficients in long run Dynamic OLS (DOLS) or Fully Modified OLS (FMOLS) test can be used. Kao and Chiang (2000) showed that both the OLS and FMOLS exhibit small sample bias. In this study we have a sample size of 26 years for four countries which is considered as small sample size due to which the results can be biased. According to

Kao the DOLS estimator outperforms than OLS and FMOLS in small sample size. The dynamic OLS test is applied to find out the long-run parameters and Pooled Mean Group (PMG) test proposed by Pesaran (1999) is used for the short and long-run parameters estimation.

To get unbiased results, DOLS estimator uses parametric adjustment to the errors by including the past and the future values of the differenced I(1) regressors. The Dynamic OLS estimator is obtained from the following equation:

$$LEG_{it} = \alpha_i + \acute{X}_{it}\beta + \sum_{j=-q1}^{j=q2} c_{ij}\,\Delta X_{i,t+j} + v_{it} \quad (7)$$

Where, $X = [LDE, LNDE]$, c_{ij} is the coefficient of a lead or lag of first differenced explanatory variables. The estimated coefficient of DOLS is given by:

$$\hat{\beta}_{DOLS} = \sum_{i=1}^{N}\left(\sum_{t=1}^{T} z_{it}\acute{z}_{it}\right)^{-1}\left(\sum_{t=1}^{T} z_{it}\,\widehat{\overline{LEG}}_{it}\right) \mathrm{L} \quad (8)$$

Where $z_{it} = \left[X_{it} - \bar{X}_i, \Delta X_{i,t-q}, \ldots\ldots, \Delta X_{i,t+q}\right]$ is a vector of regressors, and $\widehat{\overline{LEG}}_{it}$ $\left(\widehat{\overline{LEG}}_{it} = LEG_{it} - \overline{LEG_i}\right)$ is the transformed shape of GDP.

4.4.5. Step 5: Testing for Causality

In step five the study uses the Pooled Mean Group (PMG) test proposed by Pesaran et al. (1999) to find the coefficients of Panel Vector Error Correction Model (PVECM) in short and long run and to check the causality between economic growth, defence expenditure and non-defence expenditure. PMG is better than DOLS because this technique uses both pooling and averaging and it can allow the short-run dynamic specification to differ from country to country while the long-run coefficients are constrained to be the same. Then the PMG estimator helps to perform Granger-causality test. The following Panel Vector Auto Regressive model is designed with the help of residuals and error correction term estimated from equation (4):

$$\Delta LEG_{it} = \beta_{1j} + \sum_{k=1}^{p} \beta_{11ik}\ \Delta LEG_{it-k} + \sum_{k=1}^{p} \beta_{12ik}\, \Delta LDE_{it-k} + \sum_{k=1}^{p} \beta_{13ik}\, \Delta LNDE_{it-k} + \lambda_{1i}\varepsilon_{it-1} + v_{1it} \quad \textbf{(9a)}$$

$$\Delta LDE_{it} = \beta_{2j} + \sum_{k=1}^{p} \beta_{21ik}\ \Delta LEG_{it-k} + \sum_{k=1}^{p} \beta_{22ik}\, \Delta LDE_{it-k} + \sum_{k=1}^{p} \beta_{23ik}\, \Delta LNDE_{it-k} + \lambda_{2i}\varepsilon_{it-1} + v_{2it} \quad \textbf{(9b)}$$

$$\Delta LNDE_{it} = \beta_{3j} + \sum_{k=1}^{p} \beta_{31ik}\ \Delta LEG_{it-k} + \sum_{k=1}^{p} \beta_{32ik}\, \Delta LDE_{it-k} + \sum_{k=1}^{p} \beta_{33ik}\, \Delta LNDE_{it-k} + \lambda_{3i}\varepsilon_{it-1} + v_{3it} \quad \textbf{(9c)}$$

Where Δ is the first-difference operator; p is the optimal lag length determined by the Schwarz Bayesian criterion. The specification in equation (9) allows us to test for both short-run and long-run causality. For example, in the real GDP equation (Eq. 9a), short-run causality from defence expenditure and non defence expenditure is tested respectively, based on $H_0: \beta_{12ik} = 0\ \forall ik$ and $H_0: \beta_{13ik} = 0\ \forall ik$. In the defence expenditure Eq. (9b), short-run causality from real GDP and non defence expenditure is tested respectively, based on $H_0: \beta_{21ik} = 0\ \forall ik$ and $H_0: \beta_{23ik} = 0\ \forall ik$. In the non defence expenditure Eq. (9c), short-run causality from real GDP and defence expenditure are tested, respectively, based on $H_0: \beta_{31ik} = 0\ \forall ik$ and $H_0: \beta_{32ik} = 0\ \forall ik$. More generally, with respect to equations (9a)-(9c), short-run causality is determined in the PVAR model with the help of F-statistic and the long-run causality determined with the help of t-statistic on the coefficient λ, of the error correction term (ε_{it-1}).

CHAPTER 5

DATA AND EMPIRICAL RESULTS

5.1 Chapter Introduction

This chapter reports the results of statistical analysis of the data collected from various sources. All the analysis has been carried out Stata 13.0 software package. Descriptive analysis is carried out to provide the basis information about the variables included in the study. In addition, panel data analysis, panel unit root and panel cointegration is done to assess the nature of relationship between defence expenditure and economic growth and finally, the direction of causality between defence expenditure and economic growth is explored using panel vector error correction model (PVECM).

5.2 Data and its Sources

The study examines the relationship between defence expenditure and economic growth in four selected SAARC countries[16] including Pakistan, India, Bangladesh and Sri-Lanka. The choice of time period as well as countries chosen depends upon the availability of defence expenditure data. Unfortunately, no reliable data source was found except Stockholm International Peace Research Institute (SIPRI) to fetch the data of defence expenditure and records for the defence expenditure are not available prior to 1988 for the selected four South Asian countries. Thus study makes use of all available data from 1988 to 2014 and thus covers the most recent data. In addition to SIPRI, World Bank Development Indicator (WDI) is used to fetch the data of real GDP (G), used as a proxy for economic growth. This proxy has been used by a number of existing studies, see for example, Dakurah (2001), Shahbaz (2005), Hirnissa (2009) and Shah (2015) among many others. Following these studies non-defence expenditure

[16] Very limited data is available for the rest of the four countries (Afghanistan, Bhutan, Maldives and Nepal), and thus they couldn't be included in the study. Though Afghanistan has a long history of revolts and military invasions but no systematic record of her defence expenditure and other economic indicators could be traced out. Bhutan and Maldives defence expenditure is negligibly small and no prominent contribution for defence was observed. Nepal is the country about which the data is not available for the time span under consideration.

(NDE) is used as an additional variable to avoid omitted variable bias that can occur if one uses bivariate set up. The data on general government final consumption expenditure as a proxy of NDE is collected from WDI database 2015. In case of Sri Lanka, non defence expenditure for the year 2012-14 was fetched from local newspaper.[17] All the data series is converted from nominal to real terms by deflating on 2011 GDP deflator and to minimize the heterogeneity, we use all variables in their natural logarithms.

The descriptive statistics of the key variables used in the study are provided in the Table 5.1.

Table 5.1: Descriptive Statics of variables over 1988-2014

	Variable	Mean	Median	SD	Min	Max	IQR
Bangladesh	LG	10.43	10.40	0.41	9.81	11.14	10.09
	LD	6.81	6.80	0.37	6.16	7.45	6.62
	LND	7.39	7.28	0.43	6.79	8.13	7.08
India	LG	13.00	12.95	0.51	12.25	13.88	12.57
	LD	10.27	10.26	0.39	9.73	10.82	9.87
	LND	10.84	10.86	0.46	10.18	11.65	10.40
Pakistan	LG	10.58	10.54	0.32	10.04	11.09	10.34
	LD	8.62	8.54	0.18	8.34	8.96	8.48
	LND	8.25	8.06	0.35	7.82	8.89	7.97
Sri Lanka	LG	9.36	9.32	0.41	8.72	10.10	9.04
	LD	7.06	7.19	0.44	5.90	7.53	6.90
	LND	7.76	7.41	0.92	6.49	9.30	7.11

Note: Total number of observations for each variable are 27.

Here the data under observation spans from 1988 to 2014 on annual basis. So we have 27 years of time span. The mean and median for the log of real GDP (LEG) of Bangladesh are 10.43 and 10.40 respectively which are very close showing that the data for real GDP is symmetric. Similarly mean and median for the log of real GDP for India, Pakistan and Sri Lanka are also very close showing a uniform distribution. Among these India's GDP is the greatest as compare to the rest of three. Whereas the maximum value of India log of real GDP is 13.00, which is the largest one in the group. Talking about the log of defence expenditure, again India is having the

[17] Daily Eelanatham 14th July 2015

largest log of defence expenditure in the study. As the standard deviation in all cases is very low hence the data spread is not so large.

After providing the basic summary statistics, we next move to the econometric results that are discussed in the following subsections.

5.3 Results of Cross-sectional Dependence (CD) test

The results for cross sectional dependence (CD) test of Pesaran (2004) are shown in Table 5.2 below:

Table 5.2: Results of Pesaran (2004) CD Test

Variable	CD-test	p-value	correlation
LEG	12.68***	0.000	0.996
LDE	10.56***	0.000	0.829
LNDE	11.78***	0.000	0.926

Note:

1) Null Hypothesis of CD test is the all cross sectional units are independent
2) *** indicate significant at 1% significance level.
3) Ho is rejected; Cross sectional dependence exist

The p-value of CD test for all three series using without log as well as log form is zero to the three decimal places implying the rejection of null hypothesis at one percent significance level that all cross sectional units are independent. This suggests that the data for selected four countries is cross sectional dependent and it is better to use the panel unit root and panel cointegration tests that work well when the assumption of cross sectional independence gets violated. It is important to note that most of the studies on the subject undertaken by the current study didn't test this important assumption and hence their results may be misleading.

5.4 Results of Unit Root tests

The results of Maddala and Wu (1999) panel unit root test are shown in the following Table 5.3 (at levels) and Table 5.4 (at first difference).

The results for the panel unit root test conducted at levels are presented in Table 5.3 below:

Table 5.3: Results of Maddala and Wu (MW, 1999) Panel Unit Root Test

Variable	At Levels			
	Without Trend		With Trend	
	Chi-Sq	p-value	Chi_sq	p-value
LEG	0.308	1.000	1.421	0.994
LDE	2.534	0.960	3.729	0.881
LNDE	2.848	0.944	10.590	0.226

Notes:
1) H0: Series has a unit root
2) H0 is not rejected; Data is non-stationary

The null Hypothesis of both MW and CIPS is that the series is non-stationary. If p-value is less than 1%, or 5% or 10% then we will reject the Null. Both tests have been applied on all variables by taking with and without trend specification. From the results, it is concluded that series are non-stationary at levels. The null hypothesis (i.e. series has a unit root) is not rejected in case of log of GDP, log of defence expenditure and log of non defence expenditure. Hence we can say that these three series are non-stationary at levels.

The results for the panel unit root test conducted at first difference are presented in Table 5.4 below:

Table 5.4: Results of Maddala and Wu (MW, 1999) Panel Unit Root Test

Variable	At First Difference			
	Without Trend		With Trend	
	Chi_sq	p-value	Chi_sq	p-value
DLEG	46.496***	0.000	50.098***	0.000
DLDE	52.798***	0.000	41.161***	0.000
DLNDE	59.670***	0.000	42.930***	0.000

Notes:
1) H0: Series has a unit root
2) *** indicate significant at 1% significance level.
3) H0 is rejected; data is stationary at first difference.

The results show that the null hypothesis is rejected in three series at one percent significance level with and without trend specification. This means the series are stationary at their first difference.

From these results we conclude that the order of integration is one (i.e. I(1)) for all series.

In addition to Maddala and Wu (1999) Panel Unit Root test, the study makes use of second generation panel unit root test (the CIPS) proposed by Pesaran (2007).

The results of CIPS test conducted at levels are presented in the Table 5.5.

Table 5.5: Results of Pesaran (2007) Panel Unit Root test (CIPS)

Variable	At Levels			
	Without Trend		With Trend	
	Zt-bar	p-value	Zt-bar	p-value
LEG	-1.323*	0.093	-0.411	0.341
LDE	0.804	0.789	-0.135	0.554
LNDE	-0.410	0.341	-0.502	0.308

Notes:
1) H0: Series has a unit root
2) * indicate significant 10% significance level.
3) H0 is not rejected; Data is non-stationary

From the above table, it is noted that all the series are found to be non-stationary as the null hypothesis (i.e. H_0: Series has a unit root) is not rejected even at 10% significant level. Hence Pesaran (2007) Panel Unit Root test (CIPS) results also confirm the Maddala and Wu (1999) Panel Unit Root test results at levels. Note that natural logarithm of real GDP (LG) seems to be stationary at 10 % significance level without trend and rest of all variable are non-stationary whether we consider them without trend or with trend specification. However, keeping in mind the low power of unit root test, we assume that LG is non-stationary at levels as well.

Repeating the Pesaran (2007) Panel Unit Root test (CIPS) at first difference (See Table 5.6) the null hypothesis (i.e. H_0: Series has a unit root) is rejected at 1% significance level

considering the variables with and without trend. Once again the results from Maddla and Wu (1999) Panel Unit Root test are endorsed.

Table 5.6 Results of Pesaran (2007) Panel Unit Root test (CIPS)

Variable	At First Difference			
	Without Trend		With Trend	
	Zt-bar	p-value	Zt-bar	p-value
DLEG	-6.099***	0.000	-5.632***	0.000
DLDE	-4.013***	0.000	-3.021***	0.001
DLNDE	-5.748***	0.000	-4.931***	0.000

Notes:
1) H0: Series has a unit root
2) ***indicate significant at 1% significance level.
3) H0 is rejected; data is stationary at first difference.

From above discussion it is concluded that the order of integration is one (i.e. I(1)). So any regression run on the data at levels may generate spurious results.

5.5 Results of Cointegration Tests

Having confirmed that all variables are integrated of order 1. Next we move to test for the possible cointegration between the variables. For this panel cointegration tests proposed by Westerlund (2007) are used.

The findings of Westerlund cointegration tests are provided in Table 5.7:

Table 5.7: Results of Westerlund Cointegration Test

Statistic	Value	Robust P-value
Gt	-1.972***	0.000
Ga	-6.577***	0.000
Pt	-2.963***	0.000
Pa	-2.958***	0.000

Notes:
1) H0: No cointegration
2) *** indicates significance at 1% significance level
3) Robust p-values are obtained by using bootstrapping with 1000 replications.

Westerlund proposed four different tests for the cointegration. Two of the tests are panel test with alternative hypothesis that whole panel is cointegrated while the rest are grouped mean tests which test the alternative hypothesis that at least one cross sectional unit is cointegrated, there is an evidence of cointegration. Westerlund (2007) test addresses various forms of

heterogeneity and the p-values, robust against cross-sectional dependencies are calculated by using bootstrapping with 1000 replications. For all tests, the p-value is zero to the three decimal places and thus rejects the null of no cointegration and thus provides evidence that a long run relationship exists between all three variables.

5.6 Results of Static Long Run Relationship Estimation

To estimate long run parameters, the study employs the Dynamic OLS (DOLS) method. The results obtained from Static Long Run Relationship Estimation are provided in Table 5.8 below by taking economic growth as dependent variable:

Table 5.8: Results of Static Long Run Relationship Estimation

Variable	Coefficient	SE	Z	p-value	95% Conf Interval	
LDE	0.068	0.107	0.63	0.526	-0.142	0.278
LNDE	0.874***	0.093	9.38	0.000	0.692	1.057
Wald $chi^2(2)$		195.30***	Number of observation			108
p-value of Wald		0.000	Number of groups			04
R-squared		0.380	Observations per group			27

Note: ***, ** and * indicate the significant at 1%, 5% and 10% significance levels respectively.

Table 5.8 shows that there are a total of 108 observations with 27 observations for each of selected four countries. Note that, LNDE is found to be highly significant (at 1% significance level) while LDE is found to be insignificant. The p-value of Wald statistic suggests that both variables are jointly significant as well. It can be concluded that for a 1% increase in the non-defence expenditure, there is 87.4 % percent increase in the economic growth while a 1% increase in defence expenditure (LND) will lead to only 6.8% increase in economic growth, though its impact is insignificant. These findings are in line with the Benoit (1973); Deger (1986); Landau (1996); Saleem & Hassan (1992) and Khilji & Akhtar (1997) and are in contrast with Biswas (1986), Khan (2000) and Chen (1993).

5.7 Results of Causality Test through PVECM

To find the direction of causality in this study Panel Vector Error Correction Model (PVECM) is used which provides the causal relationship between the focal variables both in short as well as in the long-run. The results of PVECM are provided in Table 5.8 below:

Table 5.9: Results of Causality Test

Dependent variable	Nature of Causality			
	SR Causality			LR Causality
	DLEG	DLDE	DLNDE	EC term
DLEG	--	0.014*** (0.000)	0.140*** (0.000)	-0.020*** (0.000)
DLDE	0.913 (0.383)	--	0.111 (0.363)	-0.183** (0.011)
DLNDE	1.873*** (0.001)	-0.126 (0.312)	--	-0.083** (0.010)

Notes:

1) H0: No Causality
2) *, ** and *** indicate significant at 10%, 5% and 1% significance level respectively.
3) H0 is rejected

In the above Table 5.8, a significant coefficient of first difference of each variable indicates the existence of short term causality while long run causality is established if the coefficient of error correction term is found to be significant. For the case, when the first difference of natural logarithm of economic growth is taken as dependent variable, the results show that there exists a unidirectional causality that runs from natural logarithm of defence expenditure to natural logarithm of economic growth in the short run as coefficient of DLDE (i.e. 0.014) is significant at 1% significance level. Similarly, the coefficient of DLNDE is also found to be significant at 1% significance level so in the short run, a unidirectional causality runs from natural logarithm of non-defence expenditure to natural logarithm of economic growth as well. Since error correction term accompanying a negative sign is also found to be significant at 1% significance level, so it shows the existence of long run causality as well.

For the case when first difference of natural logarithm of defence expenditure (DLDE) is taken as dependent variable, no evidence is found for the existence of short run causality both from DLEG and DLNDE to DLDE, however, there exists a long run causality. Finally, for the case when first difference of natural logarithm of non-defence expenditure (NDLDE) is taken as dependent variable, a unidirectional causality runs from DLEG to DLNDE while no evidence is found for the existence of unidirectional causality from DLDE to DLNDE. However, the significance of error correction term indicates the existence of long run causality.

In summary, there runs a unidirectional causality from defence expenditure to economic growth in short run. In long run a feedback effect is found between defence expenditure and economic growth. It confirms the spill over hypothesis in short run and in long run the enhanced economic growth is secured by allocating more to defence expenditure. The results support the hypothesis that defence causes growth at the initial stages and in the developing countries defence expenditure are worthwhile to establish strong grounds for development. Once the nation moves on development path defence sector would receive its due share from the enhanced prosperity.

CHAPTER 6

CONCLUSIONS AND POLICY IMPLICATIONS

6.1 Conclusion

The allocation of resources for defence needs of a country is of paramount importance. It has its linkage with economic growth. The topic has been widely studied to explore whether defence expenditure causes or doesn't cause economic growth.

The subject has been handled previously using neoclassical and Keynesian framework to explore the relationship between defence expenditure and economic growth. The study has contributed to provide an empirical evidence of relationship between military expenditure and economic growth for selected SAARC countries by making use of most recent available time series data from 1988 to 2014. Due to unavailability of data for some countries, the sample includes data for India, Pakistan, Bangladesh and Sri Lanka only. Keeping in mind the panel nature of the data, the study employs panel data analysis by making use of panel first and second generation of panel unit root tests including the tests proposed by Maddala and Wu (1999) as well as by Pesaran (2007). In addition, to examine the possible cointegration, Westerlund Panel Cointegration tests have been used. The long run coefficients are determined by the DOLS approach and finally the nature of causal direction is determined by applying Panel Vector Error Correction Model (PVECM).

The empirical results of the study suggest the existence of a unidirectional causality that runs from defence expenditure to economic growth. In particular, defence expenditure has a direct and significant effect on economic growth. The positive relationship implies that defence expenditure can be helpful in improving infra-structure, human resource and other spill overs, thus enhancing the economic growth. In general, a one percent increase in defence expenditure causes 6.8% percent increase in economic growth implying that the resources should be allocated towards defence spending as well as development projects.

The study finds bidirectional causality in long run. This can be explained by consideritng the situation of a rich economy which is more concern about its security than a poor, so growth in economy brings increased defence expenditure with it to gain more protection and security. Thus it allocates more share to its defence budget. Further the defence industry starts contributing in the GDP in the form of export revenue which leads to the establishment of defence economy. Investment is stimulated in the defence economy raising the defence expenditure. The finding of this study confirms the Benoit (Benoit, 1973) hypothesis which confirms that defence expenditure causes economic growth.

The result of this study is in contrast with the Biswas (1986), Khan (2000) and Chen (1993. One of the possible reasons of the different results may be that the existing studies simply employed the first generation tests of panel unit root and panel cointegration tests that do not consider the issue of cross sectional dependence. In addition, these studies used the conventional Granger causality test which depends on the lag length as well as number of observations used. To overcome all the methodological issues with the existing studies, the present study makes use of latest available tests to deal with panel data. In particular, the present study employs second generation test panel unit root and panel cointegration tests that are better than the the conventional tests and thus lead to more robust inference.

6.2 Recommendations

The defence of a country depends not only on its armament and troops but national security also depends upon internal stability, political and economic infra-structure and on educated and prosperous populations. A growing economy with weak defence is an invitation for invasion. There is always a need of reasonable defence policy for the country which might guarantee her steady growth. It is not advisable for a nation to sharpen its blade when the war has

been imposed. At that time it has to defend its political borders as well as insurgency with in the boarders with full power. Hence, a continuous defence spending becomes unavoidable. The findings of this study provoke the idea of secured progressing economy. A prosperous economy cannot be left on the mercy of invaders. A strong defence is recommended by allocating a reasonable share to its defence needs.

On the basis of "My enemy is my friend", better defence equipment and technology may generate spill overs of defence related R&D and a secure and entrusted environment for investment in defence industries leading to economic growth in long run. To reap those long run benefits a suitable defence spending is recommended.

6.3 Limitations of the Study

The major limitation of this study is the availability and quality of the relevant data for all SAARC Countries. Unfortunately, we could only find data for Pakistan, India, Bangladesh and Sri-Lanka. However, a lot of effort has been made by some international organizations to improve the quality and availability of data, yet the data span is only from 1988-2014.

Current study shed light on the importance of defence expenditure but still there is a need to research on the correct proportion and size of defence budget which could guarantee a steady growth path for the economy.

In the developing countries stronger military always remained a threat for government. If military is strengthened then it can take over the government. A weaker defence would not be able to defeat its enemies. So there is a need to investigate the troops and technology combination.

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