Essays on Economic Growth, Military Expenditure, Armed Conflict, And Corruption

By

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ABSTRACT

This thesis is a collection of three essays, which investigate the direct and indirect impacts of military expenditure, armed conflicts, and corruption on economic growth. The first essay is set in the context of Pakistan and India from 1960-2019. Pakistan and India provide particularly useful case studies because both countries allocate substantially higher budgets to their military sectors due to their protracted internal and external conflicts. Moving on to the second essay, where we extend this analysis to 61 countries by using data from 1975-2018. There are two main reasons to extend this analysis: First, to investigate this relationship at a broader level. Second, to check how this relationship varies across income groups. The final paper introduces the inclusion of corruption into the analysis and reduces the time period from 2000-2018 because of the unavailability of data on corruption before 2000. This essay investigates two important questions:(1) how does military expenditure impact economic growth in the absence and presence of corruption? (2) how does the relationship between military expenditure, armed conflicts and economic growth vary if the time period changes from 1975-2019 to 2000-2019

Economic Growth Effects of Military Expenditure in the Absence and Presence of Armed Conflicts: Case of Pakistan and India

This essay examines the relationship between military expenditure and economic growth in the absence and presence of armed conflicts (internal and external), in the context of Pakistan and India. We employ an Autoregressive Distributed Lag (ARDL) cointegration method with different diagnostic techniques by using time series data from 1960 to 2019. The empirical findings indicate a positive and significant impact of military expenditure on economic growth in the absence of armed conflicts in the case of Pakistan. The results also suggest that external armed conflicts have a significantly negative effect on economic growth in both contexts, but external armed conflicts are more harmful to the Indian economy as

compared to its counterpart. Further, the findings suggest that military expenditure stimulates economic growth in the presence of significantly higher external armed conflicts. However, military expenditure in the absence of armed conflicts has stronger growth-stimulating effects than in the presence of external armed conflicts. This suggests that armed conflicts offset some of the positive economic growth effects of military expenditure.

Economic Growth Effects of Military Expenditure in the Absence and Presence of Armed Conflicts: Across Income Groups

The main objective of this essay is to examine the economic growth impacts of military expenditure in the presence of armed conflicts by taking the development level of the countries under consideration, using balanced panel data of 61 countries from 1975 to 2018 period. I employ pooled mean group (PMG) a dynamic panel estimation method to conduct empirical analysis. The analysis confirms the existence of the long-run relationship between the underlying variables. The findings suggest that military expenditure stimulates economic growth both in general and across income groups, particularly high and low-income groups. However, the high-income group has stronger growth-enhancing effects of military expenditure than the low-income group. Further, the analysis also captures the non-linear relationship between military expenditure and economic growth in the presence of significantly higher armed conflicts, especially in high and low-income groups. However, the relationship's direction depends on the countries' development level. It implies that after a certain level of armed conflict, military expenditure starts affecting economic growth negatively in low-income countries, whereas positively in the high-income group and these positive effects keep increasing with higher armed conflict levels. The heterogeneous findings across income groups suggest that the security/military effects work differently across countries depending on their economic capacity and susceptibility to the armed conflict levels.

Economic Growth Effects of Military Expenditure Conditional and Unconditional on Armed Conflicts and Corruption: Across Income Groups

This essay investigates the direct and indirect impacts of military expenditure, armed conflicts, and corruption on economic growth. This analysis is conducted on a panel of 61 countries and across different income groups over the period 2000-2019. Countries' armed conflicts are measured by accumulating the number of internal and external armed conflicts

that happened in a given year, and the corruption perception index (CPI) is used as a corruption measure. I employ two alternative dynamic panel data methods, pooled mean group (PMG) and dynamic fixed effects (DFE) methods for empirical analysis after carefully running the Huseman test. The analysis confirms the existence of the long-run relationship between the underlying variables. The main findings show that during the 2000-2018 period, military expenditure does not have a direct impact on economic growth except in the high-income group. The armed conflicts have a direct negative impact on economic growth, overall, and particularly in high and low-income groups. However, armed conflicts are more harmful to low-income economies than the high-income. The study also finds that the countries with higher corruption rates have lower economic growth than the countries with lower corruption rates in the high-income group. Further, military expenditure in the presence of corruption has negative and significant effects on economic growth in the high-income group.

DEDICATION

To my Parents, Nasreen and Shoukat, with gratitude.

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Chapter One

Introduction

1.1 Objectives of the Study

Countries maintain military sectors and spend a significant amount of resources on defence because they seek security inside their borders and in the international environment, characterised by instability and changing defence and strategic interrelations. A. Smith, 1776 stated, "The first duty of the sovereign is that of protecting the society from the violence and invasion of other independent societies, which can be performed only by means of a military force". The provision of national security by the military sector enhances the security of individuals and property from indigenous and foreign threats, which is essential for smooth market operations and for providing a peaceful environment for investment and innovation.

Despite Military expenditure being an important component of government expenditure that has an influence beyond the resources it consumes, especially when it utilizes to eradicate or facilitate conflicts. It was not until the early 70s that economist turned their attention toward the empirical economic implication of military expenditure. The empirical debate over the association between military expenditure and economic growth started after Benoit, 1973, who suggested the positive relationship between military expenditure and economic growth in developing countries. These unexpected findings led to enormous research activity in this field by using different countries or a set of countries with various theoretical and econometric methods and time periods, which ended up having an inconclusive relationship between military expenditure and economic growth. Previous literature concerning the economic growth effects of military expenditure is divided into two main groups. One group believes military expenditure and economic growth are positively related (Ward et al., 1991; Mueller and Atesoglu, 1993; MacNair et al., 1995; Sezgin, 2001; Wijeweera and Webb, 2009; Tiwari and Shahbaz, 2013 etc.), and the second group sees that both variables have negative relation (Lebovic and Ishaq, 1987; Mintz and Huang, 1990; P. Dunne, Nikolaidou, and Vougas, 2001; J Paul Dunne, Nikolaidou, R. Smith, et al., 2002; Shahbaz, Afza, and Shabbir, 2013 etc.).

Although this matter has been empirically analysed for almost 50 years but economists still have not reached to any definite Conclusion. That is because the relationship between military expenditure and economic growth varies across countries depending on their economic capacity and many other factors. However, the previous literature has identified several channels through which military spending can affect economic growth such as technology, capital, labour, debt, social-political effects, corruption, conflicts etc. (Deger and R. Smith, 1983; Deger, 1986; Deger and Sen, 1995). These channels interact and influence economic growth depending on the underlying country (or countries). For instance, advanced countries might have concerns over technology and foreign direct investment, while conflict-prone countries might have concerns over security issues they find themselves in, and if these countries are resource-constrained countries, then maintaining higher defence spending for security purposes might be the main concern, as the defence expenditure has the higher opportunity cost for underdeveloped countries in terms of investment or spending forgone elsewhere (John Paul Dunne, 2012).

Moreover, it has also been argued by some studies (Aizenman and Glick, 2003; Musayev, 2016) that the impacts of military expenditure on economic growth also depends upon how this spending has been induced, if defence spending is induced by conflict or threats then the economic growth effect of military spending can be positive and if the military spending induced by corruption then military expenditure can reduce economic growth. Taking these arguments into account, this thesis is based on two main objectives.

The first primary purpose of this thesis is to investigate the economic growth impacts of military expenditure conditional on armed conflicts. In simple words, how does military spending affect economic growth in the presence of armed conflict? The conflict measures are relatively ignored in previous military-growth literature (e.g. Frederiksen and Looney, 1983; Tahir, 1995; Khilji, Mahmood, and Siddiqui, 1997; Dakurah, Davies, and Sampath, 2001; Wijeweera and Webb, 2009; Wijeweera and Webb, 2011; Farzanegan, 2014; Shahbaz, Afza, and Shabbir, 2013; Tiwari and Shahbaz, 2013; Yildirim and Öcal, 2016 etc.). Ignoring threats or conflict-related variables while trying to determine the relationship between military expenditure and economic growth may lead to omitted variable bias in the estimated coefficients. According to Aizenman and Glick, 2003, the true relationship between military spending and economic growth can only be established after controlling for the conflict level. Their study validates this hypothesis empirically as well, by introducing the threat measure in the conventional growth equation and interacting it with military expenditure. Their findings regarding the relationship between military spending and economic growth suggest that military expenditure has positive economic growth effects in the presence of significantly higher threats through security, while negative in the absence of threats. However, their findings raise further empirical questions regarding the security impacts of military expenditure. Do the security effects or military expenditure effects in the presence of conflict stay homogeneous across countries? Disregarding the development level of the countries while determining the association between defence expenditure and economic growth might induce measurement error issues in the estimated parameters. Because the military-growth relationship also depends upon how military spending has been financed or how many resources are available for military purposes. In order to maintain the defence sector, underdeveloped countries are more likely to divert resources from the high-growth development sector, while developed countries or industrialized countries can maintain or even increase high military expenditure alongside the high-growth development sector (Frederiksen and Looney, 1983).

The second main purpose of this thesis is to determine the economic growth impacts of military expenditure conditional on corruption. Considering corruption while establishing the military-growth relationship is also important because secrecy and limited competition in the military sector can provide fertile ground for corrupt practices or rent-seeking activities[1], which in turn can burden the economy by increasing the overall cost of defence activities, directly through encouraging the rent-seeking activities in the military and indirectly by crowding-out growth-friendly investment in the private sector (d'Agostino, John Paul Dunne, and Pieroni, 2012). Previous studies (Aizenman and Glick, 2003; d'Agostino, John Paul Dunne, and Pieroni, 2012; Musayev, 2016) on the relationship between military expenditure and economic growth conditional on corruption suggest that military spending in the presence of higher corruption can reduce economic growth, but do these impacts vary across developed and underdeveloped countries?. Because it is a common perception that underdeveloped countries have higher corruption rates as compared to developed countries. Therefore, it would be interesting to extend this analysis to find how these effects vary across different income groups.

It has been discussed in the previous literature that there is no agreed theory to examine the economic growth impacts of military spending because most of the theoretical models do not consider the role of military expenditure explicitly (John Paul Dunne, 2012). However, J Paul Dunne, R. P. Smith, and Willenbockel, 2005 in their critical review study suggested using Aizenman and Glick, 2003 reformulated endogenous growth model, which allows military

[1]the aim of rent-seeking activities is to acquire financial benefits through the manipulation of the distribution of the economic resources, such activities considered detrimental for the economy and society because they decrease economic efficiency through the inefficient allocation of resources.

expenditure to impact economic growth through interaction with threats and corruption. Allowing such non-linearities makes this model comparatively advantageous. Their theoretical framework is based on the following conjectures;(i) military expenditure in the absence of conflict and conflict in the absence of military expenditure reduces economic growth. (ii) military spending in the presence of significantly higher conflict increases economic growth. That is because at the given level of conflict if military expenditure increases, overall security increases and higher security is key for smooth market operations because it provides a peaceful environment for investment and innovation. (iii) Corruption has direct negative economic growth effects and if military expenditure increases because of corruption that can also lead to lower economic growth. That is because military expenditure induced by corruption can divert resources from the productive sector to the unproductive sector, which in turn decreases the overall production of the economy and subsequently reduces economic growth.

1.2 Research Questions

This thesis is based on five chapters, three of which are empirical, and which quantitatively investigate the relationship between economic growth, military expenditure, conflict and corruption by using a country-specific and a Panel dataset. To achieve the objectives of this study, the empirical analysis is centred on the following three main questions.

1. ***What are the economic growth impacts of military expenditure conditional and unconditional on armed conflicts in Pakistan and India from 1960-2019?*** This question is answered in chapter 2.

2. ***What are the economic growth impacts of military expenditure in the absence and presence of armed conflicts, overall, and across income groups***

from 1975-2018? This question is addressed in Chapter 3.

3. ***What are the economic growth effects of military expenditure through corruption and armed conflicts across income groups from 2000-2018?*** This question is investigated in Chapter 4.

1.3 Contribution of the Thesis

This thesis contributes to the growth-military literature as well as conflict and corruption literature. The main contribution of this thesis is in its empirical findings found in chapters 2, 3, and 4.

The first empirical chapter, Chapter Two, investigates the economic growth impacts of military expenditure conditional and unconditional on armed conflict (internal and external) in Pakistan and India, from 1960-2019. There are several reasons which make Pakistan and India important case studies to determine the economic growth effects of military expenditure. Pakistan and India are two of the most populous countries in the world. Both countries allocate substantially high budgets to their military sectors, despite being in the lower middle-income group of countries and having a lower human development Index (HDI) ranking. Further, Pakistan and India perceive higher levels of threats not only from their neighbouring countries but also from inside their2 borders. The results from the analysis show that military expenditure in the case of Pakistan has a significantly positive impact on economic growth both in the absence and in the presence of external armed conflicts. However, the magnitude of the coefficient on military expenditure decreases in the presence of external armed conflicts. Further, in the Indian context, the military also has a positive impact on economic growth conditional on external armed conflicts. Further, the analysis also contributes to the literature by revealing that external armed conflicts are more harmful to the Indian economy as compared to the Pakistani economy. The robustness of the results has been also checked through different econometric techniques.

The second empirical chapter, Chapter Three, extends the analysis from case studies (chapter two) to the broader level by adding more countries to the sample. In this chapter, we analyse the economic growth effects of military expenditure in the absence and presence of armed conflicts both in general and across different income groups from 1975-2018. The selection of countries and time period for this chapter entirely depends on the quality and availability of data on military expenditure, economic growth, armed conflict and other underlying explanatory variables. The results show that the direct effect of military expenditure on economic growth is positive in general and specifically in high and low-income countries. However, high-income countries have a more positive impact of military spending than low-income countries. The empirical findings from this chapter also contribute by showing that military expenditure in the presence of significantly higher armed conflicts impact positively on economic growth in high-income countries, while negatively in low-income countries. These findings also reveal the existence of a non-linear relationship between military spending and economic growth conditional on armed conflicts in high-income and low-income countries, suggesting that in high-income countries as the armed conflict level increases the military expenditure effect on economic growth gets stronger and stronger. On the other hand, in low-income countries after a certain level of armed conflict military expenditure starts impacting economic growth negatively.

The third empirical chapter, Chapter Four, extends the analysis of chapter three by introducing corruption measure in the model. This chapter determines the direct and indirect impacts of military expenditure, corruption, and armed conflicts on economic growth, across income groups. Due to the unavailability of data on corruption before 2000 for most countries, this analysis is based on a panel dataset of 61 countries from 2000-2018. This chapter contributes to the literature by showing that higher quality of government institutes or lower corruption rates have a positive impact on economic growth in high-income countries. This analysis also captures the non-linear impact of military expenditure on economic growth conditional on corruption in the case of high-income countries. Suggesting that the countries in the high-income group with lower corruption rates have more negative economic growth effects of military expenditure than the countries with higher corruption rates. Further, using different time periods in chapter two and in this chapter also affects some of the findings which further allow us to compare the results on the economic growth effects of military expenditure in the absence and presence of armed conflicts.

1.4 Outline of the Thesis

The rest of the thesis is structured as follows: Chapter Two examines the economic growth impacts of military expenditure in the absence and presence of internal and external armed conflicts, in the case of Pakistan and India from 1960-2019. Chapter Three attempts to determine the impact of military expenditure on economic growth unconditional and conditional on armed conflicts across income groups from 1975-2018. Chapter Four determines the economic growth effects of military expenditure through armed conflicts and corruption, across income groups from 2000-2018. Finally, Chapter Five concludes the thesis, it summarises the results from three empirical chapters and explains the contribution of this research in detail. It also highlights the limitations of this research and offers some recommendations for future studies.

Chapter Two

Economic Growth Effects of Military Expenditure in the Absence and Presence of Armed Conflicts: Case of Pakistan and India

2.1 Introduction

The considerable debate over the economic growth effects of military expenditure started after the contribution by Benoit, 1973; Benoit, 1978, who suggested that military expenditure has a positive impact on economic growth in less developed countries. Subsequently, this unexpected inference led to extensive research activity in military-growth literature by using different empirical and theoretical methods for different countries, which result in no definite relationship between military expenditure and economic growth. Some studies state a positive association, others a negative, and some suggest no relationship at all (Stewart, 1991). This study examines the economic growth effects of military expenditure conditional and unconditional on armed conflicts by using the time-series data from 1960-2019, in the case of Pakistan and India. This analysis is distinct from previous studies in the following three ways.

First, this analysis considers two South Asian nuclear-armed neighbouring countries, Pakistan and India, which have hitherto hardly been considered in growth-defence literature or included in much extensive analysis that incorporates a higher number of countries with different social, security and economic conditions that do not lead to any substantive conclusion, while this analysis is exclusively based on Pakistan and India. There are several reasons why India and Pakistan could be excellent case studies for determining the economic impacts of military expenditure. Most importantly, both countries allocate substantially high budgets to their military sector. According to the Stockholm International Peace Research Institute (SIPRI, 2021) report, Pakistan's military burden (military expenditure share of GDP) increased from 3.3% in 2011 to 4% in 2020 which is higher than the United States (largest spender on military,3.7%) and world (2.4%) military share to GDP. On the other hand, India is 3rd world's largest military spender, whose defence spending increased by 34% from 2011 to 2020, which is equal to 79 billion dollars. Further, according to Institute for Economics and Peace (IEP, 2020) report, both Pakistan and India ranked poorly (150th and 139th, respectively) in 2020 Global Peace index (GPI) of 163 countries, respectively. Additionally, the same report also shows that Pakistan and India stood at 52nd and 112th position in the economic cost of violence percentage of GDP index with a cost of 8% and 5% of GDP, respectively. These findings highlight that both countries face higher internal and external security threats which could be the main reason for exhausting substantial amount of resources on defence every year.

Second, our analysis considers armed conflict measures (internal and external) while determining the relationship between military expenditure and economic growth, which to the best of our knowledge has not been considered in the case of Pakistan and India. Previous papers based on these case studies did not control for conflicts while investigating the growth-military relation (e.g.:Tahir, 1995; Khilji, Mahmood, and Siddiqui, 1997; Khan, 2004; Shahbaz, Afza, and Shabbir, 2013; Tiwari and Shahbaz, 2013) which may easily cause omitted variable bias in estimated coefficients, especially when conflict-prone countries are under consideration. According to Aizenman and Glick, 2003, the true relationship between defence expenditure and economic growth can only be determined after appropriately controlling for conflicts and the interaction between defence spending and conflict level. Their study also empirically verified the non-linear relationship between military expenditure and economic growth conditional on armed conflicts. Their findings suggest that military expenditure in the presence of significantly higher external threats has a positive impact on economic growth, while negative in the absence of external threats. J Paul Dunne, R. P. Smith, and Willenbockel, 2005 in their critical review paper, where they compared various theoretical models used by defence economists, concluded that Aizenman and Glick, 2003 reformulated Barro, 1990 growth model. which allows security impacts on economic growth by increasing defence expenditure in the presence of threats, is more promising and has a comparative advantage over other conventional theoretical models to explain defence outlays and economic growth. Thus, it would be worth investigating the economic impacts of military expenditure in the presence of threats in the case of Pakistan and India, where both military expenditure and threat levels are high.

Third, this analysis uses the most recent and comprehensive time series data set for both countries from 1960-2019, collected from Stockholm International Peace Research Institute (SIPRI) database and the World Bank, which allows for a more thorough and advance analysis in this context. Further, for empirical analysis, firstly we use various unit-root tests such as Augmented Dickey-Fuller (ADF) test, Philips-Peron (PP) test, Kwiatkowski, Philips, Schmidt, and Shin (KPSS) test, and Zivot-Andrew (ZA) test, after confirming the integration level of underlying variables via unit root tests, we employ Autoregressive Distributed Lag (ARDL) technique to cointegration. This analysis also uses the Fully Modified Ordinary Least Square (FMOLS) method to check the robustness of ARDL long-run estimates.

This chapter is based on six main sections. The second section provides a brief review on the relationship between military expenditure and economic growth, the third section gives a short review on countries' backgrounds. The fourth section explains data, model specification and empirical methods. The fifth section is based on results and discussion, and the final section provides a conclusion.

2.2 A Brief Review on the Relationship between Military Expenditure and Economic Growth

The empirical debate over the economic growth impacts of military expenditure started after the contributions of Benoit, 1973; Benoit, 1978, who based his analysis on a cross-sectional of 44 lower-developed countries (LDCs) between 1950 and 1965, suggested that countries facing a larger military burden (military expenditure/GDP ratio) tend to grow faster than those with a lower military burden. These unexpected results directed a large number of subsequent empirical studies toward this subject with different theoretical and empirical methods to assess the validity of his results. Consequently, this research activity divided defence-growth literature into two main groups. One group views defence expenditure as an assurance of security, peace, and welfare. On the other hand, the second group views such outlays are wastage of scarce resources and exhaustion of such resources could lead to serious economic consequences (J Paul Dunne and Tian, 2015).

Multiple studies surveyed the prior literature; J Paul Dunne, Uye, et al., 2010 reviewed 102 existing studies on military-growth literature, reports that 39 and 35% cross-country and case studies indicate negative economic growth impacts of military expenditure, respectively, while 20% show positive impacts of military expenditure on economic growth in both cases. Whereas around 40% of studies are inconclusive. In the most recent survey of 168 defence-growth studies by J Paul Dunne and Tian, 2013 found that the negative economic impacts of military expenditure are reported by 44 and 31% cross-sectional studies and case studies, respectively. Whereas, 20% reports positive effects of military expenditure on economic growth and the remaining are ambiguous.

In military-growth literature, there is no standard framework to examine the economic impacts of military expenditure because most of the theoretical frameworks do not consider the role of military expenditure explicitly (J Paul Dunne and Tian, 2015). However, the theoretical models have purposed several channels through which military expenditure can impact economic output such as technology, capital, labour, debt, social-political effects, conflict etc. (J Paul Dunne, Uye, et al., 2010). These channels can be grouped into three main channels; demand, supply, and security (J Paul Dunne, R. P. Smith, and Willenbockel, 2005).

In the demand channel, defence spending operates through the Keynesian aggregate demand multiplier effect. According to this channel, in the presence of spare capacity in the country, additional defence spending stimulates aggregate demand, which in turn increases capital utilization and decreases unemployment. Subsequently, it leads to higher investment and economic growth levels (Deger, 1986). The empirical support for this debate is provided by the following studies: Ward et al., 1991; Mueller and Atesoglu, 1993; MacNair et al., 1995; Sezgin, 2001; Wijeweera and Webb, 2009; Tiwari and Shahbaz, 2013 etc. Therefore, in this context, military expenditure often considers as it has economic growth stimulating effects. Even in many underdeveloped countries, the military sector considers as being capable of developing social infrastructure (roads, railways, airports etc.) and human capital (military education, training skills etc.) which in turn is likely to contribute to the development process of the country (Benoit, 1978). However, it has also been argued that defence spending has an opportunity cost and it diverts resources from public and private sectors that are more growth-oriented than defence. Mostly in underdeveloped countries due to budget constraints, higher military expenditure is often financed by increasing taxes, cutting other growth-friendly expenditures (e.g., education, health, infrastructure etc.), and increasing borrowing and money supply. This argument is empirically supported by the following studies: Lebovic and Ishaq, 1987; Mintz and Huang, 1990; P. Dunne, Nikolaidou, and Vougas, 2001; J Paul Dunne, Nikolaidou, R. Smith, et al., 2002; Shahbaz, Afza, and Shabbir, 2013 etc., for the different sets of countries. Besides, if the country is also importing arms, in that case, it might lead to adverse balance of payment problems.

The supply channel operates through the availability of factors of production such as natural resources, physical and human capital, labour, and technology. Which all establish the future output of the country. Besides, as mentioned earlier military expenditure has an opportunity cost. Therefore, some of the demand effects such as crowding out private and public effects may have supply effects by altering capital stock (J Paul Dunne, R. P. Smith, and Willenbockel, 2005). Moreover, Mylonidis, 2008 also mentioned a possible opportunity cost attached to defence spending such as the adverse balance of payment especially in arms importing countries, lower tax ration for the public sector, inefficient bureaucracies due to higher rent-seeking behaviours, lower level of public and private investments, diverted research and development (R&D) activities and trained worked force from the public sector. However, the proponents of military expenditure suggest that military R&D expenditure can spill over into private and public sectors in the form of advanced technology (i.e., nuclear energy, jet engines etc.) Similarly, the military-trained workforce can stimulate total factor productivity through serving in both military and civilian/private sectors (Deger and Sen, 1995).

In the security channel, the provision of national security by the military sector enhances the security of individuals and property from indigenous and foreign threats, which is essential for smooth market operations and for providing a peaceful environment for investment and innovation. According to J Paul Dunne, R. P. Smith, and Willenbockel, 2005 military expenditure to some extent increases national security that in turn may increase economic growth. Adam Smith mentioned that the first responsibility of any sovereign state is to secure its nationals from violence and invasion of other independent societies and that can only be possible with the help of military force. Further, it has been observed often that major obstacles to development in many underdeveloped countries are wars and lack of security. Therefore, higher military spending can provide the opportunity for capital accumulation and producing more output, which could lead to higher economic growth (Thompson, 1974). However, when military expenditure is driven from rent-seeking behaviour but not from security needs, in such cases defence spending can provoke an arms race or wars between the countries. Aizenman and Glick, 2003 and some followed-up studies (Yang et al., 2011; Musayev, 2016) validated this argument empirically, showing that higher military expenditure impact positively on economic growth when a country experiences significantly higher threat level and impact negatively when a country faces higher corruption level.

All the above-stated channels interact and influence economic output differently depending on the underlying country. For instance, comparatively advanced developing countries might have concerns over technology and foreign direct investment, while conflict-prone countries might have concerns over the conflict trap they are in or their security situation (John Paul Dunne, 2012). Even though the debate on the relationship between military expenditure and economic growth has been going on for more than 40 years but the result always relies on the empirical findings among other factors such as countries or a set of underlying countries, theoretical and empirical methods, time period etc. (J Paul Dunne and Tian, 2015).

2.3 A Brief background of Pakistan and India

Pakistan and India are two of the world most populous countries with 216.5 million (5th largest) and 1.32 billion (2nd largest) people, respectively, which both fall into the lower-middle income group, according to the world bank 2020 country classification on the basis of gross national income. Further, United Nation Development Program (UNDP, 2020) ranked Pakistan and India poorly on the Human Development Index, both ranked 154th and 131st out of 189 nations, respectively. Also, both countries exhaust a large portion of their GDPs to the defence sector. There are several reasons behind keeping a high level of military expenditures in both countries.

First, in Pakistan, the military has been ruling the country either directly or indirectly, since independence (1947) four military coups have directly governed Pakistan for around 33 years. A reasonable assumption would be that military rulers are more likely to devote higher resources to the military sector. Second, poor relations and longstanding border or territorial disputes with India, with which Pakistan had fought 3 major wars since independence:1965, 1971, and 1999. Third, Pakistan had been a major partner with the US against the Soviet-Union invasion (1979) in Afghanistan and the US-led war against terror, which consequently originated several new security challenges for Pakistan such as terrorism. Finally, Pakistan shares its second longest border with Afghanistan and the security situation in Afghanistan always has direct and indirect impacts on Pakistan's internal and external security matrix. Sharing a 3232 km long border with India and 2640 km long with Afghanistan requires a large number of military personnel and equipment, which automatically increases the overall portion of defence expenditure in GDP.

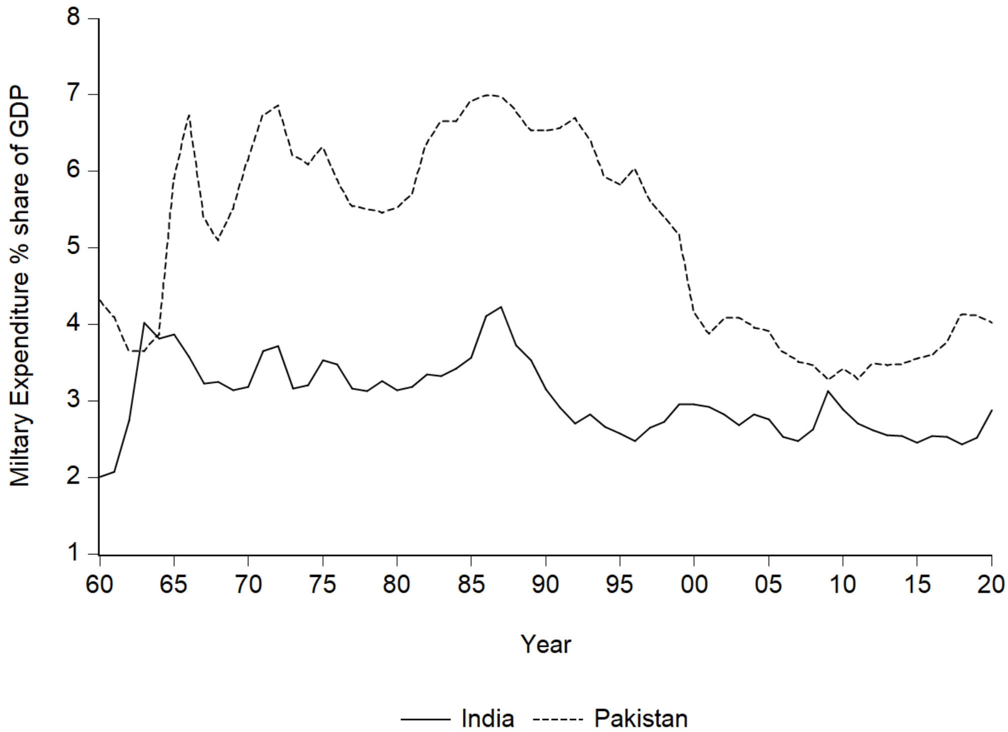
On the other hand, besides Pakistan, India has been embroiled in an endless border dispute with China because of this border conundrum both countries fought a war in 1962 and have been engaged in several border skirmishes. The troubled relationship and border disputes of India with neighbouring China and Pakistan increase the importance of maintaining a higher defence budget to deter the enemy forces. Furthermore, the Indian military has also been confronting several separatist movements. In Punjab, the Khalistan movement by Indian Sikhs seeks to create a separate sovereign state for Sikhs called Khalistan. The secessionist movement in Jammu and Kashmir (which is also claimed by Pakistan), and various violent insurgencies in the northeast of India; Asam, Nagaland, Manipur, and Tripura.

There have been wide fluctuations in defence expenditure in Pakistan and India in the past 60 years in absolute terms and as a proportion of GDP. As figure 2.1 illustrates, Pakistan's military burden (military expenditure as a percentage of GDP) is higher than the Indian military burden throughout from 1960-2020 except in 1963, when the Indian military burden was slightly greater than Pakistan's military expenditure percentage of GDP as a result of Indo-China War in 1962. Pakistan's military expenditure decreased from 4.3% to 3.8% from 1960 to 1963. However, after 1964 military burden of Pakistan reached to 6.7% from 3.7% by 1966 because of the 1965 war between Pakistan and India. Afterwards, the decreasing pattern of military expenditure can be seen in both countries. Again, Pakistan and Indian military expenditure increased up to 6.9% and 3.7% by 1972, respectively, because of another war between Pakistan and India, in which East Pakistan (Now Bangladesh) separated from West Pakistan (now Pakistan).

During the next few years, military expenditure in Pakistan declined gradually from 6.9% of GDP to around 5.5% in 1979 and in between this period Pakistan was clandestinely working on the nuclear project. Meanwhile, in mid-1974 India conducted its first successful nuclear detonation and later its military expenditure increased between 1975 and 1977 because during this period Indian Prime Minister Indira Gandhi declared an emergency across the country because of imminent internal and external threats.

After 1979, Pakistan's military expenditure percentage of GDP gradually increased from 5.5% to 6.8% by 1989, because during this period Pakistan cooperated with the U.S against the Soviet Union's invasion of Afghanistan. After the Soviet withdrawal from Afghanistan in between 1988 and 1989, the U.S dramatically reduced its support to Pakistan as well as its presence in the region, as a result, Pakistan's military burden declined after 1988. On the

Figure 2.1: Military Expenditure as Percentage Share of GDP: Pakistan and India



other hand, Indian military expenditure increased after 1984 from 3.4% to 4.2% in 1987 due to civil unrest, during this time Indian military started operation 'Blue Star' against Sikh separatists in Punjab (Indian) and Indian Prime Minister Indira Gandhi was assassinated.

During 1990-2000 Pakistan and Indian military expenditure share to GDP decreased from 6.4% to 4.2% and 3.1% to 2.9% of GDP, respectively. During this period around 1998, both countries conducted successful nuclear bomb tests and right after that fought a limited war (Kargil war) in 1999. After the 9/11 attacks when the U.S invaded several countries including Afghanistan to eradicate militancy, Pakistan joined the U.S-led Global war on terror. Therefore, Pakistan's military burden slightly increased from 3.8% to 4.1% after 2001. Later Pakistan's military expenditure share of GDP fluctuated around 4% up till now. While the Indian military burden stayed around 3%.

The dynamics of military expenditures along with serious national security concerns make both countries particularly good case studies for determining the direct and indirect impacts of military expenditure and armed conflicts (internal and external) on economic growth.

2.4 Data, Model Specification and Econometric Method

2.4.1 Data

The empirical analysis is based on time series data of two countries, Pakistan and India, over the 1960-2019 period. The dependent variable real GDP per capita (constant 2010 US$) is simply a real gross domestic product divided by population and it has been extracted from World Bank's World Development Indicators (WDI) database.

Military expenditure is measured as a real military expenditure in constant 2010 US$, and it has been obtained from Stockholm International Peace Research Institute (SIPRI). SIPRI military expenditure involves where possible all capital and current spending on the military forces, defence ministries, government agencies engaged in defence projects, paramilitary forces, and military space activities. SIPRI always include all kinds of expenditure on current personal, civil and military, retirement pensions, social services, maintenance and operations, military R&D, procurement, military construction and military aid (includes in defence spending of a donor country). SIPRI does not include expenditure on civil defence and previous military activities such as demobilization, veterans' benefits, destruction of arms and conversion of arms production facilities.

Armed conflict data has been derived from the Uppsala Conflict Data Program (UCDP), which defines armed conflict as "a contested incompatibility that concerns government and/or territory where the use of armed forces between two parties, of which at least one is the government of a state, results in at least 25 battle-related deaths in a calendar year". This analysis uses the 'intensity level' of armed conflict, which is coded in the form of 1 and

2. 1 indicates minor armed conflict: between 25 and 999 battle-related deaths. Whereas, 2 indicates war or high-intensity conflict: at least 1000 battle-related fatalities each year. Further, we added 0 in the data set to show less than 25 battle-related deaths or no death at all.

Polity score data has been extracted from the Polity IV database, which reflects the degree of democracy/autocracy in a range of -10 (consolidated autocracy) and 10 (consolidated democracy). The data on this variable is till 2018 because it has not been updated to 2019 yet, due to the unavailability of funding. The rationale behind including regime-type variables is that economic institutions (such as regulatory institutions, property rights, institutions for macro-economic stabilization, institutions for conflict management etc.) are crucial for economic growth because these institutions play a vital role in resource allocation (Rodrik, 2008).

Real gross capital formation (2010 constant US$) has been collected from the World Bank database. Gross capital formation is also called gross capital investment. This variable does not only considers fixed assets of the country/economy but also incorporates the net changes in the inventories. Fixed assets include land improvement (drain, ditches, and fences etc.), equipment purchases, construction of rails, roads, schools, hospitals and commercial, buildings etc. While inventories include stock of goods kept by producers to meet unexpected and temporary fluctuations in demand, and work in progress.

The data on real government expenditure (constant 2010 US$) also has been taken from World Data Bank (WDI) database. According to WDI, this variable includes all the current government spending on purchases of goods and services. It also includes national defence expenditures but not military expenditures. Finally, the Population growth variable also has been obtained from World Data Bank (WDI). The summary on descriptive statistics has been shown in Table 2.1.

Table 2.1: Descriptive Statistics

	Variables	Obser	Mean	Std.Dev	Minimum	Maximum
Pakistan						
	GDP per capita (US$)	60	711.17	252.56	302.09	1197.91
	Military Expenditure (US$m).	60	381	250	539	1018
	External Conflicts	60	0.40	0.56	0.00	2.00
	Internal Conflicts	60	0.55	0.77	0.00	2.00
	Polity Index	60	-4.37	22.64	-88.00	8.00
	Gross Capital Formation (US$m)	60	1690	1020	255	4227
	Government Expenditure (US$m)	60	938	776	120	2957
	Population Growth	60	2.65	1.94	2.03	3.36
India						
	GDP per capita (US$)	60	776.61	502.76	330.20	2169.14
	Military Expenditure (US$m)	60	2150	1670	273	6315
	External Conflicts	60	0.43	0.59	0.00	2.00
	Internal Conflicts	60	1.13	0.65	0.00	2.00
	Polity Index	60	8.63	0.55	7.00	9.00
	Gross Capital Formation (US$m)	60	24602	28794	2260	99166
	Government Expenditure (US$m)	60	8501	8091	799	32946
	Population Growth	60	1.88	0.41	1.02	2.02

Notes: GDP per capita, military expenditure, gross capital formation, and government expenditure are in constant 2010 U.S. Dollars.

2.4.2 Model Specification

This analysis is based on Aizenman and Glick (2003) reformulated Barro, 1990 growth model, which allows non-linear growth impacts of defence expenditure conditional on threats. This theoretical model is based on the following conjectures: military expenditure in the absence of external threats reduces economic growth, external threats without military expenditure impede economic growth, and military spending in the presence of sufficiently higher external threats stimulates economic growth.

In this analysis, we have incorporated both internal and external conflicts. Although Aizenman and Glick (2003) only considered external threats in their analysis but later they recommend the inclusion of internal threats in future studies. Finally, the above conjectures can be expressed in the following forms.

$$\frac{\partial lGDP_t}{\partial lMiliExp_t} = \alpha_1 + \alpha_4 EXT_t + \alpha_5 INT_t; \alpha_1 < 0, \alpha_4 > 0, \alpha_5 > 0 \quad (2.1)$$

$$\frac{\partial lGDP_t}{\partial EXT.Conf_t} = \alpha_2 + \alpha_4 Mili_t; \alpha_2 < 0, \alpha_4 > 0 \quad (2.2)$$

$$\frac{\partial lGDP_t}{\partial INT.Conf_t} = \alpha_3 + \alpha_5 Mili_t; \alpha_3 < 0, \alpha_5 > 0 \quad (2.3)$$

Eq 2.1, 2.2, and 2.3 are driven from equation 2.4, given below.

$$lGDP = \delta + \alpha_1 lMiliExp_t + \alpha_2 EXTConf_t + \alpha_3 INTConf_t + \alpha_4 Mili.EXT_t + \alpha_5 Mili.INT_t + \beta X_t + \mu_t \quad (2.4)$$

Where in eq 2.4, $lGDP_t$ is log of real per capita GDP, $lMiliExp_t$ is a log of real military expenditure, $EXTConf_t$ is for external conflicts, $INTConf_t$ term represents internal armed conflicts, $Mili.EXT_t$ and $Mili.INT_t$ are the interactive terms that include military expenditure, external and internal conflicts, X_t is a vector of control variables that includes $Polity_t$ (democracy index), population growth ($POPG_t$), log of real gross capital formation ($lGCF_t$), and Log of real government expenditure ($lGOV_t$). Finlay, t is for the time period and μ_t is an error term.

2.4.3 Econometric Method

To empirically estimate the military-growth relationship in the absence and presence of armed conflicts in Pakistan and India, equation 2.4 is estimated by using AutoRegressive

Distributed Lag (ARDL) model. The ARDL model introduced by Pesaran, Shin, et al., 1995 is a single equation method that has several advantages. This method does not require all underlying variables to be integrated at the same level. This technique is applicable even if the variables are integrated at level (I(0)), the first difference (I(1)) or a combination of both. This method produces robust estimates in small and finite samples. Further, an error correction model can be derived from ARDL via linear transformation, which integrates both short-run dynamics and long-run equilibrium without losing the long-run information (Nkoro, Uko, et al., 2016). The generalized ARDL (p,q) model can be expressed in the following way.

$$LGDPg_t = \delta + \sum_{i=1}^{p} \theta_i LGDPg_{t-i} + \sum_{i=0}^{q} \alpha_i Z_{t-i} + \sum_{i=0}^{q} \beta_i X_{t-i} + \mu_t \quad (2.5)$$

Where in eq 2.5, LGDPg indicates the log of real per capita GDP, Z contains all variables of interest (log of real military expenditure, external armed conflicts, internal armed conflicts, and interactive terms of military expenditure with internal and external armed conflicts), and X is a vector of other control variables. p and q represent the optimal lag length of dependent and independent variables. Finally, μ_t is an error term and δ is a constant.

In order to select the optimal lag length for the eq 2.5 to avoid serial correlation issues in the model, the analysis employs Schwarz Bayesian Criteria (SBC) lag criteria as suggested by Pesaran, Shin, and R. P. Smith, 1999 . The next step is to test the long-run relationship between the underlying variables, for that Pesaran, Shin, and R. J. Smith, 2001 proposed bounds testing approach, which is based on F statistics. The null hypothesis of this test assumes variables are not cointegrated (i.e. $\alpha_i = \beta_i = 0$).Whereas, the alternative hypothesis assumes cointegration exists (i.e. $\alpha_i \neq \beta_i \neq 0$). The bounds test approach is based on two sets of critical values, one set (lower critical bound) considers that all the under-considered variables are integrated at I (0), it points toward no long-run association among the underlying variables. Whereas. the second set of critical values (upper critical bound) which assumes all variables are integrated at I(1), meaning there is a long-run relationship among the variables. The null hypothesis of no co-integration can be rejected if the F-statistics value is greater than the upper critical bound, and not rejected if the value is lower than the lower critical bound. However, if the F-statistics value falls inside the lower and upper critical bounds, no definite inference can be drawn in that case.

After confirming the presence of cointegration among the underlying variables, the next step is to examine the long-run equilibrium and short-run dynamics by using the ARDL model parameterised in the error correction (ECM) form.

$$\Delta LGDPg_t = \delta^{'} + \gamma(LGDPg_{t-1} - \alpha_i^{'} Z_t - \beta_i^{'} X_t) + \sum_{i=1}^{p-1} \omega_i^{"} \Delta LGDPg_{t-i} + \sum_{i=0}^{q-1} \alpha_i^{"} \Delta Z_{t-i} + \sum_{i=0}^{q-1} \beta_i^{"} \Delta X_{t-i} + \epsilon_t \quad (2.6)$$

Where, Δ is a first difference operator, $\delta^{'}$ represent constant, and γ is the error-correcting speed of adjustment coefficient. $\alpha_i^{'}$ and $\beta_i^{'}$ are long-run coefficients. $\omega_i^{"}$, $\alpha_i^{"}$, and $\beta_i^{"}$ are the short-run coefficients. Finally, ϵ_t is an error term with zero mean and constant variance-covariance. Further, γ is expected to be negative and significant, its numeric value decides how quickly the dependent variable return to the long-run equilibrium after experiencing shock in the short run.

It is important to point out that Equation 2.6 represents a single-equation modelling approach to estimate the model developed in Section 2.4.2, rather than a multiple-equation system such as a Vector Auto-Regressive (VAR) model. The choice of a single-equation approach is taken to best mimic the theoretical setup from earlier in this Chapter, but we acknowledge that in many contexts the VAR, and equivalent VECM approach popularised by Johansen (1996) amongst others is used.

Moreover, this analysis also uses some diagnostic, stability, and robustness tests to determine the goodness of fit of the under-considered model. The diagnostic tests examine whether the residuals of the regression models are free from autocorrelation and heteroskedasticity issues, for that we employ Breusch Godfrey Correlation LM and Harvey tests, respectively. The stability of the coefficients can be tested by using the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ). Further, we use the fully modified ordinary least square (FMOLS) method to check the robustness of long-run ARDL estimates.

2.5 Results and Discussion

In order to establish the integration level of the variables, firstly, we employ the Augmented Dickey-Fuller (ADF) test with constant, constant and trend, and none (without constant and trend) options. The null hypothesis of the ADF test states that the series is non-stationary. The unit root tests result in both contexts (Pakistan and India) are presented in Table 2.2. The ADF unit root test indicates that in the case of Pakistan only external conflicts (Ext Conf) and Internal conflicts (stationary without constant and trend at 10% significance level) series are stationary at the level and in the case of India both external conflicts (Ext Conf) and military expenditure (constant and trend stationary at 5% significance level) is stationary at level (l(0)), while remaining variables show the evidence of unit root at level (I(0)). However, after taking the first difference (I(1)) all the variables become stationary.

Second unit root test we employ is the Philips-Peron (PP) test, which is normally considered as an alternative of the ADF test. Both tests share the same null hypothesis that the series

Table 2.2: Unit-Root Test Results

		ADF			PP			KPSS		Zivot-Andrew		
	Variables	Constant	Both	None	Constant	Both	None	Constant	Both	Constant	Trend	Both
Pakistan												
Level	LGDP	-2.30	-2.44	4.13	-2.41	-2.35	6.01	0.96	0.23	-3.62***	-2.83**	-3.20***
	LMiliExp	-1.65	-2.81	-2.83	-1.58	-1.99	4.28	0.94	0.22	-3.87***	-4.10**	-4.43**
	Ext Conf	-3.97***	-4.07**	-2.65***	-5.08***	-5.20***	-3.71***	0.21***	0.06***	-5.75***	-5.25	-6.18***
	INT Conf	-2.33	-2.85	1.62*	-3.35**	-4.22***	-2.35**	0.49*	0.12*	-4.40***	-3.32*	-4.40***
	Polity	-3.15**	-3.51**	-3.12***	-3.40**	-3.62**	-3.69***	0.36***	0.05***	4.27**	-3.39**	-7.84***
	LGCF	-1.31	-2.51	3.35	-2.32	-4.64**	3.19	0.97	0.16**	-6.62***	-4.88***	-6.37***
	LGOV	-0.99	-2.31	5.12	-0.80	-2.60	5.29	0.96	0.12***	-3.66***	-2.39***	-3.31**
	POP	-1.91	2.54	-1.08	-0.69	-1.97	-0.40	0.44**	0.27**	-5.09***	-9.48	-8.97
1st Diffrence												
	LGDP	-4.08***	-4.53***	-2.30**	-6.22***	-6.57***	-3.65***	0.36**	0.06***	-7.30**	-6.85	-7.24***
	LMiliExp	-6.29***	-6.60***	-4.43***	-5.37***	-5.44***	-4.41***	0.18***	0.07***	-6.86	-6.98	-7.12*
	Ext Conf	-7.69***	-7.63***	-7.75***	-16.06***	-15.91***	-16.08***	0.08***	0.08***	-7.68**	-7.70	-7.89*
	INT Conf	-8.23***	-8.15***	-8.28***	-11.60***	-11.49***	-11.69***	0.03***	0.03***	-8.26	-8.48	- 8.26
	Polity	-5.36***	-5.41***	-5.41***	-7.98***	-7.91***	-8.05***	0.03***	0.03***	-8.57***	-7.93***	-9.58***
	LGCF	-5.82***	-5.78***	-4.80***	-9.65***	-9.61***	-8.09***	0.23***	0.06***	-5.96*	-4.41*	-6.41*
	LGOV	-5.88***	-5.88***	-3.66***	-10.03***	-10.01***	-7.57***	0.08***	0.06***	-10.76***	-10.17***	-10.73***
	POP	-4.71***	-6.24***	-4.69***	-2.40	-2.59	-2.32**	0.53**	0.11**	-8.84	-7.57***	-9.09***
India												
Level	LGDP	4.03	0.32	5.19	6.64	0.09	7.65	0.92***	0.25***	-2.07**	-2.77**	-3.09**
	LMiliExp	-1.28	-6.40**	2.65	-1.41	-4.24***	4..35	0.98***	0.04	-7.48*	-7.44	-7.65
	Ext Conf	-4.06***	-4.04**	-2.59**.	-5.97***	-5.27***	4.43***	0.11***	0.06***	-6.26	-6.05	-6.64***
	INT Conf	-2.56	-2.44	-0.80	-2.93**	-3.08	-0.95	0.53**	0.11**	-4.07**	-3.79***	-4.43***
	Polity	-2.37	-2.57	0.14	-2.19	-2.35	-0.09	0.28***	0.20	-6.15	-4.00**	-6.43
	LGCF	0.69	-1.51	5.31	0.92	-1.76	6.94	0.95	0.22	-4.34***	-3.46**	-3.65**
	LGOV	-0.45	-5.14***	4.02	-0.62	-3.49*	9.20	0.98	0.07***	-5.886*	−6.05**	-6.08**
	POP	-1.20	-2.32	-1.96	1.81	-2.57	-1.43	0.77	0.24	-3.41	-5.81	-5.86
1st Difference												
	LGDP	-4.37***	-6.91***	-2.17***	-6.47***	-10.75***	-3.74***	1.03	0.10***	-7.34	-7.21	-7.44
	LMiliExp	-6.46***	-6.36***	-5.09***	-5.27***	-5.24***	-4.38***	0.12***	0.08***	-6.40	-8.38*	-8.17**
	Ext Conf	-8.92***	-8.83***	-8.97***	-12.68***	-12.56***	-12.78***	0.03***	0.04***	-8.90	-5.85	-6.36**
	INT Conf	-6.06***	-5.99***	-6.12***	-9.92***	-9.98***	-9.98***	0.12***	0.05***	-6.41*	-6.-05	-6.43**
	Polity	-7.35***	-7.36***	-7.42***	-8.05***	-8.35***	-8.15**	0.17***	0.10***	-7.92***	-7.48**	8.87**
	LGCF	-5.09***	-5.19***	-3.06***	-8.69***	-8.81***	-6.04***	0.23***	0.08***	-9..12***	-9.04***	-9.18***
	LGOV	-4.70***	-4.59***	-2.37***	-4.89***	4.86***	-2.19**	0.10***	0.09***	-4.82***	-4.68***	-4.99***
	POP	-3.49***	-6.54***	-2.88***	-2.09	-2.37	-1.56	0.76	0.15***	-9.96	-9.66	-10.39**

Notes: LGDP is a log of real GDP per capita, LMiliExp is a log of real military expenditure, ExtConf is for external armed conflicts, INTConf shows internal armed conflicts, Polity is a democracy index, LGCF is gross capital formation, LGOV is final government expenditure, and POP represents population growth. The null hypothesis for ADF and PP hypothesis for KPSS shows that the series is stationary. Finally, the null hypothesis for the ZA test states that the series has a unit root with a break(s). * shows the significance level at 10%, ** shows significance level at 5%, and *** indicates significance level 1%.

is non-stationary. Table 2.2 shows that PP test outcome is consistent with ADF test results except for the internal conflicts (INT Conf) series in the case of Pakistan, which is now stationary at I(0) in all cases (constant, both, and none).

Another conventional unit root test we use is the Kwiatkowski, Philips, Schmidt, and Shin (KPSS) test. The null hypothesis of this test is completely opposite of ADF and PP tests. In this test, the rejection of the null hypothesis indicates that the series has a unit root or non-stationary. Table 2.2 shows that KPSS results are also consistent with ADF and PP tests. In this case, the null hypothesis cannot be rejected after taking the first difference of the variables in the Pakistani context. Whereas, we can reject in the Indian context for GDP per capita (LGDP) series (non-stationary with constant).

The conventional unit root tests (ADF, PP, and KPSS) can be used to determine the integration level of the variables. However, these tests have a well-known weakness against structural breaks. The presence of structural breaks in the series might decrease the power of rejecting the unit-root hypothesis of these tests. Therefore, we have also employed Zivot-Andrew (1992) unit test which allows one structural break in the series. The null hypothesis of ZA test assumes that the series has a unit root with a break(s), while the alternative hypothesis assumes that the series is stationary with a break(s). Table 2.2 illustrates that in this case almost all of the variables are I(0) stationary with a break(s) in the Pakistani context while in the Indian case LGDP. LMiliExp (with constant), EXT Conf (with both constant and trend), and INT Conf are stationary at I(0) with a break(s). Altogether, the bottom line here is that variables are stationary at the mixed level of integration even in this case.

All the unit root tests confirm that the variables of interest are integrated at the mixed level (1(0) and 1(1)). In this situation, the ARDL approach to cointegration will provide consistent and reliable results because this method can be applied whether the variables are integrated at I(0), I(1) or a mixture of both. Now before proceeding to the ARDL cointegration testing method to find out the long-run association between the variables under consideration. It is essential to determine the optimal lag order of the models, for that we have used the SBC graph method and selected ARDL (1,0,0,0,0,0,0,0,0) for Pakistan and ARDL (1,0,0,0,0,0,0,0,2) for India, both graphs are available in the appendix. Based on the selected ARDL models, bounds test for cointegration results are reported in Table 2.3. The cointegration test involves a comparison between F-statistics and critical values of upper I(1) and lower I(0) bounds presented by Pesaran, Shin, and R. J. Smith, 2001. If the F-statistics exceed the upper critical bound values, then the null hypothesis of no cointegration will be rejected and if the F-statistics value falls inside the upper and lower bounds in that case inference will be inconclusive (Pesaran, Shin, and R. J. Smith, 2001). Table 2.3 shows that F-statistics values in both contexts (Pakistan and India) are higher than the upper bound. This implies that the null hypothesis of no cointegration cannot be accepted.

Table 2.3: Cointegration Test: ARDL Bounds Test

	Pakistan	India	Signif	l(0)	I(1)
F-Statistc	5.59	5.39	10%	1.88	2.99
k	9	9	5%	2.14	3.3
			2.5%	2.37	3.6
			1%	2.65	3.97

Notes: I(0) and I(1) indicate lower and upper critical bounds, respectively. The null hypothesis suggests no cointegration exists. k indicates the number of regressors in the model.

The presence of a cointegration vector allows to establish a long-run association between the underlying variables and that further allows to determine the partial effects of military expenditure, conflict, polity, gross capital formation, government expenditure, and population growth on GDP growth in both contexts. The long-run results of Pakistan and India reported in Table 2.4 show that 1% increase in Pakistan's military outlays will increase economic growth by 0.28%. This finding accords with accord with Khan, 2004 and Anwar, Rafique, and Joiya, 2012 studies, where they empirically proved that defence expenditure does not hurt economic growth in the case of Pakistan. On the other hand, in the case of India, the coefficient on military expenditure is positive but it is not significant at the conventional level. This implies that Indian military expenditure does not have any impact on economic growth. This result is in-line with Khalid and Mustapha, 2014 study, where they also failed to determine any significant relationship between defence outlays and output in the case of India.

Moreover, the coefficient on the external conflict in the case of Pakistan is significantly negative, implying if external conflict increases by 1 it impedes growth by -0.56% and as the intensity of external conflict rises further for instance 2 the economic growth, in that case, will reduce by 1.12%. Similarly, in the Indian context, the coefficient of external conflict is also negative and significant at 5% level. Interestingly, the Indian coefficient is bigger in magnitude than Pakistan's one. Implying that external conflicts have more deteriorating effects on the Indian economy than Pakistan's. These findings accord with Aizenman and Glick, 2003; Musayev, 2016; Yang et al., 2011 studies, where they also find growth deteriorating effects of external threats. On the other hand, coefficients on internal conflicts are negative but insignificant in both cases.

The coefficient of interactive term involving military expenditure and external conflict for both Pakistan and India have a significantly positive impact on economic growth. Suggesting that an additional defence expenditure in the existence of a significantly higher external threat will accelerate economic growth by 0.02% and 0.03% through security in both Pakistan and India, respectively. These results accord with Aizenman and Glick, 2003; Musayev, 2016; Yang et al., 2011 studies where they also empirically proved the nonlinear relationship between defence outlays and economic growth conditional on external armed conflict. However, the magnitude of coefficients on interactive terms are clearly smaller than the coefficients of military expenditure (0.28% and 0.04%) alone, especially in the Pakistani context. That is because the presence of external conflicts offset some of the military expenditures' positive effects. While the interactive terms consisting of internal conflicts and military expenditure are not statistically significant at any conventional level for both countries.

Moving on to the control variables, where Polity has a negative and significant impact on economic growth in both cases. However, in the Pakistani context, the coefficient is almost zero. While gross capital formation coefficients are highly significant and positive as expected in both countries. Similarly, government expenditure also affects economic growth positively, but only in the case of India. Finally, the estimated coefficient on population

Table 2.4: ARDL Long-Run Estimates

Variables	Pakistan	India
LMili Exp	0.28***	0.04
	(0.05)	(0.07)
Ext Conf	-0.56*	-0.75**
	(0.27)	(0.29)
Int Conf	-0.19	-0.07
	(0.28)	(0.35)
MIli.Ext	0.02*	0.03**
	(0.01)	(0.01)
Mili Int	0.01	0.002
	(0.01)	(0.01)
Polity	-0.0003*	-0.04**
	(0.002)	(0.01)
LGCF	0.18***	0.14***
	(0.05)	(0.05)
LGOV	0.03	0.20**
	(0.06)	(0.06)
POP	-0.01	-0.53***
	(0.02)	(0.05)
Constant	-1.97***	-1.30***
	(0.25)	(0.16)
ECM_{t-1}	-0.46***	-0.71***
	(0.06)	(0.09)
R-Squared	0.54	0.64

Notes: Log of real GDP per capita is a dependent variable, LMili Exp is a log of real military expenditure, Ext Conf and Int Conf represent external and internal armed conflicts. Mili.Ext and Mili Int are interactive terms of military expenditure and armed conflicts. Polity is a democracy index, LGCF and LGOV are for log of real gross capital formation and Log of real government expenditure, respectively. Finally, Pop shows population growth. The optimal lag order for Pakistan and India is (1,0,0,0,0,0,0,0,0,0) and (1,0,0,0,0,0,0,0,0,2), respectively. Standard errors are presented in parenthesis, * shows significance level at 10%, ** shows significance level at 5%, and *** indicates significance level 1%.

growth is negative but only significant in the case of India. This suggests holding other variables constant 1% increase in population growth will reduce growth by 0.53% in the Indian context. That is because a large population hinder economic productivity due to the extensive use of natural resources and land (Becker et al, 1990).

The estimated coefficients of lagged error correction terms (ECM_{t-1}) (derived from long-run cointegrating relationship) are equal to -0.46 and -0.71 for both Pakistan and India, respectively. The coefficients suggest that the deviation from the long-run equilibrium of economic growth in Pakistan and India will be corrected by 46% and 71% within a year, respectively. This also indicates that the speed of adjustment towards the long run is higher in India than in Pakistan. The significance and the negative sign of the ECM_{t-1} coefficient also validate the existence of a long-run relationship between the underlying variables (Benerjee et al, (1998).

Table 2.5 shows that both models pass the diagnostic tests against serial correlation and heteroskedasticity. The analysis employed the Breusch Godfrey Correlation LM test and Harvey test to check the serial correlation and heteroskedasticity issues in the models, respectively. The null hypothesis for the serial correlation test is no serial correlation. Similarly, the null hypothesis of the heteroskedasticity test assumes that the model is homoscedastic. In both cases, we accepted the null hypothesis which suggest that our models are free from serial correlation and heteroskedasticity issues.

Table 2.5: Diagnostic Tests

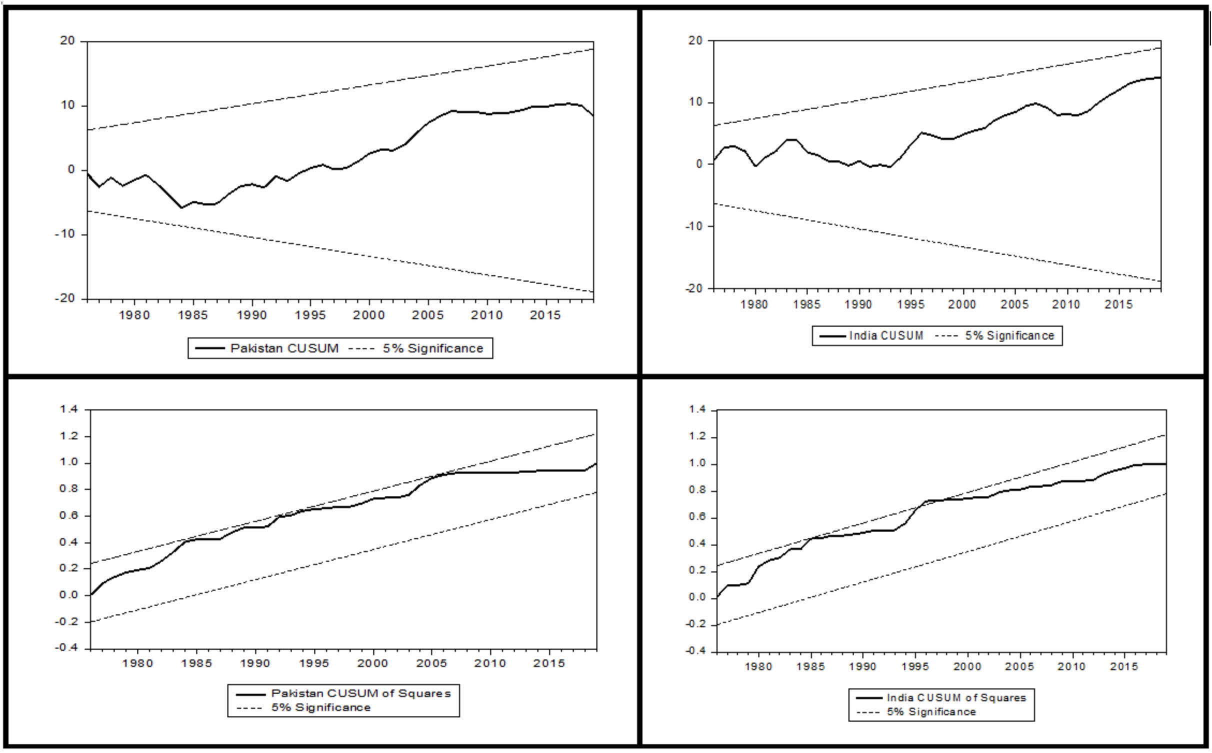
	Pakistan		India	
	F-Statistics	P-Values	F-Statistics	P-Values
Serial Correlation	0.002	0.97	0.20	0.66
Heteroskedasticity	1.51	0.17	1.63	0.12

Notes: the null hypothesis for serial correlation and heteroskedasticity tests states that no serial correlation and the model are homoscedastic, respectively.

Moreover, in order to assess the stability of the long-run and short-run coefficients. We employed Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUMSQ) methods. Figure 2.2 confirms that both short and long-run estimates are stable as the CUSUM and CUSUMSQ statics stay within the bound of 5% significance level in both cases.

The robustness of ARDL long-run estimates has been checked by using the fully modified ordinary least square (FMOLS) method. Both FMOLS and ARDL long-run estimates are illustrated in Table 2.6. FMOLS results confirm the reliability and consistency of ARDL

Figure 2.2: Cumulative Sum of Recursive residuals and Cumulative Sum of Squares



Notes: Top 2 plots represent the cumulative sum of recursive residuals (Long-Run Models) and the bottom 2 plots represent the cumulative sum of squares (Short-Run Models) for both countries. The straight lines show critical bounds at 5% significance level

long-run coefficients. Thus, we can confidently conclude that our ARDL long-run estimates are robust and free from any statistical biases.

2.6 Conclusion

This chapter examined the direct and indirect economic growth impacts of military expenditure and armed conflicts (internal and external) in the case of Pakistan and India. To the best of our knowledge, this is the first analysis on Pakistan and India that has considered threat measures while determining the relationship between military expenditure and economic growth. The inclusion of armed conflict with defence expenditure into a growth equation can give a better explanation to those countries that experience a high threat level and a high military expenditure such as Pakistan and India, as both countries have seri-

Table 2.6: FMOLS And ARDL Long-Run Results

	Pakistan		India	
Variables	FMOLS	ARDL	FMOLS	ARDL
LMili Exp	0.28***	0.28***	0.03	0.04
	(0,04)	(0.05)	(0.07)	(0.07)
EXT Conf	-0.53**	-0.56*	-1.03***	-0.75**
	(0.22)	(0.27)	(0.30)	(0.29)
INt Conf	0.33	-0.19	0.30	-0.07
	(0.21)	(0.28)	(0.32)	(0.35)
MIli.Ext	0.02**	0.02*	0.04***	0.03**
	(0.01)	(0.01)	(0.01)	(0.01)
Mili INT	-0.01	0.01	-0.01	0.002
	(0.01)	(0.01)	(0.01)	(0.01)
Polity	-0.0004**	-0.0003*	-0.01	-0.04**
	(0.0001)	(0.002)	(0.01)	(0.01)
LGCF	0.17***	0.18***	0.19***	0.14***
	(0.039)	(0.05)	(0.06)	(0.05)
LGOV	0.05	0..03	0.15**	0.20**
	(0.04)	(0.06)	(0.07)	(0.06)
POP	-0.02	-0.01	-0.47***	-0.53***
	(0.02)	(0.02)	(0.05)	(0.05)
Constant	-4.61***	-1.97***	-1.85***	-1.30***
	(0.31)	(0.25)	(0.61)	(0.16)

Notes: FMOLS is a fully modified ordinary least square method and ARDL is an autoregressive distributed lag model. The log of real GDP per capita is a dependent variable. Standard errors are presented in parentheses. * shows a significance level at 10%, ** shows a significance level at 5%, and *** indicates a significance level at 1%.

ous internal and external security concerns. This analysis is completely based on Aizenman and Glick, 2003 theoretical framework, that allows a non-linear association between military expenditure and economic growth conditional on threats. The empirical analysis has been conducted by using different unit root tests (ADF, PP, KPSS, and Zivot Andrew), an Autoregressive Distributed Lag (ARDL) cointegration technique with different diagnostic tests, and Fully Modified Ordinary Least Square (FMOLS) to check the robustness of ARDL long-run estimates.

Through empirical analysis, we found a positive and significant direct impact of military expenditure on economic growth in the absence of armed conflict in the case of Pakistan, while insignificant in the Indian context. These findings are not in line with Aizenman and Glick, 2003 cross-sectional study, where they have a negative direct impact of defence expenditure on economic growth. That is because their empirical analysis is based on a cross-sectional of 91 heterogeneous countries, while this analysis is specifically based on the case studies. Also, The military-growth relationship depends on several factors such as empirical techniques, sample size, underlying countries, time span etc. The stimulating economic growth effects of military expenditure in Pakistan could be because the Pakistani military army plays a major role in running the state affairs both directly and indirectly. It owns self-generating capital sources such as Banks, arms industries, housing colonies across the country, universities, schools, colleges, hospitals etc. Further, the Pakistani army is also playing an important role in building infrastructure, especially in those areas which are badly affected by terrorism and where government access is limited.

Another important finding of our empirical analysis is that external conflicts have a direct negative impact on economic growth in both countries. These results are highly in accord with Aizenman and Glick, 2003 study, where they have empirically proved that external conflicts directly deteriorate economic growth. Furthermore, we also find that the external threats are more harmful to the Indian economy than to the Pakistani economy. Moving on to another crucial finding that emerges from our study is that the economic effects of defence expenditure are a non-linear function of effective external militarized conflicts in both countries. This implies that military spending in the presence of significantly higher external threats stimulates economic output in both countries (Pakistan & India). That might be because higher military expenditure attenuates the intensity of conflicts and help strengthen the confidence of national and international investors to invest by providing a peaceful environment. However, military spending in the absence of armed conflict has stronger growth-stimulating effects than in the presence of armed conflict. The reason behind this is that conflicts offset some of the positive effects of defence outlays.

Chapter Three

Economic Growth Effects of Military Expenditure in the Absence and Presence of Armed Conflicts: Across Income Groups

3.1 Introduction

The impact of military expenditure on economic growth has been a continuous subject of debate in the literature with a lack of clear consensus. It continues to be an imperative focus because military expenditure is a significant component of government expenditure that has influence beyond the resources it consumes. Especially, when it is consumed to facilitate conflicts or to provide security to alleviate internal and external threats (John Paul Dunne, 2012). Previous studies identified several channels through which military expenditure can affect economic growth such as technology, labour, capital, social-political effects, debt, external relations, and conflicts (J Paul Dunne, Uye, et al., 2010). These channels interact and influence economic growth differently depending on the country under consideration. For instance, comparatively advanced countries might have more concern over technology and foreign direct investment, than the opportunity cost, while conflict-prone countries might have concern over security or opportunity cost, in case they have to increase their military expenditure to eradicate threats. (John Paul Dunne, 2012). Moreover, the relationship between military spending and economic growth depends on the country or sample of countries, and the time period (J Paul Dunne and Tian, 2013).

Most of previous empirical studies did not consider conflict measures while establishing the relationship between military expenditure and economic growth (e.g. Frederiksen and Looney, 1983; Tahir, 1995; Khilji, Mahmood, and Siddiqui, 1997; Dakurah, Davies, and Sampath, 2001; Wijeweera and Webb, 2009; Wijeweera and Webb, 2011; Farzanegan, 2014; Shahbaz, Afza, and Shabbir, 2013; Tiwari and Shahbaz, 2013; Yildirim and Öcal, 2016). Disregarding threat measures may induce omitted variable bias in the estimated coefficients. According to Aizenman and Glick, 2003, the true economic effects of military expenditure can only be determined after controlling for conflicts or threats. Their study validates this conjecture empirically as well, by introducing threat into the conventional growth equation and interacting it with military expenditure to identify the non-linear relationship between military outlays and economic growth. Their empirical findings suggest that military spending in the presence of significantly higher threats has a positive economic impact through security, while negative in the absence of threats. Security impacts are worth investigating because the security of individuals and property from indigenous and foreign threats is imperative for smooth market operations and for providing a peaceful environment for investment and innovation. To some extent, additional military expenditure increases national security that in turn increases economic growth (J Paul Dunne, R. P. Smith, and Willenbockel, 2005). Furthermore, it has been pointed out in previous literature (J Paul Dunne, Uye, et al., 2010 that in many underdeveloped countries, the major obstacles to progress are wars and lack of security. Thus, higher military expenditure can provide the opportunity to accumulate capital stock and produce more, that in turn can increase economic growth (Thompson, 1974).

The above discussion leads to a further question which has also not been answered by previous studies. Do the security or military expenditure effects in the presence of conflict stay homogeneous across income groups? Not considering the development level of the countries while exploring the relationship between military expenditure and economic growth might induce measurement error issues in the estimated parameters. Because economic effects of military outlays are also dependent on how military expenditure has been financed or how much resources are available for military purposes. To maintain the defence sector, resource-constrained countries tend to cut back growth-friendly expenditures while resource-abundant countries can easily maintain or even increase their defence program without abandoning development expenditures (Frederiksen and Looney, 1983).

Taking the above discussion under consideration, this chapter contributes to the ongoing discourse on the relationship between military expenditure and economic growth in the following ways. Firstly, we examine the non-linear economic growth impacts of military expenditure conditional on armed conflicts across income groups in the Aizenman and Glick, 2003 reformulated Barro growth style model, which has not been done before, using a balanced panel dataset of 61 countries from 1975-2018. Secondly, this chapter is based on the most recent and comprehensive panel dataset, which will allow for a more thorough and up-to-date analysis. Thirdly, for empirical analysis, this chapter employs the pooled mean group (PMG) method, which to the best of our knowledge has not been used in this context.

This chapter proceeds as follows: the next section provides a brief review of the existing literature on the relationship between military expenditure and economic growth. section 3.3 describe data, model specification and econometric methodology. section 3.4, explains the results and discussion on the estimated model for both aggregate and sub-samples. final section 3.5 is on conclusion.

3.2 Military Expenditure and Economic Growth

The debate on the military-growth relationship was initiated with the contribution of Benoit, 1973, who suggested a positive relationship between military expenditure and economic growth in less developed countries. This unexpected finding stimulated subsequent literature, using different theoretical and empirical methods with different countries or sets of countries, which resulted in an ambiguous relationship between defence expenditure and economic growth. The military-growth literature divides into two main groups; one group view military expenditure as a guarantee of peace, welfare, and security, while the other group view such expenditure as a wastage of limited resources that may lead to serious economic consequences (J Paul Dunne and Tian, 2015).

J Paul Dunne and Tian, 2013 in their most recent survey of 168 military-growth studies, show that negative economic effects of military expenditure were reported by 44% cross-country studies and 31% by case studies. While only 20% showed positive effects of military expenditure on growth and the remaining are ambiguous. Another survey by J Paul Dunne, Uye, et al., 2010, where they reviewed 102 studies, reports that 39% cross country studies and 35% country-specific studies found negative economic effects of military outlays. Whereas, for both kinds of studies only 20% reported positive impacts and the remaining 40% were unclear. Although the debate on the defence-growth nexus has been going on for over 50 years, still there is no consensus. That is because the direction of the relationship between military expenditure and economic growth depends on several factors such as a theoretical framework, empirical method, time span, underlying country, and the data type.

In the defence-growth literature, there is no standard framework to examine the economic impacts of military outlays, as most of the theoretical models do not consider the role of military expenditure explicitly (J Paul Dunne and Tian, 2015). However, J Paul Dunne, R. P. Smith, and Willenbockel, 2005 in their critical review paper suggested that the reformulated endogenous Barro, 1990 growth model used by Aizenman and Glick, 2003 is potentially more promising because it allows security effects on growth and it measures security by military spending relative to the threat, by allowing such non-linearities makes this model comparatively advantageous.

Aizenman and Glick, 2003 cross-sectional data illustrating economic growth from 1989-98 for 91 countries with a standard set of control variables such as initial GDP per capita, the investment rate, education, and population growth, by using the OLS method. In the first regression, only the military share of GDP (military burden) is included with other control variables, where it has a negative but insignificant coefficient on military expenditure. In the second regression, as the threat variable was included as an explanatory variable the magnitude of the coefficient on military expenditure increased but remained insignificant. However, the coefficient of the military expenditure becomes more negative and highly significant after including the interactive term of military expenditure and threat. And the interactive term has a significantly positive impact on growth as conjectured.

In this vein, Yang et al., 2011 study employed Aizenman and Glick, 2003 theoretical framework, by using cross-sectional data from 1992-2003 for 92 countries. For empirical estimation, they applied Threshold Autoregressive (TAR) model and took countries' level of development into consideration. Their findings suggest that countries with an initial income equal or lower than $476 per capita tend to have negative economic growth impacts of military expenditure in the presence of significantly higher threats. Whereas, countries with an initial income higher than $476 per capita show no sign of a significant relationship.

Similarly, Musayev, 2016 attempts to assess the relationship between military outlays and economic growth by following Aizenman and Glick, 2003 study. The analysis employs balanced panel data over the period of 1970-2010 and took 5 years averages in order to remove short-run cyclical variations. For empirical analysis, the study applies the GMM dynamic panel data method. Their findings suggest that overall military expenditure and economic growth have a negative relationship but in the presence of threats military expenditure affects output positively.

The Aizenman and Glick, 2003 and Yang et al., 2011 studies on the economic growth impacts of military expenditure conditional on armed conflicts are based on cross-sectional data. In fact, previous literature on the growth-defence nexus is predominated by cross-sectional studies because of the unavailability of the data. To overcome this issue, our study takes advantage of the newly available data to create a large panel data set of 61 countries from 1975-2019. Moreover, Aizenman and Glick, 2003 and Musayev, 2016 both studies do not take the development levels of the countries under consideration, while this analysis divides the whole sample into three different income groups according to their development levels, to reduce the heterogeneity level in the sample.

3.3 Data, Model Specification, and Econometric Method

The empirical analysis is based on a balanced panel dataset of 61 countries from 1975-2018. The dependent variable GDP per capita growth was collected from World Bank's database. Military expenditure percentage share of GDP was extracted from Stockholm International Peace Research Institute (SIPRI). Armed Conflict data was taken from Uppsala Conflict Data Program (UCDP). It takes the value 1 (low intensity) if countries have experienced minimum 25 battle-related fatalities in a given year, and 2 (high intensity) if a country has experienced minimum 999 battle-related deaths. Later, for this analysis, we constructed an armed conflict level variable by accumulating a number of armed conflict incidents that happened each year, that includes both internal and external, and low and high-intensity armed conflicts. This empirical analysis also includes other control variables such as Polity

Index, which ranges from -10 to 10, -10 reflects consolidated autocracy while 10 indicates consolidated democracy and this index was obtained from the Polity IV database. Furthermore, data on gross Capital formation percentage share of GDP, population growth, and government expenditure percentage share of GDP was attained from the World Bank's database.

To determine the economic effects of military expenditure across income groups. We stratified countries according to the World Bank classification (Low-Income, Low-Middle Income, Upper-middle income, and High-Income) based on 2019's Gross National Income (GNI) per capita. Due to having only two countries in the low-income group in our sample, We combined low-income and lower-middle-income groups and formed a single group named the low-income group. Whereas we define upper-middle income as a middle-income group and the high-income group stays unchanged.

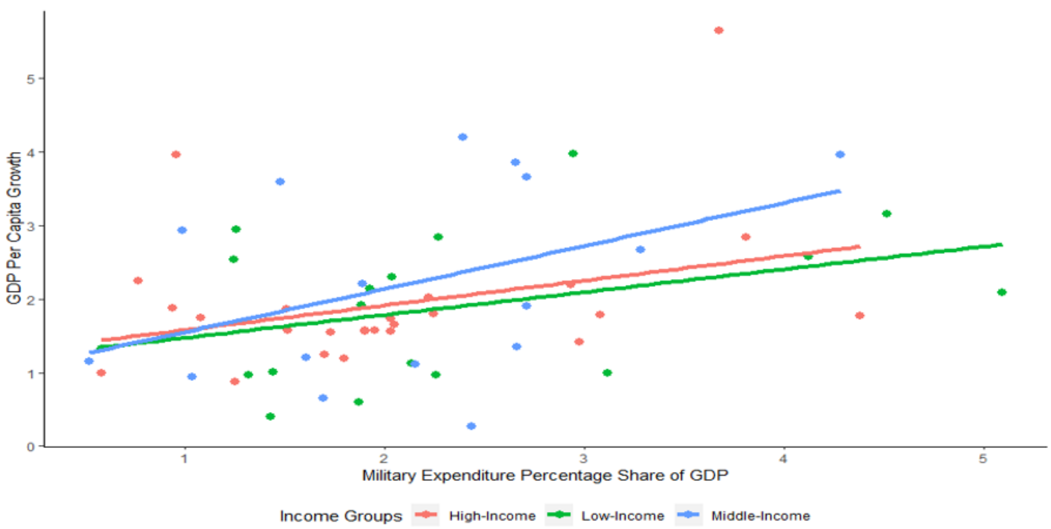
Table 3.1 illustrates the summary of descriptive statistics on GDP per Capita growth, military expenditure share of GDP, and armed conflict over the full and sub-samples. The following two facets are key to the analysis. First, the high-income and low-income countries face higher average armed conflict levels and the average military spending share of GDP (2.782% and 2.305%, respectively) as compared to the middle-income group (2.158%). it suggests countries with higher armed conflict levels are more likely to spend a higher amount on the military sector as compared to the countries with lower armed conflict levels. Second, both high-income and low-income countries have comparatively lower average GDP per capita growth than the middle-income group (1.903%, 1.879%, and 2.230%, respectively). it also implies that countries with higher conflict levels and higher military expenditure tend to grow economically slower than the countries with lower armed conflicts and military expenditure. Figure 3.1 provides a scatter plot depicting a positive correlation between military expenditure share of GDP and GDP per capita growth across all income groups. This plot gives an initial idea that what kind of relation we can expect from our empirical analysis.

Table 3.1: Descriptive Statistics for GDP Growth, Military Expenditure, and Conflict

Descriptive Stat	Variables	observations	Mean	Std Dev	Minimum	Maximum
All Countries						
	GDP g	2745	1.982	3.585	-47.503	37.536
	Mili exp	2683	2.478	2.488	0.277	30.463
	Conflict	2684	0.592	1.030	0	9
High Income						
	GDP g	1215	1.903	2.962	-14.256	23.986
	Mili exp	1188	2.782	3.252	0.277	30.464
	Conflict	1188	0.555	0.898	0	9
Middle Income						
	GDP g	720	2.230	3.753	-14.351	23.986
	Mili exp	704	2.158	1.479	0.348	12.069
	Conflict	704	0.509	0.776	0	5
	Mili.Conf	688	1.489	3.071	0	32.762
Low Income						
	GDP g	810	1.879	4.224	-47.503	37.536
	Mili exp	791	2.305	1.711	0.277	15.431
	Conflict	792	0.722	1.352	0	7

Notes: GDPg is GDP per capita growth, Mili exp is military expenditure share of GDP, and Conflict is the cumulative sum of external and internal armed conflicts that happened in a given year. There are total 61 countries in the sample, the high-income group contains 27 countries, the middle-income group has 16 countries, and the low-income group has 18 countries.

Figure 3.1: GDP Per Capita Growth Versus Military Expenditure Share of GDP



3.3.1 Model Specification and Econometric Method

This analysis is based on the Aizenman and Glick, 2003 reformulated endogenous (Barro, 1990) growth model, which allows a non-linear association between economic growth and military expenditure by interacting threat measures with military expenditure into the conventional military-growth equation. Their theoretical framework is based on three conjectures; first, military expenditure without threats impacts economic growth negatively. second, threats without military expenditure reduce economic growth. Third, military expenditure in the presence of significantly higher threats stimulates economic growth. Considering all of the above arguments the Aizenman and Glick, 2003 equation can be specified in the following way.

$$GDPg = \alpha_1 Mili + \alpha_2 Conf + \alpha_3 Mili.Conf + \beta X; \alpha_1 < 0, \alpha_2 < 0. \alpha_3 > 0 \quad (3.1)$$

Where in equation 3.1, GDPg shows GDP per capita growth, MiLi indicates military expenditure percentage share of GDP, Conf is for Armed Conflicts level, Mili.Conf is an interaction term for military expenditure and armed conflicts, and X is for other control variables (polity, gross capital formation percentage share of GDP, population growth, and government expenditure percentage share of GDP) that we are using in the empirical analysis.

We employ a panel autoregressive distributed lag (ARDL) model. Equation (3.1) can be specified in an ARDL (p,q) generalized form in the following way.

$$GDPg_{i,t} = \delta_i GDPg_{i,t-1} + \alpha_{i,1} Mili_{i,t} + \alpha_{i,2} Conf_{i.t} + \alpha_{1,3} Mili.Conf_{i,t} + \sum_{j=0}^{q} \beta'_{i,j} X_{i,t-j} + \omega_i + \epsilon_{i,t} \quad (3.2)$$

Where, p and q show the optimal lag length of dependent and independent variables, respectively. The number of countries i=1,2.........61 and time t=1975....2019. δ_i is the coefficient of the lagged dependent variables,$\alpha_{i,1}$, $\alpha_{i,2}$,$\alpha_{i,3}$ are the coefficients of independent variables, and $\beta'_{i,j}$ is a vector coefficient on other control variables (polity, gross capital formation percentage share of GDP, population growth, and government expenditure percentage share of GDP) that we have considered in the analysis.ω_i indicates countries fixed effects and $\epsilon_{i,t}$ is an error term. The generalized ARDL (p,q) model can be re-parametrized into the error correction form by a linear transformation. which incorporates both short-run dynamics and long-run equilibrium.

$$\Delta GDPg_{i,t} = \theta_i(GDPg_{i,t-1} - \alpha_1 Mili_{i,t} - \alpha_2 Conf_{i.t} - \alpha_3 Mili.Conf_t - \sum_{j=0}^{q} \beta'_j X_{i,t-j}) + \sum_{j=1}^{p-1} \gamma_{i,j} \Delta GDPg_{i,t-j} + \sum_{j=0}^{q-1} \alpha'_i \Delta X'_{i,t-j} \quad (3.3)$$

Where in the equation 3.3, Δ is a 1st difference operator, θ_i is country-specific error-correcting speed of adjustment coefficient, which measures the speed at which the dependent variable returns to the long-run equilibrium after experiencing shock in the short-run. This coefficient expected to be negative and significant ($\theta_i < 0$) to depict the speed of adjustment and the existence of long-run relationship between the variables. Moreover, $\theta_i = 0$ shows no long-run relationship between the variables. Further, $\alpha_1 - \alpha_3$ and β'_j are the long-run coefficients of military expenditure, armed conflict, interactive term involving military expenditure and armed conflicts, and other underlying control variables. $\gamma_{i,j}$ and α'_i are for short-run coefficients of dependent and independent variables, respectively. Finally, X' includes all the short-run independent variables.

The empirical analysis contains large panel data [N=61 and T=44] where different panel time-series techniques can be used. For instance, at one end, the mean group (MG) method, introduced by Pesaran and R. Smith, 1995. This method allows intercept, slope coefficients and error terms to change across countries. However, this estimator does not consider that certain parameters might be homogeneous. On the other end, the traditional pooling method such as dynamic fixed effects(DFE), which only allows intercepts to vary across groups, while slope coefficients and error variances remain homogeneous. Pesaran, Shin, R. P. Smith, et al., 1997and Pesaran, Shin, and R. P. Smith, 1999 introduced pooled mean group (PMG) method, which is an intermediate estimator that allows intercepts, slope coefficients and error variances to be heterogeneous across groups in the short run, while homogeneous in the long run.

in order to select the suitable method for empirical analysis, among PMG, MG, and DFE, as all these methods might provide inconsistent and misleading results if certain conditions are not met. As explained earlier, the PMG method restricts long-run estimates to be homogeneous across groups, The MG method assumes all the factors are heterogeneous across groups in the short and long run, and the DFE method put homogeneity restrictions on both long-run and short-run estimates. Therefore, we employed the Hausman test, suggested by Pesaran, Shin, and R. P. Smith, 1999 to select a more appropriate method. The null hypothesis of the Hausman test states no systematic differences between the coefficients of PMG and MG or PMG and DFE. The acceptance of the null hypothesis suggests that the PMG method is more suitable.

In order to establish the appropriate lag order of the ARDL(p.q), the Schwarz Bayesian Criterion (SBC) method has been used on each country with a maximum lag of 1, as recommended by Pesaran, Shin, and R. P. Smith, 1999, the most common choice more than half sample was ARDL(1,0,0,0,0,1,0,0).

3.4 Results and Discussion

As the empirical analysis is based on annual data, prior to the model estimation, The Panel IPS unit-root is performed to determine the integration level of the variables. The null hypothesis of this test assumes all the underlying series have a unit root, while the alternative hypothesis assumes some of the underlying series are stationary. Table 3.2 illustrates the unit-root test results. The results suggest that the null hypothesis can not be rejected for some variables at levels such as military expenditure share of GDP (high-income group), population growth, and government expenditure in the middle-income group. That is because these series are not stationary at the level at any conventional level (1%, 5%, and 10%). However, the null hypothesis is strongly rejected for all variables after taking the first difference.

Table 3.2: Panel IPS Unit Root Test Result

Level & 1st Difference	Variable	Statistics	p-values	Statistics	p-values
All Countries					
	GDP g	-21.532	0.000	-49.275	0.000
	Mili exp	-3.271	0.000	-29.649	0.000
	GCF	-7.6860	0.000	-32.997	0.000
	POP	-11.179	0.000	-36.289	0.000
	GOV	-3.865	0.000	-28.518	0.000
High Income					
	GDP g	-15.064	0.000	-31.492	0.000
	Mili exp	0.479	0.684	-18.157	0.000
	GCF	-6.0973	0.000	-21.345	0.000
	POP	-7.704	0.000	-23.857	0.000
	GOV	-3.480	0.000	-18.709	0.000
Middle Income					
	GDP g	-10.967	0.000	-23.986	0.000
	Mili exp	-1.704	0.044	-16.672	0.000
	GCF	-4.939	0.000	-15.653	0.000
	POP	-0.083	0.467	-17.417	0.000
	GOV	-0.2685	0.394	-14.159	0.000
Low Income					
	GDP g	-10.849	0.000	-29.527	0.000
	Mili exp	-5.001	0.000	-16.625	0.000
	GCF	-2.027	0.021	-19.842	0.000
	POP	-11.064	0.000	-21.166	0.000
	GOV	-2.601	0.005	-16.235	0.000

Notes:GDPg is GDP per capita growth, Mili exp is the military expenditure percentage share of GDP, GCF is gross capital formation percentage share of GDP, POP is population growth, and Gov is final government expenditure percentage share of GDP. There are total 61 countries in the sample, the high-income group contains 27 countries, the middle-income group has 16 countries, and the low-income group has 18 countries.

We estimate the economic growth impacts of military expenditure conditional and unconditional on armed conflicts, overall, and across income groups by using three alternative empirical methods; namely pooled mean group (PMG), mean group (MG), and dynamic fixed effects (DFE). The empirical findings derived from the PMG method are presented in Table 3.3, while the findings from MG and DFE are available in Appendix, according to the Hausman test PMG method is more suitable for this analysis. In Table 3.3, we have executed three models for all aggregate and subsamples (high-income, middle-income, and low-income). The first model only goes with military expenditure, the second model considers both military expenditure and armed conflicts, and the third model includes military expenditure, armed conflicts along with their interactive term. The reason behind running three different models is to check whether the inclusion of armed conflict measures affects military expenditure coefficients or not.

Model 1, Table 3.3 only illustrates the effects of military expenditure share of GDP on GDP per capita growth along with other control variables. in the long-run results, the coefficient on military expenditure is positive and highly statistically significant in the aggregate sample, suggesting that 1% point increase in military expenditure share of GDP can increase GDP per capita growth by 0.26% points. This finding is in line with Benoit, 1978 and MacNair et al., 1995, who also suggest the positive impacts of military expenditure on economic growth. Moving on to the income groups, both high-income and low-income countries' coefficients on military spending share of GDP are significantly positive at 1% and 10% significance levels, respectively. Implying that the 1% point increment in military expenditure share to GDP can lead to stimulate GDP per capita growth by 0.34% and 0.23% points, respectively. The estimated coefficient in the case of the middle-income group is not significant at any conventional level. Further, the short-run coefficients are not statistically significant in any case.

Model 2 in Table 3.3 considers both armed conflicts and military expenditure along with

Table 3.3: Pooled Mean Group (PMG) Long and Short Run Results

		All Countries			High Income			Middle Income			Low Income		
	Variables	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Long Run													
	Mili exp	0.258***	0.179***	0.144***	0.344***	0..267***	0.226***	0.105	0.056	0.001	0.230*	0.109	0.208*
		(0.006)	(0.039)	(0.047)	(0.041)	(0.047)	(0.055)	(0.121)	(0.128)	(0.175)	(0.112)	(0.116)	(0.114)
	Conflict		-0.235***	-0.354***		-0.237***	-0.389***		-0.081	-0.283		0.005	0.561***
			(0.043)	(0.094)		(0.051)	(0.104)		(0.219)	(0.526)		(0.102)	(0.211)
	Mili.Conf			0.046			0.059*			0.069			-0.203***
				(0.031)			(0.034)			(0.176)			(0.078)
	Polity	-0.007	0.001	-0.0002	-0.029**	-0.021*	-0.022*	-0.009	-0.003	-0.007	0.014	0.015*	0.018**
		(0.006)	(0.006)	(0.006)	(0.012)	(0.012)	(0.012)	(0.027)	(0.016)	(0.017)	(0.009)	(0.009)	(0.008)
	GCF	0.096***	0.093***	0.095***	0.047**	0.055***	0.056***	0.093***	0.099***	0.102***	0.091***	0.099***	0.103***
		(0.011)	(0.012)	(0.012)	(0.018)	(0.019)	(0.019)	(0.027)	(0.027)	(0.027)	(0.019)	(0.020)	(0.019)
	POP	-1.081***	-1.027***	-0.983***	-0.849***	-0.728***	-0.646***	-0.954***	-1.202	-1.206***	-1.324***	-1.278***	-1.466***
		(0.087)	(0.087)	(0.088)	(0.125)	(0.127)	(0.126)	(0.266)	(0.264)	(0.266)	(0.167)	(0.164)	(0.159)
	GOV	-0.307***	-0.248***	-0.243***	-0.433***	-0352***	-0.344***	-0.106**	-0.119**	-0.114**	-0.059	-0.059	-0.051
		(0.023)	(0.023)	(0.023)	(0.029)	(0.032)	(0.032)	(0.050)	(0.048)	(0.048)	(0.061)	(0.062)	(0.063)
Short Run													
	dMili exp	-0.030	-0.058	-0.173	-0.452	-0.069	-0.203	0.602	-0.107	-0.202	0.068	0.028	-0.168
		(0.359)	(0.364)	(0.395)	(0.373	(0.449)	(0.623)	(0.977)	(0.947)	(0.815)	(0.578)	(0.632)	(0.684)
	dConf		0.024	-6,974		(0.216)***	-0.545		-0.623	-26.834		0.124	-0.301
			(0.129)	(7.213)		(0.074)	(1.181)		(0.378)	(27.439)		(0.185)	(0.837)
	dMili.Conf			14.817			1.549			54.371			0.138
				(14.374)			(0.154)			(54.793)			(0.506)
	dPolity	-0.113	-0.102	-0.103	-0.100	-0.164**	-0.144**	-0.023	0.071	0.029	-0.243	-0.192	-0.205
		(0.359)	(0.108)	(0.106)	(0.067)	(0.066)	(0.065)	(0.088)	(0.153)	(0.126)	(0.335)	(0.332)	(0.339)
	dGCF	0.594***	0.589***	0.592***	0.567***	0.569***	0.589***	0.803***	0.807***	0.790***	0.407***	0.392***	0.397***
		(0.063)	(0.064)	(0.063)	(0.006)	(0.059)	(0.059)	(0.138)	(0.144)	(0.144)	(0.137)	(0.138)	(0.139)
	dPOP	0.229	0.646	0.702	0.137	0.197	0.095	-3.817	-3.395	-3.369	4.834	6.159	6.546
		(1.437)	(1.653)	(1.647)	(0.712)	(0.758)	(0.777)	(2.519)	(2.825)	(2.797)	(4.121)	(4.409)	(4.472)
	dGOV	-0.703***	-0.730***	-0.698***	-1.283***	-1.299***	-1.274***	-0.140	-0.054	0.005	-0.403**	-0.504**	-0.482**
		(1.148)	(0.145)	(0.143)	(0.229)	(0.217)	(0.205)	(0.192)	(0.210)	(0.213)	(0.190)	(0.198)	(0.197)
	Cons	4.572***	3.992	4.156	7.748***	6.314***	6.174***	2.169***	2.502***	2.497***	2.890***	2.759***	2.779***
		(0.148)	(0.202)	(2.877)	(0.516)	(0.399)	(0.401)	(0.261)	(0.252)	(0.262)	(0.364)	(0.328)	(0.347)
	ECM	-0.808***	-0.803***	-0.797***	-0.831***	-0.821***	-0.816***	-0.786***	-0.783***	-0.776***	-0.855***	-0.844***	-0.846***
		(0.032)	(0.029)	(0.029)	(0.041)	(0.038)	(0.039)	(0.048)	(0.047)	(0.048)	(0.079)	(0.073)	(0.073)
	Hausman MG PMG			0.964						0.754			0.992
	Hausman DFE PMG			0.826						0.936			0.607
	Countries	61	61	61	27	27	27	16	16	16	18	18	18
	Total Obser	2581	2524	2524	1144	1118	1118	679	663	663	758	743	743

Notes: GDP per capita growth is a dependent variable. The pooled mean group (PMG) method has been used after carefully running the Hausman test. The standard errors are presented in parenthesis.
*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

other control variables. In the aggregate sample, the coefficient of military expenditure stays positive and highly significant even after including the armed conflict measure in the model. The coefficient on armed conflicts in the aggregate panel has a direct negative impact on economic growth, implying that an additional armed conflict will lead to reduce GDP per capita growth by 0.24 percent points in the long run. This result accords with Aizenman and Glick, 2003 Musayev, 2016, who find a direct negative effect of conflicts on economic growth. The high-income group also has a negative and highly significant coefficient (0.23%) on armed conflicts. However, the armed conflict estimates are not statistically significant in the middle-income and low-income groups. Interestingly, the magnitude of military expenditure's coefficients decreases after introducing including armed conflict measure in the model, in the aggregate panel, and in both high and low-income groups. it indicates that the estimates on military expenditure share GDP were upward biased before including the armed conflicts variable in the model.

Model 3, in Table 3.3 considers interactive terms of military expenditure and armed conflicts along with all other variables. In the aggregate sample, the estimated coefficient on military expenditure share of GDP remains significantly positive at the 1% significance level, even after including the effects of both armed conflicts and interactive term. The reason behind positive impacts might be because increasing military expenditures can be a guarantee of higher security and a peaceful environment for domestic and foreign investors, or it could be contributing to economic growth by engaging resources, specifically population, research, and development activities, providing educational training, technical skills, building infrastructure essential for economic development or because of combination all the factors. The coefficient of conflict also stays negative and highly significant, showing a direct negative impact on GDP per capita, while the estimated coefficient of an interactive term is positive, but it is not significant at conventional levels.

Moving on to the income groups, high-income and low-income countries' estimates of military expenditure share to GDP are significantly positive at 1% and 10% levels, respectively. Interestingly, the magnitude of the coefficient on military expenditure share to GDP in the case of high-income countries is higher than the low-income groups. Implying that the impact of military expenditure/GDP ratio in the high-income group is stronger than in the low-income group. Further, the coefficients on armed conflicts are negative in the high-income and middle-income groups but only significant in the high-income group. On the other hand, in the low-income group, the coefficient on armed conflicts is positive, contrary to our base model, which suggests the negative impact of threats on economic growth.

Moreover, in income groups, the coefficient on the interactive terms (MILI.CONF) of military expenditure and armed conflict is significantly positive in the high-income group, while negative in the low-income group, suggesting that at a given level of armed conflicts an additional 1% point military expenditure can lead to stimulate GDP per capita growth by 0.06% point in high-income countries, while reduce GDP per capita by 0.20% point in low-income countries. Quantitatively, in low-income countries military expenditure/GDP ratio start impacting GDP per capita growth negatively after 1.05 (=0.21/0.20) number of armed conflicts. This implies that the Aizenman and Glick, 2003 findings only hold true for high-income countries, but not for low-income countries. The plausible reason behind this might be that resource-abundant countries can afford higher military expenditure even in the presence of higher armed conflicts. But resource-constrained countries cannot afford to exhaust their limited resources on military, and if they do, instead of getting positive security economic effects they might end up damaging their economies. Furthermore, the short-run results are not significant at conventional levels.

Moving on to control variables, the coefficient on Gross Capital Formation share to GDP (GCF) is highly significant and positive as expected, both in the short and long run. It implies gross capital formation is positively related to GDP per capita growth. Further, the estimates of population growth are throughout negative and highly significant in the long run, while the short-run coefficients of population growth are not statistically significant. The estimated coefficients on the final government expenditure share to GDP (Gov) are negative and highly statically significant almost in all the cases except for the low-income group in the long run and the middle-income group in the short run. Moreover, the outcome on the polity index (Polity) is not significant for the aggregate sample. However, in the high-income group the short and long run, the estimates are negative and significant. Whereas, in the low-income group estimates are significantly positive but they are only significant in the long run. Further, the middle-income results on Polity are not significant both in the short and long run.

Finally, as expected, the estimated coefficients on ECM are highly significant and negative at 1% level. The negative sign and the significance of this coefficient suggest the degree of adjustment of GDP per capita growth towards the long-run equilibrium after facing shock in the short run. In the aggregate sample, the estimate of ECT is -0.79, suggesting that at least 0.79% point disequilibrium in the short-run period seems to converge back to the long-run equilibrium within a year. In subsamples, the speed of adjustment varies slightly across income groups. The findings from model 3 suggest that the low-income group has the highest speed of adjustment (0.84% point) toward the long-run equilibrium than the high-income (0.82% point) and middle-income (-0.78% point) groups. Moreover, the significance of negative ECT terms also validates the model and confirms the existence of the long-run relationship between the variables.

3.5 Conclusion

The main purpose of this chapter was to examine the economic growth impacts of military expenditure conditional and unconditional on armed conflicts, in general, and across income groups. The Aizenman and Glick, 2003 reformulated Barro, 1990 growth model has been used as a base model, which allows military expenditure to act on economic growth through interaction with armed conflicts. The empirical analysis has been conducted by using pooled mean group (PMG) estimator, using a balanced panel dataset of 61 countries from 1975-2018. Further, in order to address the heterogeneity emanating from different development levels of the underlying countries, the sample of 61 countries was divided into three income groups: high-income, middle-income, and low-income countries.

The main findings of this analysis suggest that in general military expenditure has a direct positive impact on economic growth. This result does not accord with Aizenman and Glick, 2003, who suggests a direct negative effect of military spending on economic growth. That might be because the defence-growth relationship depends on different other factors such as empirical methods, countries, sample size, time span etc. These findings stay the same across high and low-income groups. These results are in line with Benoit, 1973; MacNair et al., 1995; Yildirim and Öcal, 2016. Military expenditure stimulates economic growth through positive spin-off effects. For example, research and development (R&D) for military motives contribute to the advancement in technology, which helps the manufacturing sector to grow, subsequently the overall production increases and then economic growth. However, these effects are more relevant to high-income or industrialized countries, where they have extensive use of sophisticated technology. Whereas, in low-income countries, advanced technology has very little to do with civilian lives, but these countries have other types of positive spillovers. For Instance, civilians can take advantage of military infrastructure such as roads, satellites, hospitals, schools etc. The military sector also plays an integral part in human capital formation in low-income countries. Furthermore, our study also reveals that the impact of military expenditure is higher in high-income than low-income countries, implying that the spillover growth-boosting effects of military expenditure are stronger in high-income than in low-income countries.

Another important finding that emerges from this analysis is that the economic growth impact of military expenditure is a non-linear function of effective armed conflict. The results suggest that military expenditure has a positive impact on economic growth in the presence of armed conflicts in high-income countries, and a negative in low-income countries.

Chapter Four

Economic Growth Effects of Military Expenditure Conditional and Unconditional on Armed Conflicts and Corruption: Across Income Groups

4.1 Introduction

The aim of this paper is to examine the direct and indirect impacts of military expenditure, conflicts, and corruption on economic growth in the panel of 61 countries and across income groups from 2000-2018. Military expenditure is not only an important component of government expenditure but also has a significant impact beyond the resources it consumes, particularly when countries require a certain level of security to alleviate or facilitate conflicts. It has been argued by some studies (Aizenman and Glick, 2003; Musayev, 2016) that defence spending driven by threats stimulates economic growth, while defence spending driven by corruption reduces economic growth. Taking these arguments under consideration, this paper is based on two main objectives.

The first aim is to investigate the economic growth impacts of military expenditure conditional on armed conflicts in the long run. In other words, how does military expenditure impact economic growth in the presence of armed conflicts in the form of security? The security effects are worth investigating because the strong national defence system of any country secures its individuals and their property rights from indigenous and foreign threats. Also, a higher security level is imperative for smooth market operations and in providing a peaceful environment for investment and innovation. To some extent, an additional military expenditure increases national security, as a result, that may affect economic growth positively (J Paul Dunne, R. P. Smith, and Willenbockel, 2005. Adam Smith also mentioned that the first responsibility of any sovereign state is to protect its nationals from violence and invasion of other independent societies, and that can only be done with the help of military force. Wars and lack of security are major obstacles to progress in many developing countries. Thus, military spending can raise the opportunities to accumulate capital stock and produce more, which in turn leads to higher economic growth (Thompson, 1974). However, when military spending is driven by rent-seeking not from security purposes, in such cases military outlays can provoke arm race or wars between the countries and that subsequently can hurt economic growth (J Paul Dunne, R. P. Smith, and Willenbockel, 2005). Further, economic growth impacts of military expenditure also depend upon how military expenditure is financed or how much resources are available for security purposes. These effects are most likely to dependent on the development level of the countries or countries' financial resources. For instance, resource constraint countries may have to cut down their growth-friendly expenditures to maintain the defence sector. On the other hand, resource-abundant countries have more resources available, these countries can easily afford the capital investment program necessary for economic growth while maintaining or even expanding the defence sector (Frederiksen and Looney, 1983)

The second main objective of this study is to evaluate the relationship between military expenditure and economic growth in the presence of corruption. This relationship is also worth examining because besides wars or conflicts, corruption is also one of the main hurdles to development in lower developed countries (d'Agostino, J Paul Dunne, and Pieroni, 2016;

Gupta, De Mello, and Sharan, 2001). Typically, governments are the sole suppliers and consumers of defence services. Certain elements of defence provision are particularly susceptible to corruption. Limited competition among suppliers and lack of transparency because of secrecy around military services provide an incentive to officials to involve in rent-seeking activities. Further, military contracts are often excluded from general scrutiny, which makes it difficult for tax and customs administration to monitor the defence sector's administration procedures, these aspects can be highly persistent in both high-income and low-income countries (Gupta, De Mello, and Sharan, 2001; d'Agostino, J Paul Dunne, Lorusso, et al., 2020). Moreover, if the military expenditure does not increase because of security purposes, it may increase the cost of the military which encourage the rent-seeking behaviour in the defence sector and crowd-out resources from the productive sector such as private investment (d'Agostino, John Paul Dunne, and Pieroni, 2012). Previous literature on the corruption-growth relationship is based on two main strands. First, corruption can be used as a mean of attaining a higher degree of economic efficiency by "greasing the wheel" of government, politicians, and bureaucrats to circumvent tight inefficient government regulations. In other words, the absence of corruption might prevent market operations, and economic institutions to work smoothly (Beck and Maher, 1986; Lien, 1986). The second strand is based on "sand the wheels" concept which means corruption may impede economic output because it prevents efficient production and innovation. Some empirical studies suggest that corruption hinder economic growth, particularly in countries that have low investment rates and poor governance level (Ugur, 2014; d'Agostino, J Paul Dunne, and Pieroni, 2016; Gründler and Potrafke, 2019). Ugur, 2014 meta-analysis study extracted 327 estimates from 29 primary studies on the direct impact of corruption on GDP per capita, found heterogeneous findings because of different measures of corruption, estimation periods and methodologies, countries etc.

It has been discussed in previous literature that there is no agreed theory to investigate the economic impacts of military expenditure because most of the theoretical models do not consider the role of military expenditure explicitly (John Paul Dunne, 2012). We decided to use Aizenman and Glick, 2003 reformulated endogenous Barro growth model because this particular model allows military expenditure to act on economic growth through interaction with threats/conflicts and corruption. J Paul Dunne, R. P. Smith, and Willenbockel, 2005 in their critical review paper conformed that reformulated Barro growth model is more promising, as it measures security by military expenditure relative to the threat, allowing such non-linearities makes this model comparatively advantageous.

This empirical study contributes to the existing military-growth literature in three ways. First, it uses the most recent balanced panel dataset of 61 countries from 2000-2018, which allows up-to-date analysis on this matter. Second, the study also examines the heterogeneity of the results across income groups which has been relatively ignored in this context. Thirdly, we use Aizenman and Glick, 2003 reformulated growth model as a base model, which allows both conflict and corruption to interact with military expenditure to act on economic growth. The rest of the chapter is arranged in the following way: the next section explains data, model specification, and empirical method, the third section illustrates results and discussion and the final section is on conclusion.

4.2 Data, Model Specification,and Empirical Methods

The empirical analysis is based on the balanced panel dataset of 61 countries from 2000-2019. The sample selection entirely depends upon the quality and availability of the data on military expenditure, GDP per capita growth, armed conflicts, corruption, and other control variables. GDP per capita growth is used as a dependent variable, extracted from the World Bank's database. Military spending share to GDP was obtained from Stockholm

International Peace Research (SIPRI) military expenditure database. The armed conflict data was extracted from Uppsala Conflict Data Program (UCDP), it takes the value of 1 if the country experiences a minimum 25 battle-related deaths in a year, and 2 indicates at least 1000 battle-related deaths. Later, we constructed a conflict level variable by accumulating a number of armed conflict incidents that happened in a year, that includes both internal and external conflicts. Corruption is measured by the corruption perception index (CPI), obtained from the Transparency International database. The CPI values range from 0 (highly corrupt) to 100 (least corrupt). The analysis also includes a set of control variables namely: government expenditure/GDP ratio, gross capital formation/GDP ratio, and population growth, all these variables are drawn from the World Bank's database. The rationale behind including government expenditure is that it includes non-military expenditure on education, health, infrastructure, and expenditure on internal defence and security. Gross capital formation can be used as a proxy of physical capital, which directly contributes to economic output. Population growth is included in the analysis to capture the adverse growth effects of over-population pressure on the capital-to-labour ratio (Aizenman and Glick, 2003). Further, the empirical analysis also considers the democracy index, which ranges from -10 (consolidated autocracy) to 10(consolidated democracy) taken from the Polity IV database. The intuition behind including regime-type variable is because economic institutions (such as regulatory institutions, property rights institutions, institutions for macro-economic stabilization, institute for conflict management etc.) are crucial for economic growth across countries because they play an important part in resource allocation (Rodrik, 2008).

To address the heterogeneity emanated from different development levels of the countries, we used the World Bank classification (low income, lower-middle income, upper-middle income, and high income) of the countries on the basis of gross national income per capita. Due to having only two countries in the low-income group in our sample because of unavailability of data, we combined low-income and lower-middle income groups together and formed a single group named the low-income group, while the upper-middle income defined as the middle-income group and the high-income group remains unchanged in our analysis.

Table 4.1: Descriptive Statistics for GDP Growth, Military Expenditure, Conflict and Corruption

Descriptive Stat	Variables	observations	Mean	Std Dev	Minimum	Maximum
All Countries						
	GDP g	1220	2.082	2.813	-11.855	23.986
	Mili exp	1160	1.811	1.459	0.311	12.062
	Conf	1159	0.907	1.239	0	9
	Corruption	1188	51.536	23.616	4	100
High Inc						
	GDP g	540	1.317	2.593	-8.998	23.986
	Mili exp	513	1.961	1.857	0.311	12.062
	Conflict	513	1.060	1.093	0	9
	Corruption	536	74.316	14.473	33.889	100
Middle Inc						
	GDP g	320	2.551	3.333	-11.855	23.986
	Mili exp	305	1.596	0.943	0.353	5.034
	Conflict	304	0.460	0.786	0	5
	Corruption	311	34.289	7.696	16	53
Low Inc						
	GDP g	360	2.814	2.301	-7.329	12.457
	Mili exp	342	1.794	1.092	0.348	6.381
	Conflict	342	1.073	1.624	0	7
	Corruption	341	31.459	8.308	4	56

Notes: GDPg is GDP per capita growth, Mili exp is military expenditure percentage share of GDP, Conf is the cumulative sum of external and internal conflicts that happened in a given year, and Corr represents Corruption Perception index (CPI), it ranges from 0 (highly corrupt) to 100 (least corrupt). There are total 61 countries in the sample, the high-income group contains 27 countries, the middle-income group has 16 countries, and the low-income group has 18 countries.

Table 4.1 shows the summary of descriptive statistics on GDP per capita growth, military expenditure/GDP ratio, armed conflict level and corruption or corruption perception Index (CPI). The following three aspects are the keynotes of the analysis. The first feature is that high-income and low-income countries experience higher average armed conflict levels and the average share of military spending (1.961% and 1.794%, respectively) as compared to the middle-income group (1.596%). It implies that countries with higher armed conflict levels tend to spend relatively more on the defence sector than the countries with a lower armed conflict level. The second aspect is that the high-income countries' average GDP per capita growth level (1.32%) is relatively lower than the middle-income and the low-income (2.55% and 2.81%) countries. This supports the claim that high-income countries tend to grow slower than low-income countries (Aizenman and Glick, 2003). The third facet of these statistics is that the low-income countries have the lowest average score 31.46% in CPI than the high-income and middle-income countries (74.32% and 34.29%). It implies that a higher corruption rate may be one of the main obstacles preventing low-income countries to develop (d'Agostino et al., 2016a; Gupta et al. 2001).

4.2.1 Model Specification and Empirical Method

The benchmark analysis is based on a similar specification used by Aizenman and Glick (2003), which provides evidence of non-linear economic impacts of defence expenditure after controlling for threats and corruption. Their theoretical model is based on the following conjectures: defence spending instigated by significantly higher threats should enhance economic growth through security and military expenditure instigated by rent-seeking or lower governance levels should reduce economic growth. Their basic growth equation looks like this:

$$GDPg = \alpha_1 Mili + \alpha_2 Mili.X + \partial'.X + \beta Z \tag{4.1}$$

Where in equation 4.1, $GDPg$ is GDP per capita growth, $Mili$is Military expenditure as a share of GDP, X is a set of variables that interact with military expenditure, such as the level of effective armed conflict faced by a country and corruption or governance level. Finally, Z comprises a set of other control variables that have been used in the model. In this particular specification, it is assumed that both military expenditure and corruption have a direct negative impact on economic growth, while the interactive term of military expenditure and armed conflict has a positive impact on growth but the interactive term on military expenditure and corruption has a negative effect.

The empirical analysis employs a panel autoregressive distributed lag (ARDL) model, parametrized in error correction form (ECM), which comprises both short-run dynamics and long-run equilibrium. The ECM form of the ARDL(p,q) model is as follows:

$$\begin{aligned}\Delta GDP_{i,t} = \sigma_i(GDP_{i,t-1} - \alpha_1 Miliexp_{i,t} + \alpha_2 Conf_{i,t} + \alpha_3 Corr_{i.t} + \alpha_4 Mili.Conf_{i,t} + \alpha_5 Mili.Corr_{i,t} \\ + \alpha_6 Polity_{i,t} + \alpha_7 GCF_{i,t} + \alpha_8 POP_{i,t} + \alpha_9 GOV_{i,t}) + \sum_{j=1}^{p-1} \alpha'_{0.i} \Delta GDP_{i,t-j} + \sum_{j=0}^{q-1} [\alpha'_{1,i} \Delta Miliexp_{i,t-j} \\ + \alpha'_{2,i} \Delta Conf_{i,t-j} + \alpha'_{3,i} \Delta Corr_{i.t-j} + \alpha'_{4,i} \Delta Mili.Conf_{i,t-j} + \alpha'_{5,i} \Delta Mili.Corr_{i,t-j} + \alpha'_{6,i} \Delta Polity_{i,t-j} \\ + \alpha'_{7,i} \Delta GCF_{i,t-j} + \alpha'_{8,i} \Delta POP_{i,t-j} + \alpha'_{9,i} \Delta GOV_{i,t-j}] + \mu_i + \epsilon_{i,t} \quad (4.2)\end{aligned}$$

where, p and q represent the optimal lag length of dependent and independent variables, respectively. Δ is a 1st difference operator. σ_i is the country-specific error-correcting speed of adjustment coefficient, which measures the speed at which the model returns to the long-run equilibrium after a shock in the short run. This parameter is expected to be significant and negative ($\sigma_i < 0$) to illustrate the speed of adjustment towards equilibrium and a long-run relationship between the variables. Further, $\sigma_i = 0$ indicates toward no long-run relationship between the underlying variables. $\alpha_1 - \alpha_9$ are long run coefficients and $\alpha'_{0,i} - \alpha'_{9,i}$ are the short-run coefficients. Finally, μ_t is for country-specific effects and $\epsilon_{i,t}$is an error term.

The empirical analysis employs two alternative panel time series methods: Pooled Mean Group (PMG) and Dynamic Fixed effects (DFE). PMG method is proposed by Pesaran, Shin, R. P. Smith, et al., 1997 and Pesaran, Shin, and R. P. Smith, 1999 . PMG is an intermediate empirical method, which includes both pooling and averaging. In other words, this method allows intercepts, short-run parameters, and error variance to be heterogeneous across groups but constrains the long-run parameters to remain homogeneous across groups, if the condition of homogeneity is not true then the PMG method can lead to inconsistent results. The DFE estimator allows intercepts to change across, while slop coefficients and error variance are restricted to be homogeneous across groups. If the slope homogeneity condition is not full filled then the DFE method may produce misleading results.

In order to choose the appropriate method for empirical analysis, between PMG and DFE, as both methods may produce misleading results if certain conditions are not fulfilled. As mentioned earlier, PMG restricts long-run estimates to be homogeneous across groups and DFE put homogeneity conditions on both short-run and long-run estimates. Therefore, we employ the Hausman test, suggested by Pesaran, Shin, and R. P. Smith, 1999 to select a more suitable estimator. The null hypothesis of the Hausman test is that no systematic differences between the coefficients of the PMG and DFE. The acceptance of the null hypothesis indicates that the PMG method is more suitable for the analysis.

To determine the optimal lag order of the ARDL(p,q), the Schwarz Bayesian Criterion (SBC) has been performed on each country with a maximum lag of 1, as suggested by Pesaran et al. (1999). The most common choice in half of the sample was ARDL (1,0,0,0,0,0,0,1,1,1).

4.3 Results and Discussion

Before proceeding to the model estimation, the IPS unit-root test is employed to determine the stationarity level of the underlying variables. The null hypothesis of the IPS test states that all under-considered series have a unit root. Whereas. the alternative hypothesis assumes that some of the underlying series are stationary. Table 4.2 comprises the unit-root test results. The results indicate that the null hypothesis can not be rejected in the case of some series at level such as government expenditure (In all groups), CPI (high-income and low-income groups), and gross capital formation (low-income group). However, the null hypothesis is strongly rejected after taking the first difference of the variables.

Table 4.2: Unit Root Test Results

Level & Ist Diff	Variables	Statistics	p-values	Statistics	p-values
All Countries					
	GDP g	-10.304	0.000	-24.193	0.000
	Mili exp	-5.252	0.000	-13.663	0.000
	Corruption	-1.386	0.083	-13.830	0.000
	GcfGDP	-3.608	0.002	-15.299	0.000
	PopGro	-13.772	0.000	-18.128	0.000
	GovGDP	0.204	0.581	-12.955	0.000
High Inc					
	GDP g	-7.727	0.000	-15.892	0.000
	Mili exp	-2.408	0.008	-9.307	0.000
	Corruption	-1.148	0.126	-9.909	0.000
	GcfGDP	-3.896	0.000	-11.311	0.000
	PopGro	-6.475	0.000	-11.347	0.000
	GovGDP	-0.673	0.251	-9.162	0.000
Middle Inc					
	GDP g	-5.563	0.000	-12.010	0.000
	Mili exp	-4.413	0.000	-6.031	0.000
	Corruption	-0.565	0.000	-6.053	0.000
	GcfGDP	-2.438	0.007	-7.078	0.000
	PopGro	-4.587	0.000	-8.912	0.000
	GovGDP	0.271	0.607	-6.991	0.000
Low Inc					
	GDP g	-4.260	0.000	-13.751	0.000
	Mili exp	-2.564	0.005	-8.246	0.000
	Corruption	-0.615	0.269	-7.619	0.000
	GcfGDP	0.426	0.665	-7.638	0.000
	PopGro	-13.098	0.000	-11.071	0.000
	GovGDP	0.944	0.827	-6.036	0.000

GDPg is GDP per capita growth, Mili exp is military expenditure percentage share of GDP, Corr represents Corruption Perception Index, it ranges from 0 (highly corrupt) to 100 (least corrupt), GCF is fixed Gross Capital formation share of GDP, POP is Population growth, and GOV is Government expenditure share of GDP. There are total 61 countries in the sample, the high-income group contains 27 countries, the middle-income group has 16 countries, and the low-income group has 18 countries.

We employed two alternative empirical methods, namely PMG and DFE to analyse the direct and indirect impacts of military expenditure, armed conflicts, and corruption on economic growth in the long run. to decide the suitable empirical method for our analysis, we took the help of the Hausman test. As stated earlier that the null hypothesis of the Hausman test assumes that the difference between long-run estimates of PMG and DFE is not significant. Whereas the alternative hypothesis states that the difference between the long-run estimates of both estimators is significant. The acceptance of the null hypothesis of this test suggests that the PMG method is more suitable and the rejection of the null hypothesis suggests to use DFE method. The long-run estimates of the PMG and DFE are presented in Table 3, where we have run three different regressions for all aggregate and sub-samples (high-income, middle-income, and low-income). The first model goes with the armed conflict variables, the second with corruption variables, and the third model considers both conflict and corruption variables, which further explains the robustness of our estimates.

Table 4.3, in the aggregate sample, the estimated coefficients on the military burden are not significant in any model, implying that the overall military burden does not have any direct impact on GDP per capita growth. These findings are in line with Barro, 1991a; Barro, 1991b, who also failed to find any direct relation between military expenditure and economic growth. However, in the high-income group, models 2 and 3 suggest a positive and significant impact of military expenditure share to GDP on GDP per capita growth, implying that a 1%increase in military expenditure can increase GDP per capita growth by 2.74 percentage points in the model only with corruption, while in the model 3 the magnitude of the military expenditure/GDP ratio decreases to 2.66 from 2.75 percentage points after including armed conflicts variables in the model, that is because conflicts offset some of the positive impacts of military expenditure on economic growth. Interestingly, the coefficient on the military expenditure/GDP ratio only becomes significant after introducing corruption-related variables, which suggests that corruption plays an important role in establishing the relationship between military expenditure/GDP ratio and economic per capita growth. Moving on to the middle-income group, military expenditure share to GDP is only significant in model 1 which goes with armed conflict variables, while in models 2 and 3 the coefficients on military expenditure/GDP ratio are not significant at conventional levels. In low-income

Table 4.3: Dynamic Fixed Effects (DFE) and Pooled Mean Group (PMG) long run Estimates

	All Countries			High Income			Middle Income			Low Income		
Variables	DFE(1)	DFE(2)	DFE(3)	DFE(1)	DFE(2)	DFE(3)	PMG(1)	DFE(2)	PMG(3)	DFE(1)	PMG(2)	DFE(3)
Mili exp	-0.060	0.550	0.815	0.267	2.754***	2.657***	1.253***	-4.863	-2.024	-0.065	-1.438	0.089
	(0.251)	(0.695)	(0.645)	(0.451)	(0.739)	(0.909)	(0.396)	(3.922)	(1.689)	(0.423)	(1.075)	
Confl	-1.007***		-0.853***	-0.584*		-0.291	-0.204		0.881*	-1.052**		-1.037**
	(0.345)		(0.415)	(0.324)		(0.348)	(0.355)		(0.515)	(0.500)		(0.033)
Mili Conf	0.325***		0.231	0.155		0.035	0.196		-0.764*	0.417**		0.404*
	(0.115)		(0.152)	(0.111)		(0.119)	(0.358)		(0.418)	(0.204)	(0.207)	
Corr		0.016	0.052		0.168***	0.169***		-0.262	-0.103		-0.102	0.016
		(0.045)	(0.039)		(0.053)	(0.057)		(0.199)	(0.063)		(0.073)	(0.048)
Mili Corr		-0.009	-0.017		-0.039***	-0.040***		0.127	0.066		0.051	-0.003
		(0.010)	(0.032)		(0.009)	(0.012)		(0.103)	(0.041)		(0.034)	(0.031)
Polity	0.005	0.012	0.007	0.072	0.375*	0.239	0.056	-0.019	-0.365**	0.004	0.002	0.005
	(0.008)	(0.009)	(0.008)	(0.232)	(0.192)	(0.224)	(0.060)	(0.063)	(0.159)	(0.009)	(0.010)	(0.010)
GCF	0.051	0.078	0.049	0.172***	0.184***	0.180***	0.008	0.0001	0.039	0.042	0.053	0.048
	(0.043)	(0.056)	(0.049)	(0.045)	(0.048)	(0.048)	(0.025)	(0.110)	(0.039)	(0.062)	(0.094)	(0.083)
POP	-0.659*	-1.077***	-0.940***	-0.202	-0.859***	-0.807***	-1.771***	-2.227*	-3.103***	-2.069***	-2.213***	-2.276***
	(0.337)	(0.223)	(0.237)	(0.215)	(0.222)	(0.257)	(0.525)	(1.310)	(0.479)	(0.663)	(0.776)	(0.834)
Gov	-0.342	-0.329***	-0.359***	-0.543***	-0.557***	-0.541	-0.339***	-0.052	-0.265***	-0.201*	-0.167	-0.197*
	(0.096)	(0.097)	(0.102)	(0.135)	(0,119)	(0.125)	(0.091)	(0.212)	(0.116)	(0.104)	(0.102)	(0.197)
ECM	-0.813***	-0.811***	-0..817***	-0.851***	-0.903***	-0.892***	-0.875***	-0.820 ***	-0.799***	-0.854***	-0.732 ***	0.812***
	(0.030)	(0.051)	(0.049)	(0.098)	(0.079)	(0.086)	(0.071)	(0.052)	(0.103)	(0.083)	(0.060)	(0.069)
Hausman T	0.000	0.000	0.002	0.006	0.000	0.000	0.935	0.000	0.529	0.000	0.156	0.000
Total Obser	1035	1062	1015	459	482	457	271	278	267	305	302	280
Countries	61	61	61	27	27	27	16	16	16	18	18	18

Notes: Notes: GDP per capita growth is the dependent variable. Mili exp is the military expenditure percentage share of GDP, and Conf is the cumulative sum of external and internal armed conflicts that happened in a given year. Mili.conf is an interactive term on military expenditure (% share of GDP) and armed conflicts. Corr represents Corruption Perception Index, it ranges from 0 (highly corrupt) to 100 (least corrupt). Mili Corr is an interactive term of military expenditure share of GDP and corruption. Polity is a democracy index that lies between -10 (consolidated autocracy) and 10 (consolidated democracy). GCF is the gross capital formation percentage share of GDP, POP is population growth, and GOV is the final government expenditure percentage share of GDP. Dynamic Fixed Effects (DFE) and Pooled Mean Group (PMG) have been used under the framework of the Panel ARDL model and suitable estimators are selected on the basis of the Hausman test. The optimal lag order is ARDL(1,0,0,0,0,0,0,1,1,1) for all the models. The standard errors are presented in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level.* significant at the 10 percent level. This table only shows long-run results because short-run findings of both methods (PMG & DFE) are not comparable, as PMG short-run estimates are heterogeneous across countries and DFE results are homogeneous.

countries, none of the coefficients on the military burden is significant in any model. These heterogeneous findings highlight the fact that the estimated effect of military expenditure also depends on the sample composition.

Armed conflicts, in the aggregate panel, estimated coefficients on armed conflict stay significantly negative, suggesting that one additional armed conflict can hinder GDP per capita growth by a 1.01 percentage point in model 1, and in model 3 growth decreases by 0.85 percentage point because of an additional armed conflict. These findings are highly in accord with Aizenman and Glick, 2003 and Musayev, 2016 studies. Further, high-income and low-income countries also have negative and significant coefficients on armed conflict. However, in high-income only 1 estimate is significant. Additionally, the estimated coefficients on armed conflict in low-income countries (1.05 and 1.04) are around double the high-income coefficient (0.58), suggesting that armed conflicts have more deteriorating effects in low-income countries than the high-income. Furthermore, in the middle-income group, contrary to our expectations the coefficient of armed conflict has a positive sign. This finding is in line with Yang et al., 2011, who also found the positive and significant coefficient of the threat variable.

Moving on to the interactive term of military expenditure/GDP ratio and armed conflict, in the aggregate sample, the coefficient on the interactive term (MILI.Conf) is significantly positive as expected, implying that an overall additional 1% point military expenditure in a given armed conflict level can lead to stimulate GDP per capita growth by 0.33 percentage point. This finding is highly in line with our theoretical framework or Aizenman and Glick, 2003 and Musayev, 2016 studies. In subgroups, only low-income countries' coefficients of the interactive terms (Mili.Conf) are significantly positive. The high-income countries also have positive coefficients but are not significant at conventional levels. Whereas, in the middle-income group, the estimated coefficient from model 3 is significantly negative, implying that military expenditure share of GDP would decrease the GDP per capita growth in the presence of armed conflict. This result highly accords with Yang et al., 2011, who also considered the income levels of the countries and concluded that the security effects of military expenditure also depend on the development level of the countries.

In the aggregate sample, the coefficient of corruption is not significant at conventional levels in any model. These findings in line with Aizenman and Glick, 2003 and Musayev, 2016 studies, who also did not find a direct impact of corruption on growth. In the subgroups, the estimated coefficients on corruption are only significant in the high-income group with a positive sign, implying that an improvement in the corruption perception index (CPI) by 1 unit (on a scale of 0 to 100) can increase GDP per capita growth by 0.17 percentage point in the high-income countries. Interestingly the coefficient of corruption stays almost the same even after adding the armed conflict variables in model 3, which further explains the robustness of our findings.

Moreover, the coefficients of interactive terms of military expenditure share to GDP and corruption are only significant in the high-income group. Suggesting that the estimated coefficient on Mili and Mili.Corr implies that the high-income countries with a CPI score below 66.5 (=2.66/0.04) with higher military spending have a less negative impact on GDP per capita growth than the high-income countries with above 66.5 CPI score. Quantitatively, The impact of military expenditure/GDP ratio ranges from a low of -1.34 for high-income countries with the highest CPI score (100) to a high of 1.30 for high-income countries with the lowest CPI score (33.89). In simple words, the military spending /GDP ratio has less negative economic impacts in the presence of higher corruption in high-income countries.

Moving on to control variables, the Polity index coefficients are almost insignificant except in the high-income group in model 2 and in the middle-income group in model 3. The Gross capital formation/GDP ratio has an expected positive impact on GDP per capita growth but is only significant in the high-income group. Further, the population growth and government expenditure/GDP ratio have a significant negative impact on GDP per capita growth, overall.

Finally, as expected the estimated coefficients of ECM coefficients are significantly negative at 1%. The negative sign and significant coefficient of ECT suggest the degree of adjustment of GDP per capita growth towards long-run equilibrium after experiencing shock in the short run. In the aggregate panel, the coefficient of ECM is -0.82 and significant, implying that at least 82% point disequilibrium in a short-run period seems to converge back to the long-run equilibrium within a year. The speed of convergence differs slightly across income groups. Our findings from model 3 in sub-groups suggest that high-income countries have the highest degree of adjustment (0.89% point) towards the long-run equilibrium than the middle income (0.80% point) and the low-income (0.81%) countries. Further, the significantly negative ECT coefficient is also an indication of a valid model and confirms the existence of the long-run relationship between the underlying variables.

4.4 Conclusion

The aim of this chapter was to examine the direct and indirect impacts of military expenditure, armed conflict, and corruption on GDP growth in the long run. In addition, this study also examined these impacts across income groups (high-income, middle-income, and low-income) as the included countries differ in terms of development level. The study examines the balanced panel dataset of 61 countries from 2000-2018. In this analysis, we used Aizenman and Glick, 2003 reformulated Barro, 1990 growth model as a base model, which allows military expenditure to affect GDP growth through interaction with armed conflict/threat and corruption. Further, the empirical analysis is based on two main steps: (i) unit root test (ii) and two alternative empirical methods dynamic fixed effects (DFE) and pooled mean group (PMG) estimator, each method is selected on the basis of Hausman test.

The main DFE and PMG panel estimates suggest that: (i) there is a long-run relationship among the underlying variables (ii) the military spending/GDP ratio has no direct impact on the GDP per capita growth except in the high-income group. In high-income countries, military spending is positively associated with GDP per capita growth. That might be because, high-income countries (U.S France, Germany, U.K etc) are industrialized countries and they spend higher amounts on research and development for military purposes, which subsequently plays an important part in the advancement of the technology that further helps in the manufacturing sector which in turn increases overall production and then GDP growth. (iii) overall and in high and low-income groups armed conflicts have a negative and significant impact on GDP per capita; interestingly, armed conflicts are more harmful to low-income economies than to high-income countries. The plausible reason behind this might be that mostly high-income countries' conflicts are outside their territories, while low-income countries have conflicts inside their countries or on their borders. (iv) In general and in high and low-income military expenditure/GDP ratio in the presence of armed conflicts impact positively on GDP per capita growth, whereas in the middle-income the impact is negative, suggesting that the security effects vary across income groups. (v) Corruption has no direct impact on GDP per capita growth except in the high-income group. In high-income countries, corruption has a direct negative association with GDP per capita growth, suggesting that as the quality of government institutions or corruption perception index (0-100) score gets higher and higher it has higher positive economic effects. (vi) Military expenditure/GDP ratio in the presence of corruption has a negative and significant impact in high-income countries, implying that countries in the high-income group with higher CPI scores have a more negative impact of military expenditure share to GDP on GDP per capita growth than the high-income countries with lower CPI score. The plausible reason behind that might be because normally defence projects or deals are surrounded by secrecy and in order to execute them, the absence of corruption makes it difficult to overcome strict government regulations, that might have gone smoothly in the presence of corruption and in turn had impacted positively on GDP growth. In simple words, the absence of corruption might prevent the smooth functioning of markets or economic institutes.

Overall, the empirical findings suggest that when examining the impacts of military expenditure, corruption, and conflict on GDP growth, it is important to consider not only direct but also indirect impacts and heterogeneity in terms of the income or development level of the countries. Failure to do so may lead to misleading results.

Chapter Five

Conclusion

5.1 Introduction

This thesis is based on three independent empirical chapters which investigate the relationship between economic growth, military expenditure, armed conflict, and corruption. Although, the ongoing discourse on the relationship between military expenditure and economic growth remains. This study contributes to the existing literature in different ways. First, by determining the economic growth impacts of military expenditure conditional and unconditional on armed conflicts in Pakistan and India, the previous studies specifically on Pakistan and India did not consider the conflict measures while establishing the relationship between economic growth and military expenditure. Second, this thesis, in chapter three uses a different empirical method (pooled mean group) which to the best of our knowledge has not been used in this context. Finally, this analysis not only determines the economic impacts of military expenditure in the absence and presence of armed conflicts and corruption in general but also across income groups which have also been relatively ignored in this framework.

5.2 Summary of Results

The main objective of the first empirical chapter was to determine the economic growth effects of military expenditure conditional and unconditional on armed conflicts (internal and external) in the case of Pakistan and India from 1960-2019. The rationale behind picking the 1960-2019 period was to include as many wars or armed conflict incidents in the analysis as possible and the selection of period is also based on the quality and availability of data on underlying variables. This empirical chapter provides answers to some questions. How does military expenditure impact economic growth in the case of Pakistan and India? How does military expenditure impact economic growth in the presence of significantly higher armed conflicts in the case of Pakistan and India? In order to answer these questions, for empirical analysis, this chapter employed a robust econometric method named the autoregressive distributed lag (ARDL) model, along with different diagnostic tests.

The findings suggest that military expenditure has a significantly positive impact on economic growth in Pakistan, while insignificant in India. That might be because the Pakistan army is a major player in running state affairs both directly and indirectly. It has self-generating capital sources such as the arms industry, housing colonies across the country, hospitals, schools, colleges, Banks etc. Further, Pakistan's military has played an important role in building infrastructure in remote areas which were highly affected by terrorism. Our findings on the economic growth effects of military expenditure do not accord with Aizenman and Glick, 2003, who suggests that military expenditure in the absence of armed conflict or threats impacts negatively. That might be because their analysis is based on cross-sectional data of 91 heterogeneous countries, while our analysis is based on case studies. As we have mentioned earlier that the military-growth relationship varies from country to country depending on their overall economic capacity, strategic environment and many other factors.

Another significant finding that emerges from chapter two's empirical analysis is that military expenditure affects economic growth positively in the presence of external armed conflicts in both countries (Pakistan and India). These findings are in line with Aizenman and Glick, 2003, who also suggests that military expenditure impacts positively in the presence of significantly higher threats. That might be because higher military expenditure attenuates the intensity of armed conflicts and help strengthen the confidence of national and international investors to invest by increasing the security level of the country. However, military expenditure has higher growth-stimulating effects without external armed conflicts than in the presence of external armed conflicts. That is because external armed conflict offsets most of the growth-stimulating effects of military expenditure.

Moreover, the empirical analysis also suggests that external armed conflicts are more harmful to the Indian economy than the Pakistani economy. The plausible reason behind this may be because besides Pakistan, India has a troubling relationship with China and China is one of the largest trading partners of India. Thus, whenever tension increases at the borders between India and China that directly and indirectly affects their trade relations. Consequently, it ends up hurting the Indian economy.

The second empirical chapter set out to address the following questions. How does military expenditure impact economic growth in general and across income groups? How does military expenditure impact economic growth in the presence of armed conflicts in general and across income groups? To address these questions, this chapter used a balanced panel dataset of 61 countries from 1975-2018 and for empirical analysis pooled mean group (PMG) method has been employed after carefully determining the stationarity level of underlying variables and the other reason for using PMG method was due to its ability to address parameter heterogeneity, which may arise when examining the relationship between military expenditure and economic growth across different countries. In my sample, it was evident that countries exhibit variations in their military expenditure patterns, influenced by factors such as armed conflicts and the presence of high-tech defence industries. These factors can significantly impact the relationship between military spending and economic growth. Further, in order to determine the economic growth impacts of military expenditure across income groups, the sample of 61 countries has been divided into three main groups; high-income, middle-income, and low-income countries, according to the World Bank country classification based on the 2019 GNI per capita.

The main findings of chapter three suggests that in general military expenditure has a positive impact on economic growth in the long run. Morover, these findings remain homogeneous across income groups, especially in high-income and low-income countries. The plausible reason behind positive economic growth impacts of military expenditure might be the spill-over effects of military expenditure through which military expenditure impacts economic growth. For instance, research and development (R&D) for defence purposes contributes to the advancement in the technology that subsequently supports the manufacturing sector to grow and that in turn increases the overall production level of the country, which at last affects the economic growth positively. However, these technological advancements effects are more relevant to industrialised countries, where they have civilian applications of sophisticated technology. Whereas, in less developed countries technology plays a minor role in civilian lives. But might be these countries have other kinds of spill-over effects. For example, civilian uses of military infrastructure such as roads, hospitals, schools, satellites, and the role of the military in disasters or building infrastructure in remote areas where civilian government access is difficult. Further, the empirical analysis of this chapter also reveals that the economic growth effects of military spending are higher in high-income groups than the low-income groups. It implies that spill-over growth-enhancing effects of military expenditure are stronger in high-income countries than in low-income countries.

Moving on to other significant findings that emerge from this chapter is that in the presence of armed conflicts military expenditure impacts economic growth positively in high-income countries, while negatively in low-income countries. These findings also capture the non-linear relationship between military spending and economic growth conditional on armed conflicts in the case of high-income and low-income countries. it implies that after a certain level of armed conflict military expenditure starts affecting economic growth negatively in low-income countries, while in high-income countries the positive impact of military expenditure on growth keeps increasing with higher armed conflicts. The heterogeneous findings across income groups are because the security channel works differently across countries depending on their economic capacity and susceptibility to the armed conflict level. That is because resource-abundant countries can afford higher military expenditure even in the presence of higher armed conflicts. Whereas, resource-constrained countries cannot exhaust their limited resources on the military. For instance, in industrialized countries, if the demand for military expenditure increases due to security reasons or armed conflicts, the overall arms production increases and then arms exports, which in turn increases the financial resources of the country. In this way, the resource-abundant countries can not only compensate for their higher military expenditure but also increase their financial resources as the armed conflict increases. On the other hand, in resource-constrained countries, if the military expenditure increases because of security concerns, initially military expenditure might impact positively, that in turn might increase the production level of the country. But, as the armed conflict increases after a certain level, the impact of military spending becomes negative. Because in resource-constrained countries in order to increase military expenditure to tackle the higher armed conflicts, they might need to divert their resources from the productive sector to the military sector. Consequently, the positive economic growth impacts of military expenditure with increasing armed conflicts might turn into negative effects.

The main objective of the third empirical chapter has been to determine the growth impacts of military expenditure conditional and unconditional on armed conflicts and corruption, in general, and across different income groups from 2000-2018. The selection of time period for this chapter was based on the availability of data on corruption which is not available before 2000 for most countries. Further, This chapter has also examined whether using a different time period (2000-2019) has any impact on the growth-military relationship as this chapter has used the same set of countries as chapter 2. In order to determine these impacts, we employed two alternative empirical methods, namely pooled mean group (PMG) and dynamic fixed effects (DFE), after carefully conducting the unit root test.

The main empirical findings from this chapter verifies the existence of non-linear relation between military expenditure and economic growth conditional on corruption, in high-income countries. The results show that in the presence of corruption military expenditure impact economic growth negatively. However, in the high-income group, countries with lower corruption rates have more harmful growth effects of military expenditure than those with higher corruption rates. The plausible argument behind that might be that normally defence-related deals and projects are surrounded by secrecy because of national security reasons. Sometimes, the presence of strict government regulations makes it difficult to execute such projects or deals, that might had gone smoothly in the presence of corruption and in turn had increased economic activity. In short, the absence of corruption might prevent the smooth functioning of markets or economic institutes in high-income countries. Further, the findings also suggest that corruption has a direct negative impact on economic growth in high-income countries, implying that the higher quality of institutions or lower corruption rates are associated with higher economic performance, in the high-income group.

Moving on to the second aim of this chapter, which is to investigate the economic growth impacts of military expenditure in the absence and presence of armed conflicts from 2000-2019. The main findings suggest that in the 2000-2018 period, in the high-income group, the direct impact of military expenditure stays positive and significant like in the 1975-2019 period, while in the aggregate sample and low-income countries the estimates become insignificant. Further, in the aggregate panel and in low countries, the economic growth impacts of military spending in the presence of armed conflict have a positive impact in the under-considered period. whereas, in the high countries these impacts become insignificant.

5.3 Contribution and Implications of the Research

Several contributions and implications emerge from the empirical chapters. In the case of Pakistan and India, there are only a handful of studies on the relationship between military expenditure and economic growth and none of the studies consider threats or armed conflicts while examining the relationship between military expenditure and economic growth (Tahir, 1995; Khilji, Mahmood, and Siddiqui, 1997; Khan, 2004; Shahbaz, Afza, and Shabbir, 2013; Tiwari and Shahbaz, 2013). Considering conflict measures in the model do not only allow us to determine the direct impacts of conflicts on economic growth but also the impact of military expenditure in the presence of armed conflicts, after interacting conflict measures with military expenditure. The empirical analysis suggests that external armed conflicts have a direct negative impact on the economic growth of both countries (Pakistan and India) in the absence of defence expenditure. However, at the given level of external armed conflicts, the increasing military expenditure has a positive impact on growth and as the intensity of external conflicts increases in both countries, the overall military expenditure effects on GDP per capita growth also get stronger and stronger. Having positive economic growth impacts of military expenditure in the presence of armed conflicts does not suggest that both countries should keep spending their limited resources on the military, as the positive impact is very small in both cases. This suggests that both countries should resolve their territorial disputes through peaceful means or diplomacy rather than using military forces. So the resources that both countries allocate each year to eradicate the threats could be spent on growth-oriented projects.

The second empirical chapter contributes by showing that military expenditure in the presence of armed conflicts has a positive impact on growth in high-income countries and a negative impact in low-income countries. In low-income countries after a certain level of armed conflicts, military expenditure starts impacting economic growth negatively, while in high-income countries the economic growth effects of military expenditure keep increasing with increasing armed conflicts. The high-income group findings accord with Aizenman and Glick, 2003, who also suggests a positive impact of military expenditure in the presence of threats, but low-income results are not in line with their study. That might be because their study did not account for the development level of the underlying countries. Having heterogeneous findings across income groups suggest that the economic effects of military expenditure are highly dependent on the economic capacity of the countries. The empirical findings of this chapter also suggest that excluding conflicts in the model while determining the growth-military relation can give biased estimates of military expenditure.

The third empirical chapter contributes by suggesting that military expenditure in the presence of higher corruption has a less negative impact on economic growth than in the presence of lower corruption in the high-income group. This implies that in the high-income group, countries with strong institutions or higher CPI [1] scores have more negative impacts of military expenditure on economic growth than countries with weak institutions or lower CPI scores. This finding does not accord with Aizenman and Glick, 2003, who suggests that military expenditure in the presence of higher corruption has a negative impact on economic growth. The reason behind having different findings might be because both studies used different samples, time periods, and even different corruption measures.

The third empirical chapter also contributes by investigating whether the different time period or sample has an impact on defence-growth relation in the absence and presence of armed conflicts. The findings suggest the negative effects of armed conflicts on economic growth is higher in the 2000-2018 panel than in the 1975-2019 period, both in general and

[1] Corruption Perception Index ranges from 0 to 100, 0 shows highly corrupt and 100 indicates least corrupt.

across income groups (except for the middle-income groups, the coefficient on armed conflicts stays insignificant in both samples). That is because in the post-9/11 period the number of armed conflicts grew in many countries, especially after the U.S and its allies launched the 'global war on terror' operation in different countries to eradicate terrorism. Another important finding that emerged from this sample is the direct impact of military expenditure becomes insignificant in the shorter (2000-2018) panel, in general, and particularly in high-income and low-income groups. Similarly, the security impacts or military expenditure impacts on economic growth in the presence of armed conflicts also become insignificant, especially in the overall sample and high-income group. The plausible reason for that might be higher armed conflict level in the post-9/11 period nullifies the overall positive direct impact of military expenditures and security effects.

5.4 Limitations of the Research

This study suffers from some limitations, therefore we acknowledge the limitations of this research in this section. The foremost limitation of this analysis is regarding the limited availability of data. In the first empirical chapter, we wanted to include corruption measures, as they could be an important determinant of economic growth, especially in the case of Pakistan and India, as both countries have higher corruption rates, but unfortunately, we did not find data on corruption before 2000. Moreover, Another important variable, due to data constraints, we were unable to include was human capital. This factor could hold great significance in determining the relationship between military expenditure and economic growth, particularly since our analysis indicates a positive impact of military expenditure on economic growth. Therefore, the exclusion of human capital measures from our study is a notable limitation that warrants further attention in future research. Further, the second and third empirical chapters' analyses were constrained by a limited sample of 61 countries due to the limited availability of data on many countries (Yemen, Syria, Saudi Arabia, Iraq, Afghanistan, China, Russia etc.), those have either active armed conflicts or higher military expenditures. Moreover, it would have been better if we had included arms trade measures in our model, as we were examining the military expenditure impacts on economic growth across income groups and arms trade could play an important role in determining the growth-military relation across income groups. But the data on the arms trade is either available for a few countries or for a shorter time period. Further, In the first empirical chapter, we have used the intensity level measure of internal and external armed conflict, which is coded in the form of 1 and 2. 1 indicates low-intensity armed conflict: between 25 and 999 battle-related deaths. 2 indicates war or high-intensity conflict: minimum 999 battle-related deaths. Whereas, in the second and third empirical chapters, we accumulated the number of low and high-intensity armed conflicts that happened in the same year.Which we believe is the better way to show the broader picture especially when we interact armed conflicts with military expenditure.

5.5 Potential Avenues for the Future Research

This research suggests a number of potential avenues for future research concerning the military-growth relationship and through which military expenditure can affect economic growth. One could investigate the interaction between the arms trade and military expenditure to check how military expenditure impacts in the presence of higher arms imports or exports after classifying countries accordingly: arms importing countries and arms exporting countries. As it has been clear from our analysis that the defence-growth relation also depends on the underlying time period. So, one could build a separate analysis to check the military growth relationship in the different time periods such as pre-9/11, post-9/11 and overall.

Appendix One

First Appendix

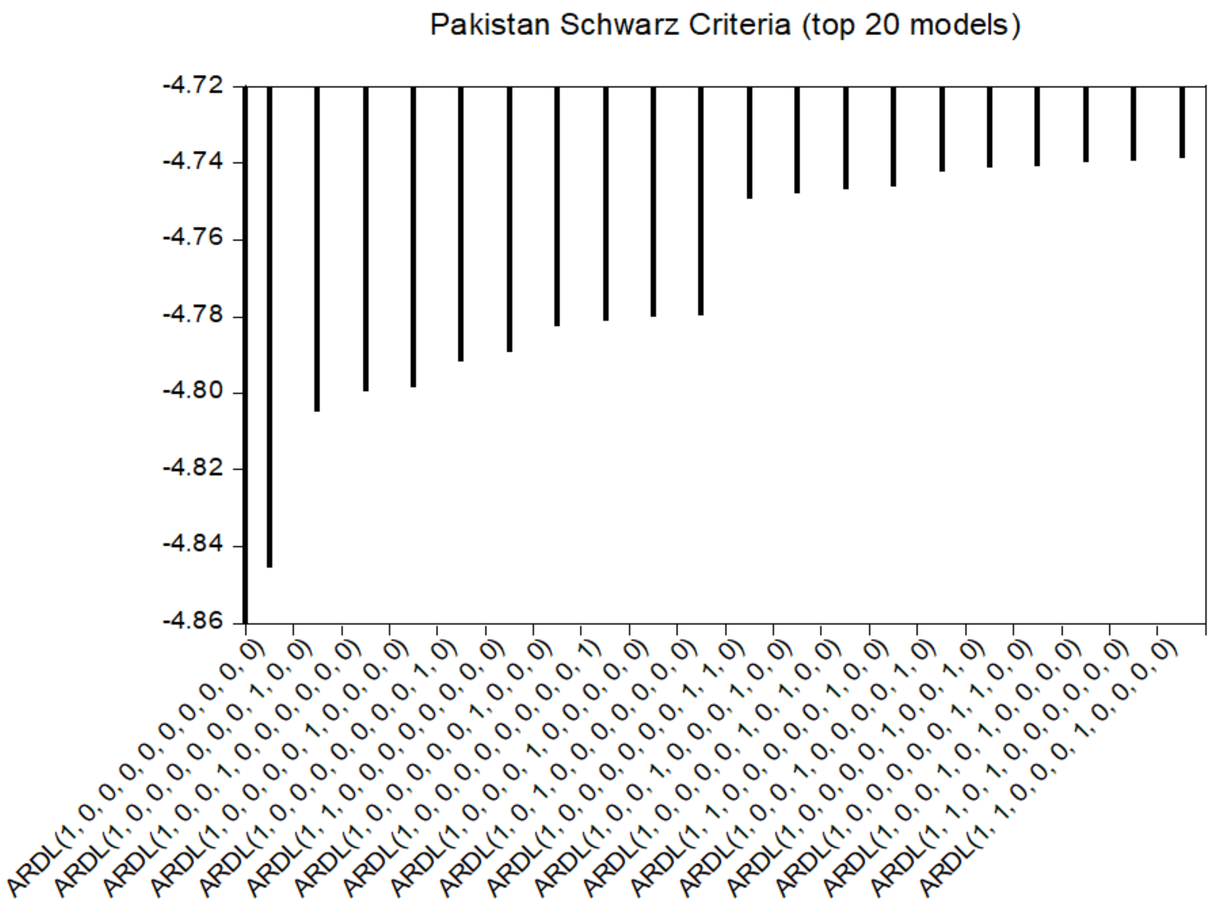


Figure A.1: Pakistan: Optimal Lag Order

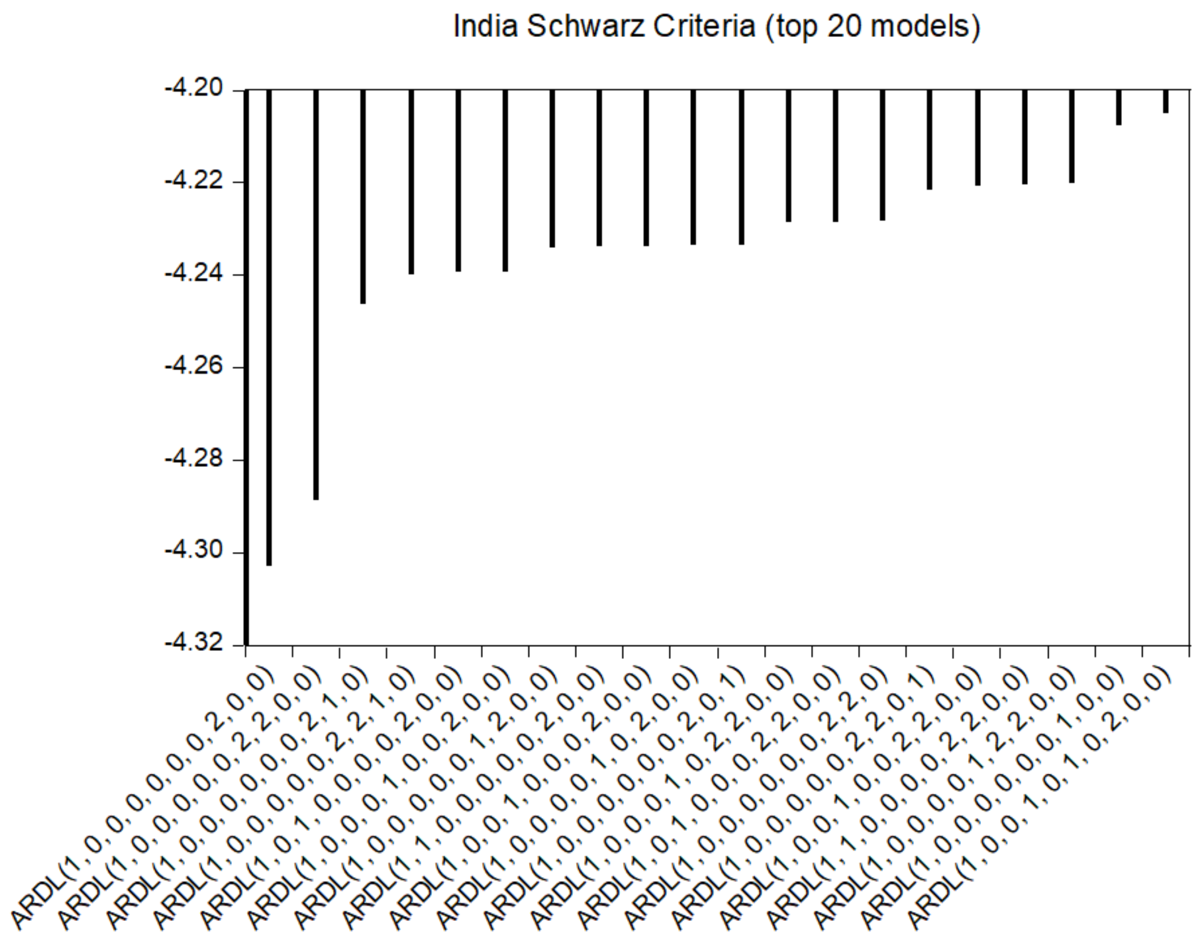


Figure A.2: India: Optimal Lag Order

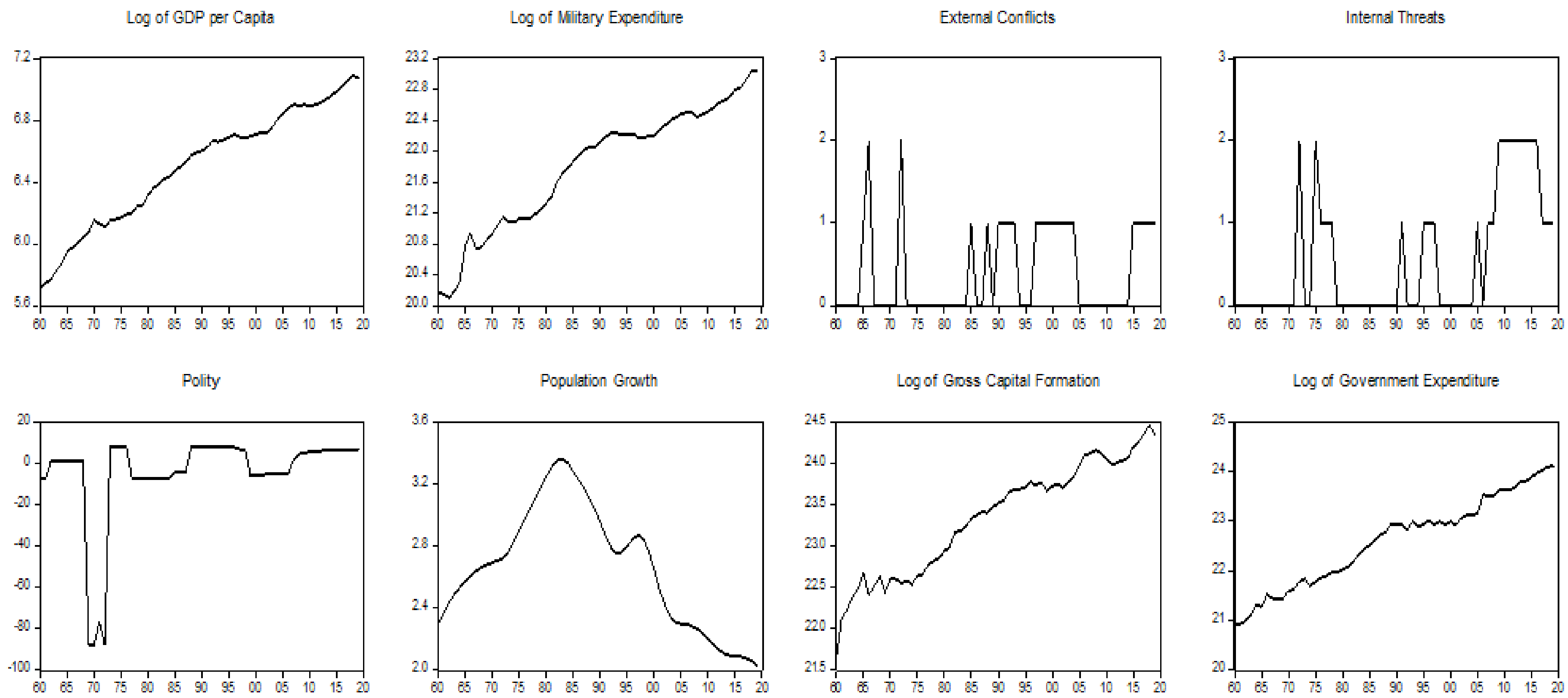


Figure A.3: Pakistan: Time-Series Plots At Level

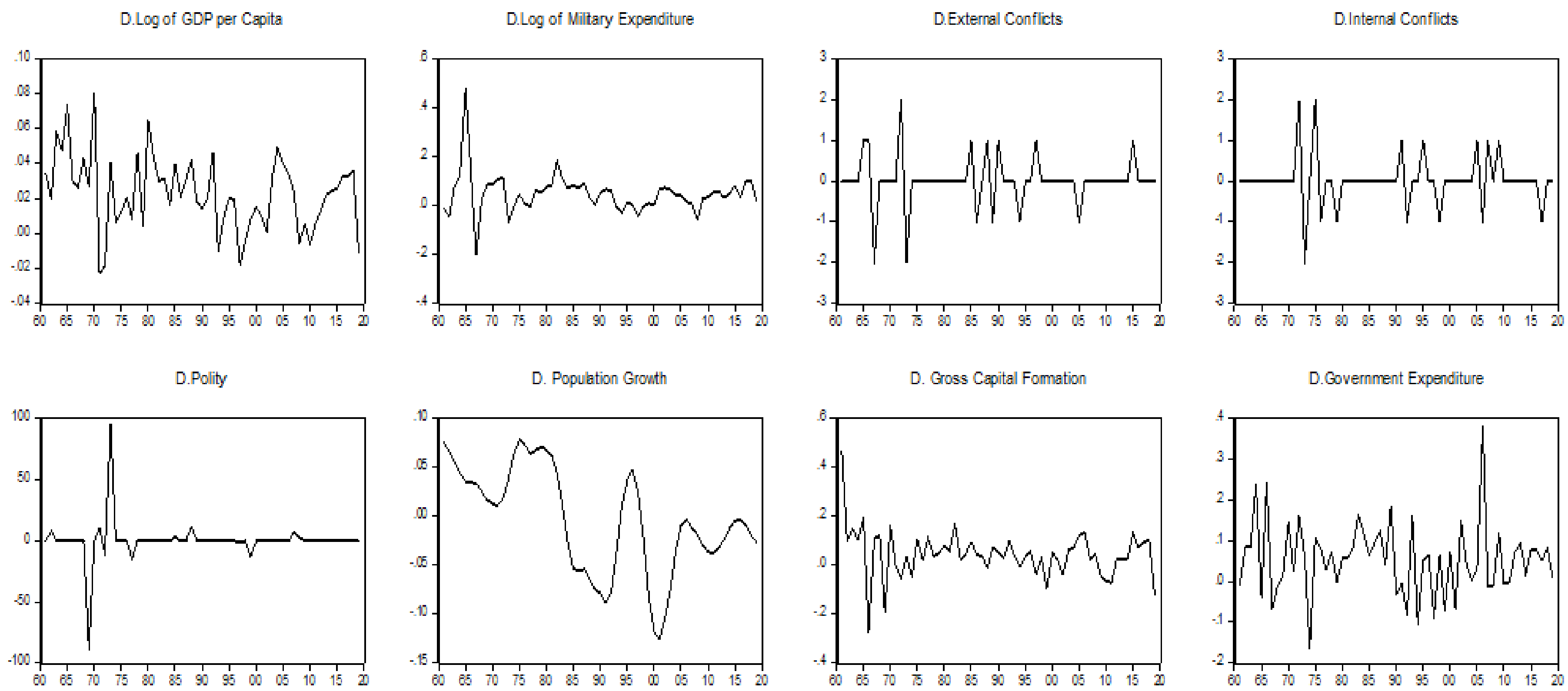


Figure A.4: Pakistan: Time-Series Plots At 1st Difference

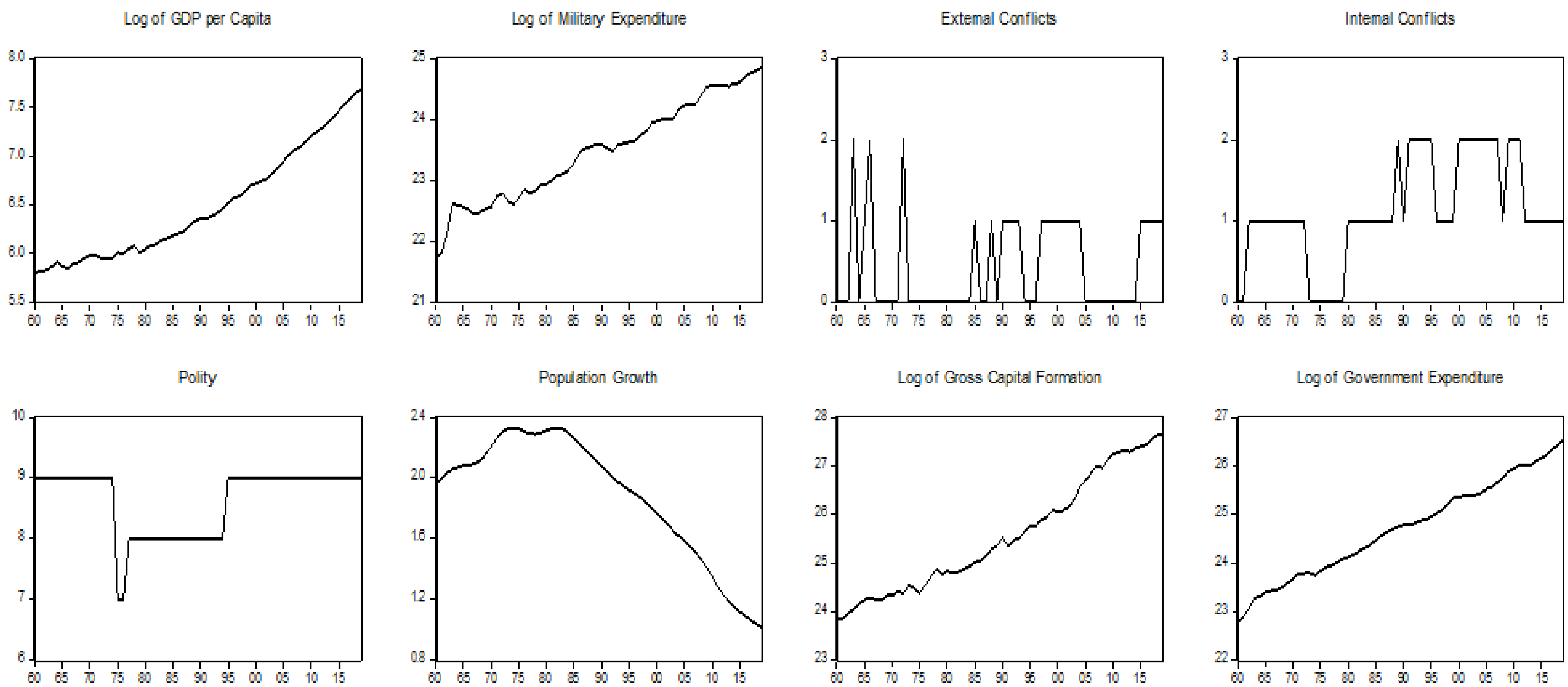


Figure A.5: India: Time-Series Plots At Level

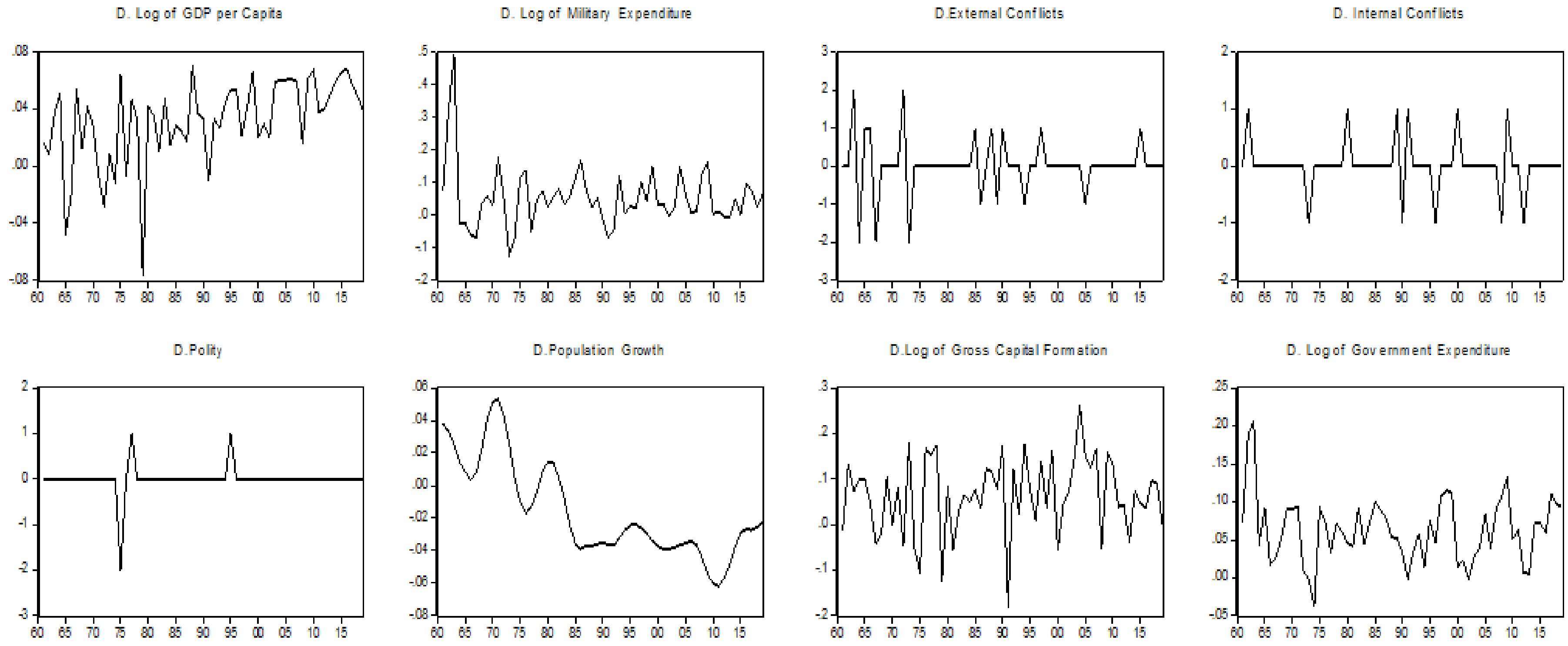


Figure A.6: India: Time-Series Plots At 1st Difference

Table A.1: India: Short-Run Results

Variables	India
d.Pop G	-0.563*
	(0.329)
d.Pop G (-1)	1.284***
	(0.386)

Table A.2: ARDL Long-Run Estimates

Variables	Pakistan	India
LGDP PC	1.88***	-0.02
	(0.41)	(0.39)
Ext Conf	1.02	1.71**
	(0.87)	(0.81)
Int Conf	-1.27	-2.02**
	(0.89)	(0.99)
MIli.Ext	-0.04	-0.07**
	(0.04)	(0.03)
Mili Int	0.06	0.09**
	(0.04)	(0.04)
Polity	-4.12	-0.05
	(0.00)	(0.03)
LGCF	-0.08	-0.13
	(0.17)	(0.17)
LGOV	0.15	0.82***
	(0.14)	(0.15)
POP	-4.12***	-0.23
	(0.06)	(0.24)
Constant	4.06***	3.95***
	(0.56)	(0.55)
ECM_{t-1}	-0.54***	-0.54***
	(0.06)	(0.07)
R-Squared	0.69	0.81

Notes: Log of real military expenditure is a dependent variable, LGDP PC is log of GDP per capita, Ext Conf and Int Conf represent external and internal armed conflicts. Mili.Ext and Mili Int are interactive terms of military expenditure and armed conflicts. Polity is a democracy index, LGCF and LGOV are for log of real gross capital formation and Log of real government expenditure, respectively. Finally, Pop shows population growth. The optimal lag order for Pakistan and India is (1,0,1,0,1,0,0,0,0,0)and (1,0,0,0,0,0,0,0,2,0), respectively. Standard errors are presented in parenthesis, * shows a significance level at 10%, ** shows a significance level at 5%, and *** indicates a significance level at 1%.

Table A.3: ARDL Short-Run Estimates

Variables	Pakistan	India
d.LGOV		1.24***
		(0.55)
d.$LGOV_{t-1}$		0.46***
		(0.14)
d.Ext Conf	1.99***	
	(0.37)	
d.MIli.Ext	-0.08	
	(0.01)	

Notes: Log of real military expenditure is a dependent variable, The optimal lag order for Pakistan and India is (1,0,1,0,1,0,0,0,0,0)and (1,0,0,0,0,0,0,0,2,0), respectively. Standard errors are presented in parenthesis, * shows a significance level at 10%, ** shows a significance level at 5%, and *** indicates a significance level at 1%.

Table A.4: Cointegration Test: ARDL Bounds Test

	Pakistan	India	Signif	l(0)	I(1)
F-Statistc	4.31	4.42	10%	1.88	2.99
k	9	9	5%	2.14	3.3
			2.5%	2.37	3.6
			1%	2.65	3.97

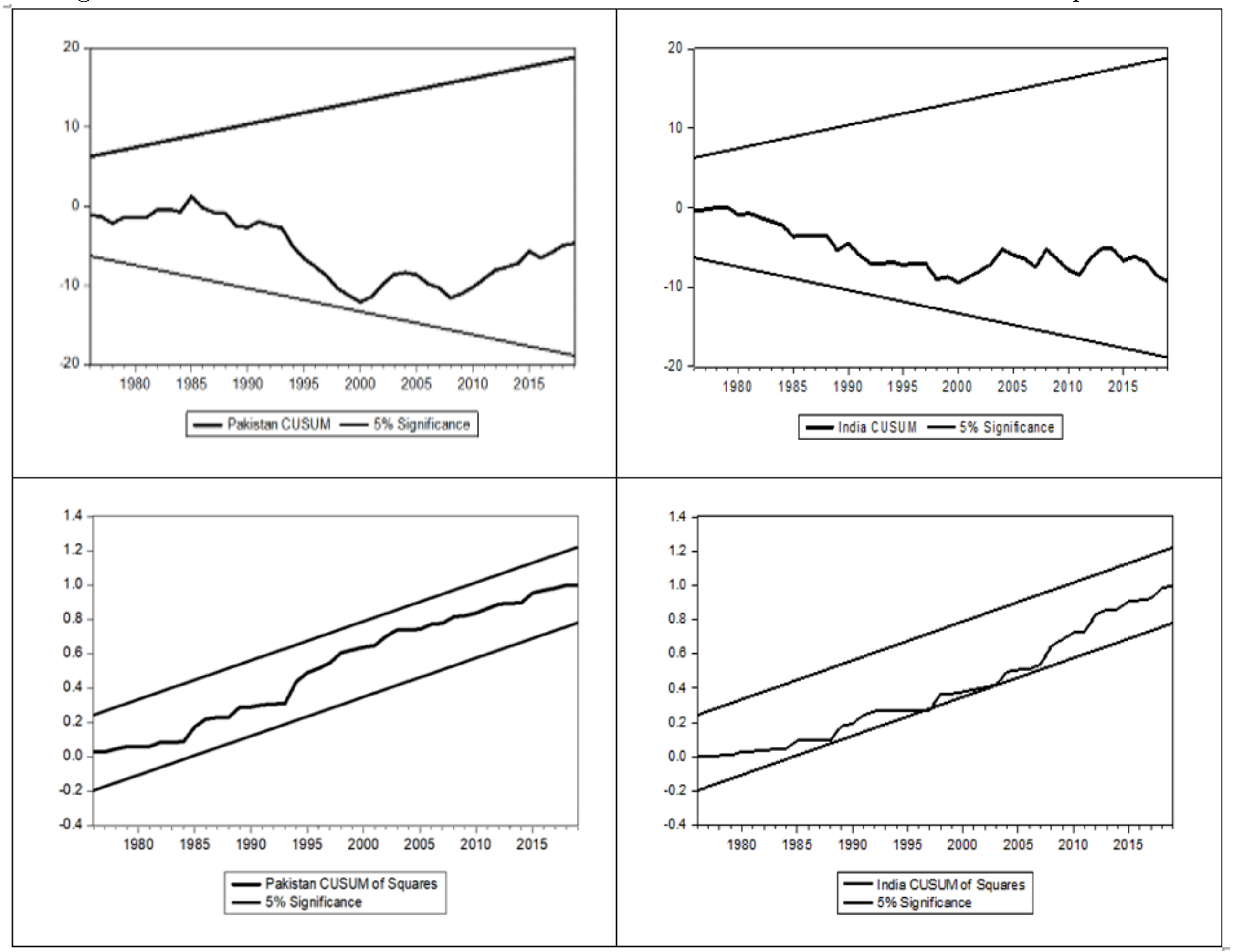
Notes: I(0) and I(1) indicate lower and upper critical bounds, respectively. The null hypothesis suggests no cointegration exists. k indicates the number of regressors in the model.

Table A.5: Diagnostic Tests

	Pakistan		India	
	F-Statistics	P-Values	F-Statistics	P-Values
Serial Correlation	2.04	0.16	1.61	0.21
Heteroskedasticity	0.11	0.17	1.22	0.30

Notes: the null hypothesis for serial correlation and heteroskedasticity tests states that no serial correlation and the model are homoscedastic, respectively.

Figure A.7: Cumulative Sum of Recursive residuals and Cumulative Sum of Squares



Notes: Top 2 plots represent the cumulative sum of recursive residuals (Long-Run Models) and the bottom 2 plots represent the cumulative sum of squares (Short-Run Models) for both countries. The straight lines show critical bounds at 5% significance level

Table A.6: FMOLS Method Results With Average Years of Schooling Measure

Variables	Pakistan	India
LMili Exp	0.58	0.02
	(0.15)	(0.11)
Ext Conf	0.13	-0.56
	(0.95)	(1.70)
Int Conf	0.35	0.70
	(0.30)	(0.61)
MIli.Ext	-0.01	0.02
	(0.02)	(0.07)
Mili Int	-0.02	-0.03
	(0.01)	(0.03)
Polity	0.00	0.01
	(0.00)	(0.01)
LGCF	-0.12	0.22
	(0.04)	(0.09)
LGOV	-0.16	0.01
	(0.12)	(0.16)
POP	0.01	-0.26
	(0.05)	(0.20)
Educ	0.11	0.09
	(0.02)	(0.07)
R-Squared	0.99	0.99

Notes: Log of real GDP per capita is a dependent variable, LMili Exp is log real military expenditure, Ext Conf and Int Conf represent external and internal armed conflicts. Mili.Ext and Mili Int are interactive terms of military expenditure and armed conflicts. Polity is a democracy index, LGCF and LGOV are for log of real gross capital formation and Log of real government expenditure, respectively. Finally, Educ indicates average years of schooling and Pop shows population growth. The used data is in Five-years interval form from 1960-2015. Standard errors are presented in parenthesis, * shows significance level at 10%, ** shows significance level at 5%, and *** indicates significance level 1%.

Table A.7: ARDL Long-Run Results With Democracy Indices

Variables	Pakistan	India
LMili Exp	0.20***	-0.08
	(0.05)	(0.07)
Ext Conf	-0.37	-0.67**
	(0.23)	(0.30)
Int Conf	0.35	0.70
	(0.30)	(0.49)
MIli.Ext	0.02	0.03**
	(0.02)	(0.01)
Mili.Int	0.01	-0.03
	(0.01)	(0.02)
LGCF	0.21***	0.18***
	(0.05)	(0.06)
LGOV	0.06	0.25***
	(0.04)	(0.07)
POP	0.04	-0.44***
	(0.03)	(0.07)
EGAL DEMO	0.83	0.73
	(0.96)	(0.57)
DELIB DEMO	0.36*	0.03
	(0.21)	(0.57)
ELECT DEMO	-0.61	-3.40**
	(0.42)	(1.55)
PARTI DEMO	0.60	-0.06
	(0.50)	(0.68)
LIBER DEMO	-0.11	3.02**
	(0.36)	(1.14)
Constant	-2.35***	-0.94***
	(0.22)	(0.09)
R-Squared	0.71	0.76

Notes: Log of real GDP per capita is a dependent variable, LMili Exp is log real military expenditure, Ext Conf and Int Conf represent external and internal armed conflicts. Mili.Ext and Mili Int are interactive terms of military expenditure and armed conflicts. LGCF and LGOV are for log of real gross capital formation and Log of real government expenditure, respectively. POP shows population growth, EGAL DEMO indicates Egalitarian Democracy Index, DELIB DEMO shows Deliberative Democracy Index, ELECT DEMO represents Electoral Democracy Index, PARTI DEMO indicates Participatory Democracy Index, and LIBER DEMO is Liberal Democracy Index, The optimal lag order for Pakistan and India is (1,0,0,0,0,0,0,0,0,0,0,0,1,1,1) and (1,1,0,1,0,1,0,1,0,0,1,0,0,0,0), respectively. Standard errors are presented in parenthesis, * shows significance level at 10%, ** shows significance level at 5%, and *** indicates significance level 1%.

Table A.8: Cointegration Test: F Bounds Test

	Pakistan	India	Signif	l(0)	I(1)
F-Statistc	5.47	5.72	10%	1.83	2.94
k	14	14	5%	2.06	3.24
			2.5%	2.28	3.50
			1%	2.54	3.86

Notes: I(0) and I(1) indicate lower and upper critical bounds, respectively. The null hypothesis suggests no cointegration exists. k indicates the number of regressors in the model.

Table A.9: Diagnostic Tests

	Pakistan		India	
	F-Statistics	P-Values	F-Statistics	P-Values
Serial Correlation	0.10	0.75	0.00	0.98
Heteroskedasticity	1.16	0.34	1.28	0.25

Notes: the null hypothesis for serial correlation and heteroskedasticity tests states that no serial correlation and the model are homoscedastic, respectively.

Appendix Two

Second Appendix

Figure B.1: GDP Per Capita Growth Versus Armed Conflict

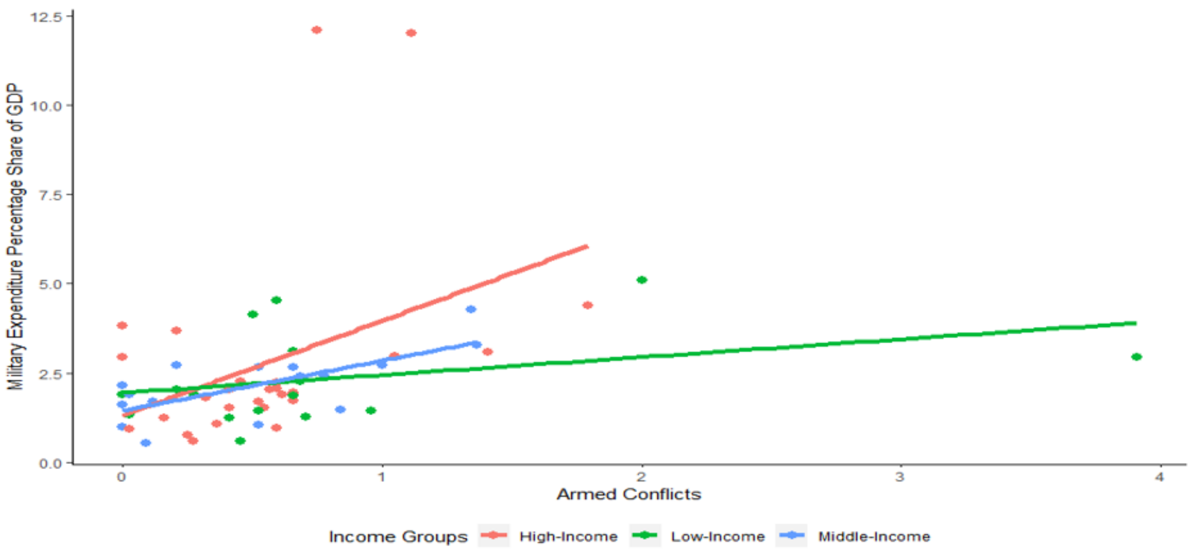


Figure B.2: GDP Per Capita Growth Versus Armed Conflict

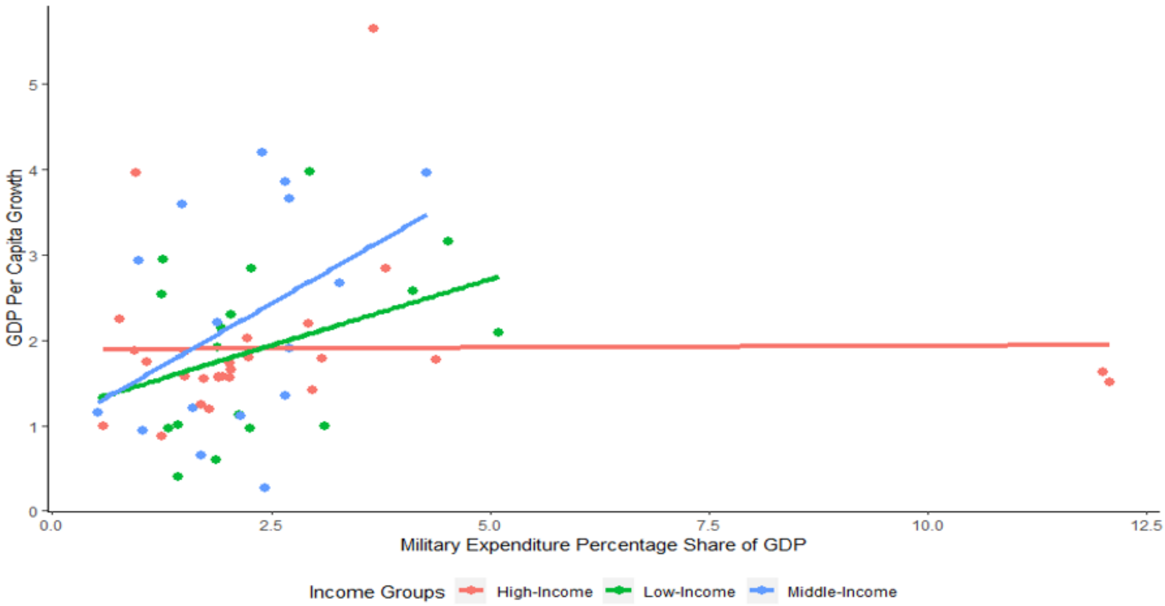


Table B.1: Mean Group (MG) Long Run and Short Run Estimates

	Variables	All Countries	High Income	Middle Income	Low Income
Long Run					
	Mili exp	0.433	1.287	-0.760	0.211
		(0.505)	(0.999)	(0.549)	(0.620)
	Conflict	-6.439	2.299*	-26.488	-1.727
		(6.782)	(1.194)	(25.519)	(2.638)
	Mili.Conf	13.00	-2.194*	51.547	1.546
		(13.513)	(1.142)	(51.396)	(1.907)
	Polity	-0.104	-0.086	-0.194	-0.049
		(0.145)	(0.298)	(0.192)	(0.134)
	GCF	0.075*	0.076	0.082	0.069
		(0.044)	(0.049)	(0.094)	(0.106)
	POP	-1.367	-0.803*	-1.737	-1.882
		(0.845)	(0.466)	(1.313)	(2.575)
	GOV	-0.297***	-0.486***	-0.158	-0.135
		(0.083)	(0.110)	(0.127)	(0.191)
Short Run					
	dMili exp	-0.754	-1.360	-0.162	-0.373
		(0.726)	(1.327)	(1.279)	(0.961)
	dConf	-2.635	-1.542	-11.239	3.372
		(3.466)	(1.643)	(12.349)	(3.439)
	dMili.Conf	-0.034	2.376	24.441	-2.311
		(0.182)	(1.904)	(24.349)	(2.512)
	dPolity	-0.034	-0.131	0.177	-0.075
		(0.182)	(0.189)	(0.214)	(0.526)
	dGCF	0.571***	0.586***	0.831***	0.319**
		(0.068)	(0.064)	(0.164)	(0.135)
	dPOP	0.094	0.496	-6.777**	5.599
		(1.901)	(1.158)	(2.798)	(5.453)
	dGOV	-0.623***	-1.178***	0.017	-0.360*
		(0.139)	(0.201)	(0.238)	(0.208)
	Cons	4.156	4.738	7.034	0.726
		(2.878)	(3.367)	(4.084)	(7.669)
	ECM	-0.996***	-0.950***	-0.922***	-1.132***
		(0.031)	(0.039)	(0.036)	(0.075)

*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

Table B.2: Dynamic Fixed Effects (DFE) Long Run and Short Run Estimates

	Variables	All Countries	High Income	Middle Income	Low Income
Long Run					
	Mili exp	0.039	0.271***	0.110	-0.248
		(0.072)	(0.079)	(0.225)	(0.158)
	Confl	-0.258	-0.305	-0.681	-0.015
		(0.173)	(0.195)	(0.584)	(0.338)
	Mili.Confl	-0.009	-0.048	0.176	-0.023
		(0.051)	(0.050)	(0.152)	(0.126)
	Polity	0.032***	0.012	0.002	0.059***
		(0.009)	(0.019)	(0.019)	(0.014)
	GCF	0.045***	0.048	0.033	0.033
		(0.017)	(0.031)	(0.042)	(0.243)
	POP	-0.363***	-0.402**	-1.099**	-0.131
		(0.119)	(0.171)	(0.425)	(0.173)
	Gov	-0.119***	-0.356***	-0.072	0.045
		(0.037)	(0.059)	(0.069)	(0.072)
Short Run					
	d.Mil exp	-0.144	0.315**	-0.229	-0.098
		(0.149)	(0.160)	(0.328)	(0.342)
	d.Confl	0.256	0.456**	-0.028	0.123
		(0.203)	(0.186)	(0.542)	(0.527)
	d.Mili.Confl	-0.017	-0.032	-0.100	-0.013
		(0.059)	(0.052)	(0.151)	(0.179)
	d.Polity	-0.004	-0.014	0.008	-0.021
		(0.007)	(0.052)	(0.012)	(0.014)
	d.GCF	0.437***	0.499***	0.491***	0.293***
		(0.025)	(0.035)	(0.045)	(0.051)
	d.POP	0.559**	-0.571**	-0.313	1.074***
		(0.229)	(0.249)	(1.682)	(0.384)
	d.GOV	-0.405***	-0.899***	0.044	-0.372***
		(0.058)	(0.091)	(0.124)	(0.103)
	Cons	2.699***	5.472	3.055**	1.556
		(0.058)	(1.024)	(1.219)	(1.054)
	ECM	-0.818***	-0.739***	-0.755	-0.961***
		(0.019)	(0.025)	(0.036)	(0.036)

*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

Table B.3: Countries Included in Analysis

High Income	Middle Income	Low Income
1: Australia	1: Argentina	1: Burkina Faso
2: Austria	2: Brazil	2: Bangladesh
3: Belgium	3: Colombia	3: Bolivia
4: Canada	4: Dominican Republic	4: Cameron
5: Switzerland	5: Ecuador	5: Algeria
6: Chile	6: Guatemala	6: Egypt
7: Germany	7: Indonesia	7: Ghana
8: Denmark	8: Iran	8: India
9: Spain	9: Mexico	9: Kenya
10: Finland	10: Malaysia	10: Morocco
11: France	11: Peru	11: Malawi
12: U. K	12: Paraguay	12: Nigeria1
13: Greece	13: Thailand	13: Nepal1
14: Ireland	14: Turkey	14: Pakistan
15: Israel	15: South Africa	15: Philippine
16: Italy	16: Sri Lanka	16: Rawanda1
17: Japan		17: El Salvador
18: South Korea		18: Tunisia
19: Luxembourg		
20: Netherlands		
21: Norway		
22: New Zealand		
23: Oman		
24: Portugal		
25: Sweden		
26: Uruguay		
27: U.S		

Table B.4: PMG Estimates Without Outliers (Oman and Israel)

	Variables	All countries	High Income
Long Run			
	Mili EXP	0.132**	0.201***
		(0.057)	(0.073)
	Conf	-0.258**	-0.313***
		(0.102)	(0.118)
	Mili.Conf	0.004	0.026
		(0.036)	(0.042)
	Polity	-0.0002	-0.023*
		(0.006)	(0.012)
	GCF	0.096***	0.056***
		(0.012)	(0.019)
	POP	-1.089***	-0.779***
		(0.092)	(0.145)
	GOV	-0.245***	-0.352***
		(0.024)	(0.033)
Short Run			
	d.Mili Exp	-0.218	-0.294
		(0.407)	(0.657)
	d.Conf	-7.291	-0.709
		(7.463)	(1.251)
	d.Mili.Conf	15.385	1.768
		(14.875)	(0.290)
	d.Polity	-0.082	-0.106*
		(0.108)	(0.547)
	d.GCF	0.595***	0.598***
		(0.065)	(0.060)
	d.POP	0.714	0.189
		(1.706)	(0.844)
	d.GOV	-0.717	0.189
		(0.146)	(0.844)
	Constant	3.975***	-1.360***
		(0.207)	(0.208)
	ECM	-0.796***	-0.815***
		(0.029)	(0.041)

Table B.5: Dynamic Fixed Effects (DFE) And Pooled Mean Group (PMG) Estimates

Variables	All Countries	High Income	Middle Income	Low Income
Mili Exp	-0.001	0.092	0.353**	-0.323***
	(0.065)	(0.075)	(1.152)	(0.091)
Confl	-0.463***	-0.370**	1.308	-0.386
	(0.167)	(0.154)	(7.614)	(0.512)
Mili.Confl	0.043*	-0.048	-0.475	-0.050
	(0.026)	(0.038)	(0.353)	(0.049)
Polity	0.006	-0.196*	0.074***	0.029
	(0.020)	(0.106)	(0.020)	(0.033)
GCF	0.095	-0.001	0.554*	-0.068
	(0.062)	(0.029)	(0.285)	(0.048)
POP	-1.809***	-1.108***	-2.358	-1.905***
	(0.253)	(0.173)	(1.448)	(0.476)
Gov	-0.365***	-0.422***	0.011	-0.042
	(0.092)	(0.045)	(0.106)	(0.079)
ECM	-0.800***	-0.863***	-0.988***	-0.791***
	(0.062)	(0.050)	(0.105)	(0.143)
Countries	27	19	2	6
Total Obser	808	568	60	180
Hausman T	0.01	0.983	1.00	1.00
Method	DFE	PMG	PMG	PMG

GDP per capita growth is the dependent variable. Mili exp is the military expenditure percentage share of Government expenditure, and Conf is the cumulative sum of external and internal armed conflicts that happened in a given year. Mili.conf is an interactive term on military expenditure (% share of government expenditure) and armed conflicts. Polity is a democracy index that lies between -10 (consolidated autocracy) and 10 (consolidated democracy). GCF is the gross capital formation percentage share of GDP, POP is population growth, and GOV is the final government expenditure percentage share of GDP. Dynamic Fixed Effects (DFE) and Pooled Mean Group (PMG) have been used under the framework of the Panel ARDL model and suitable estimators are selected on the basis of the Hausman test. The optimal lag order is ARDL(1,0,0,0,0,1,0,1) for all the models. The standard errors are presented in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level.* significant at the 10 percent level. This table only shows long-run results because short-run findings of both methods (PMG & DFE) are not comparable, as PMG short-run estimates are heterogeneous across countries and DFE results are homogeneous.

Table B.6: Fixed Effects (FE) Estimates With Average Years of Schooling

Variables	All Countries	High Income	Middle Income	Low Income
Mili exp	0.077	0.210	-0.225	0.292
	(0.096)	(0.148)	(1.171)	(0.176)
Confl	-0.133	-0.247	0.401	0.291
	(0.189)	(0.288)	(0.601)	(0.321)
Mili.Confl	-0.003	0.044	0.015	-0.109
	(0.059)	(0.101)	(0.115)	(0.133)
Polity	0.059***	0.036*	0.026	0.064**
	(0.015)	(0.018)	(0.020)	(0.023)
GCF	0.141***	0.123***	0.062	0.122***
	(0.021)	(0.034)	(0.064)	(0.034)
POP	0.187	-0.563*	-0.801	1.031*
	(0.607)	(0.298)	(0.628)	(0.524)
Gov	-0.126**	-0.351***	0.028	-0.096
	(0.056)	(0.071)	(0.060)	(0.110)
Educ	-1.161	-0.360**	-0.254	-0.601
	(0.203)	(0.146)	(0.377)	(0.416)
Year FE	Yes	Yes	Yes	Yes
Constant	1.392	7.941***	4.855	-0.542
	(2.446)	(2.150)	(2.800)	(2.688)

GDP per capita growth is the dependent variable. Mili exp is the military expenditure percentage share of Government expenditure, and Conf is the cumulative sum of external and internal armed conflicts that happened in a given year. Mili.Conf is an interactive term on military expenditure (% share of GDP) and armed conflicts. Polity is a democracy index that lies between -10 (consolidated autocracy) and 10 (consolidated democracy). GCF is the gross capital formation percentage share of GDP, POP is population growth, and GOV is the final government expenditure percentage share of GDP. Educ is an average year of schooling. The dataset is from 1960-2015 in the form of five-year intervals. The standard errors are presented in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level.* significant at the 10 percent level.

Table B.7: Pooled Mean Group (PMG) Long-Run Estimates With Democracy Indices

Variables	All Countries	High Income	Middle Income	Low Income
Mili exp	0.194 ***	0.262***	0.126	0.244*
	(0.051)	(0.063)	(0.188)	(0.132)
Confl	-0.425***	-0.488***	-0.378	0.631**
	(0.093)	(0.105)	(0.570)	(0.267)
Mili.Confl	0.073**	0.077 **	0.172	-0.239**
	(0.031)	(0.035)	(0.181)	(0.098)
GCF	0.077***	0.051***	0.089***	0.095***
	(0.013)	(0.019)	(0.029)	(0.020)
POP	-0.889***	0.616***	-1.204***	-1.411***
	(0.095)	(0.128)	(0.359)	(0.177)
GOV	-0.284***	-0.354***	-0.256***	-0.009
	(0.095)	(0.033)	(0.060)	(0.067)
ELECT DEMO	-0.284*	19.565***	-5.867	-0.437
	(0.026)	(6.628)	(5.238)	(3.697)
LIBER DEMO	-5.925*	-17.220***	9.122	-2.433
	(3.147)	(6.639)	(6.287)	(4.500)
PARTI DEMO	-4.436	-8.309***	-14.438**	11.436**
	(2.141)	(2.664)	(6.420)	(5.180)
EGAL DEMO	7.30***1	9.186***	13.725**	-8.394*
	(2.331)	(3.275)	(5.446)	(5.009)
ECT	-0.781***	-0.822***	-0.748***	-0.809***
	(0.030)	(0.041)	(0.047)	(0.0734)
Countries	61	27	16	18
Total Obs	2524	1118	663	743
Hausman T	0.322	0.928	1.00	0.704

GDP per capita growth is the dependent variable. Mili exp is the military expenditure percentage share of Government expenditure, and Conf is the cumulative sum of external and internal armed conflicts that happened in a given year. Mili.conf is an interactive term on military expenditure (% share of GDP) and armed conflicts. GCF is the gross capital formation percentage share of GDP, POP is population growth, and GOV is the final government expenditure percentage share of GDP. EGAL DEMO indicates the Egalitarian Democracy Index, ELECT DEMO represents Electoral Democracy Index, PARTI DEMO indicates Participatory Democracy Index and LIBER DEMO is Liberal Democracy Index The optimal lag order is ARDL(1,0,0,0,1,0,0,0,0,0) for all the models. The standard errors are presented in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level.* significant at the 10 percent level.

Appendix Three

Third Appendix

Table C.1: Long-run Estimates of Different Time Periods

	All Countries		High Income		Middle Income		Low Income	
Variables	(1975-2019)	(2000-2019)	(1975-2019)	(2000-2019)	(1975-2019)	(2000-2019)	(1975-2019)	(2000-2019)
Mili EXP	0.144***	-0.060	0.226***	0.267	0.001	1.253***	0.208*	-0.065
	(0.047)	(0.251)	(0.055)	(0.451)	(0.175)	(0.396)	(0.114)	(0.423)
Conf	-0.354***	-1.007***	-0.389***	-0.584*	-0.283	-0.204	0.561***	-1.052**
	(0.094)	(0.345)	(0.104)	(0.324)	(0.526)	(0.355)	(0.211)	(0.500)
Mili.Conf	0.046	0.325***	0.059*	0.155	0.069	0.196	-0.203***	0.417**
	(0.031)	(0.115)	(0.034)	(0.111)	(0.176)	(0.358)	(0.078)	(0.204)
Polity	-0.0002	0.005	-0.022*	0.072	-0.007	0.056	0.018**	0.004
	(0.006)	(0.008)	(0.012)	(0.232)	(0.017)	(0.060)	(0.008)	(0.009)
GCF	0.095***	0.051	0.056***	0.172***	0.102***	0.008	0.103***	0.042
	(0.012)	(0.043)	(0.019)	(0.045)	(0.027)	(0.025)	(0.019)	(0.062)
POP	-0.983***	-0.659*	-0.646***	-0.202	-1.206***	-1.771***	-1.466***	-2.069***
	(0.088)	(0.337)	(0.126)	(0.215)	(0.266)	(0.525)	(0.159)	(0.663)
GOV	-0.243***	-0.342	-0.344***	-0.543***	-0.114**	-0.339***	-0.051	-0.201*
	(0.023)	(0.096)	(0.032)	(0.135)	(0.048)	(0.091)	(0.063)	(0.104)
ECM	-0.797***	-0.813***	-0.816***	- 0.851***	-0.776***	-0.875***	-0.846***	-0.854***
	(0.029)	(0.030)	(0.039)	(0.098)	(0.048)	(0.071)	(0.073)	(0.083)
Countries	61	61	27	27	16	16	18	18
Total Obser	2524	1035	1118	459	663	271	743	305

Notes: GDP per capita growth is the dependent variable. Mili exp is the military expenditure percentage share of GDP, and Conf is the cumulative sum of external and internal armed conflicts that happened in a given year. Mili.conf is an interactive term on military expenditure (% share of GDP) and armed conflicts. Polity is a democracy index that lies between -10 (consolidated autocracy) and 10 (consolidated democracy). GCF is the gross capital formation percentage share of GDP, POP is population growth, and GOV is the final government expenditure percentage share of GDP. The standard errors are presented in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level.* significant at the 10 percent level.

Table C.2: Dynamic Fixed Effects (DFE) and Pooled Mean Group (PMG) Long-Run Estimates With Arms Imports Measure

	All Countries			High Income			Middle Income			Low Income		
Variables	DFE(1)	DFE(2)	PMG(3)	PMG(1)	PMG(2)	PMG(3)	DFE(1)	PMG(2)	PMG(3)	DFE(1)	PMG(2)	PMG(3)
Mili exp	-0.321	0.338	0.241	-0.260	0.986*	20.962**	-1.217	-6.303**	-7.303	0.521	3.847***	120.294
	(0.262)	(0.730)	(1.113)	(0.222)	(0.559)	(10.034)	(1.513)	(2.924)	(12.455)	(0.683)	(1.058)	(420.296)
Confl	-0.578**		-0.317	-0.240**		-2.574	-0.003		-6.261	0.888		18.682
	(0.274)		(0.372)	(0.105)		(1.760)	(1.387)		(9.136)	(0.836)		(81.675)
Mili Conf	0.173**		0.127	0.046		0.411	-0.664		2.617	-0.226		-5.4600
	(0.078)		(0.136)	(0.041)		(0.696)	(1.030)		(3.627)	(0.269)		(25.130)
Corr		0.044	0.022		0.003	0.984**		-0.257*	-0.649		0.291***	8.004
		(0.067)	(0.072)		(0.019)	(0.431)		(0.141)	(0.651)		(0.049)	(27.406)
Mili Corr		-0.007	-0.007		-0.014*	-0.305**		0.113	0.117		-0.055**	-3.503
		(0.012)	(0.015)		(0.008)	(0.140)		(0.072)	(0.280)		(0.019)	(12.155)
Arms GDP	-0.157	-0.306	1.281	-1.526	1.092	-3.959	-12.915*	0.002	-2.379	-2.399**	-1.362***	26.839
	(1.233)	(1.241)	(1.623)	(1.176)	(1.227)	(10.033)	(7.770)	(3.228)	(12.707)	(1.019)	(0.289)	(116.387)
Polity	0.011	0.020	0.018	-0.124**	0.002*	-0.856	-0.100	-0.199**	-0.020**	0.004	-0.048	-0.832
	(0.028)	(0.016)	(0.030)	(0.067)	(0.075)	(0.972)	(0.075)	(0.093)	(0.180)	(0.024)	(0.041)	(3.212)
GCF	0.075	0.080	0. 111	0.035	-0.030	2.709	-0.037	0.193**	0.437	0.076	0.137***	1.091
	(0.049)	(0.061)	(0.109)	(0.027)	(0.031)	(1.765)	(0.212)	(0.010)	(0.510)	(0.078)	(0.030)	(2.814)
POP	-0.482**	-0.724**	-0.881**	-1.319***	-1.184***	-4.481	-0.081	0.784	0.532	-4.016***	-4.671***	-21.866
	(0.209)	(0.280)	(0.368)	(0.144)	(0.131)	(3.576)	(2.205)	(1.191)	(4.818)	(0.524)	(0.523)	(80.727)
Gov	-0.342**	-0.363**	-0.631***	-0.538***	-0.504***	0.692	-0.190	-0.562**	0.300	-0.049	-1.045***	2.532
	(0.135)	(0.136)	(0.142)	(0.039)	(0.043)	(0.809)	(0.618)	(0.179)	(0.672)	(0.313)	(0.111)	(13.420)
ECM	-0.789***	-0.808***	-2.480**	-0.950***	-0.939***	-5.510	-0.796***	-0.834 ***	1.780	-0.845***	-1.102**	6.750
	(0.063)	(0.067)	(1.250)	(0.046)	(0.043)	(4.470)	(0.083)	(0.123)	(1.830)	(0.097)	(0.369)	(2.380)
Hausman T	0.000	0.000	1.00	0.419	0.114	1.000	0.039	0.126	1.00	0.000	0.652	1.000
Total Obser	622	619	618	373	375	373	142	140	140	107	104	105
Countries	35	35	35	21	21	21	8	8	8	6	6	6

Notes: GDP per capita growth is the dependent variable. Mili exp is the military expenditure percentage share of GDP, and Conf is the cumulative sum of external and internal armed conflicts that happened in a given year. Mili.conf is an interactive term on military expenditure (% share of GDP) and armed conflicts. Corr represents Corruption Perception Index, it ranges from 0 (highly corrupt) to 100 (least corrupt). Mili Corr is an interactive term of military expenditure share of GDP and corruption. Arms GDP is arms imports percentage share of GDP. Polity is a democracy index that lies between -10 (consolidated autocracy) and 10 (consolidated democracy). GCF is the gross capital formation percentage share of GDP, POP is population growth, and GOV is the final government expenditure percentage share of GDP. Dynamic Fixed Effects (DFE) and Pooled Mean Group (PMG) have been used under the framework of the Panel ARDL model and suitable estimators are selected on the basis of the Hausman test. The optimal lag order is ARDL(1,1,0,0,0,0,1,0,1,1,1) for all the models. The standard errors are presented in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level.* significant at the 10 percent level. This table only shows long-run results because short-run findings of both methods (PMG & DFE) are not comparable, as PMG short-run estimates are heterogeneous across countries and DFE results are homogeneous.

Table C.3: Dynamic Fixed Effects (DFE) And Pooled Mean Group (PMG) Estimates

Variables	All Countries	High Income	Middle Income	Low Income
Mili exp	-0.379*	2.897***	0.419	-1.462**
	(0.224)	(0.997)	(1.453)	(0.635)
Corr	-0.045**	0.132*	-0.203*	-0.167
	(0.018)	(0.070)	(0.116)	(0.134)
Mili.Corr	0.013***	-0.027**	-0.013*	-0.033**
	(0.003)	(0.013)	(0.007)	(0.015)
Polity	-0.028	0.158	0.903***	0.054
	(0.033)	(0.234)	(0.285)	(0.059)
GCF	0.003	0.187***	-0.077	-0.147
	(0.028)	(0.041)	(0.441)	(0.127)
POP	-1.351***	-1.108***	-4.971	-0.834
	(0.163)	(0.416)	(5.977)	(1.387)
Gov	-0.470***	-0.571***	-0.454	-0.182
	(0.037)	(0.170)	(0.471)	(0.185)
ECM	-0.920***	-0.987***	-0.949***	-0.883***
	(0.048)	(0.066)	(0.015)	(0.113)
Countries	27	19	2	6
Total Obsr	486	342	36	108
Hausman T	0.382	0.000	0.000	0.043
Method	PMG	DFE	DFE	DFE

GDP per capita growth is the dependent variable. Mili exp is the military expenditure percentage share of Government expenditure, and Corr represents Corruption Perception Index, which ranges from 0 (highly corrupt) to 100 (least corrupt). Mili Corr is an interactive term of military expenditure share of government expenditure and corruption. Polity is a democracy index that lies between -10 (consolidated autocracy) and 10 (consolidated democracy). GCF is the gross capital formation percentage share of GDP, POP is population growth, and GOV is the final government expenditure percentage share of GDP. Dynamic Fixed Effects (DFE) and Pooled Mean Group (PMG) have been used under the framework of the Panel ARDL model and suitable estimators are selected on the basis of the Hausman test. The optimal lag order is ARDL(1,1,1,1,0,1,1,1) for all the models. The standard errors are presented in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level.* significant at the 10 percent level. This table only shows long-run results because short-run findings of both methods (PMG & DFE) are not comparable, as PMG short-run estimates are heterogeneous across countries and DFE results are homogeneous.

Table C.4: Fixed Effects (FE) Estimates With Average Years of Schooling

Variables	All Countries	High Income	Middle Income	Low Income
Mili exp	0.710	1.787	0.078	-0.697
	(1.029)	(3.169)	(2.809)	(1.546)
Corr	0.061	0.026	0.265	0.026
	(0.044)	(0.103)	(0.286)	(0.069)
Mili.Corr	-0.006	0.010	0.006	-0.032
	(0.011)	(0.036)	(0.010)	(0.044)
Polity	0.0121	-0.681	0.165	0.002
	(0.016)	(0.652)	(0.154)	(0.016)
GCF	0.050	0.566**	-0.653	-0.053
	(0.109)	(0.215)	(0.657)	(0.096)
POP	-1.216*	-3.214**	3.455	-2.385**
	(0.647)	(1.236)	(4.866)	(0.901)
Gov	-0.585	-1.752**	-0.370	-0.047
	(0.451)	(0.719)	(0.381)	(0.145)
Educ	-0.264	-0.091	-0.766	-0.621
	(0.183)	(0.393)	(0.866)	(0.535)
Year FE	Yes	Yes	Yes	Yes
Constant	9.487	24.600	10.953	10.678*
	(6.633)	(17.101)	(9.824)	(5.612)

GDP per capita growth is the dependent variable. Mili exp is the military expenditure percentage share of Government expenditure, and Corr represents Corruption Perception Index, which ranges from 0 (highly corrupt) to 100 (least corrupt). Mili Corr is an interactive term for military expenditure share of GDP and corruption. Polity is a democracy index that lies between -10 (consolidated autocracy) and 10 (consolidated democracy). GCF is the gross capital formation percentage share of GDP, POP is population growth, and GOV is the final government expenditure percentage share of GDP. Educ is an average year of schooling. The dataset is from 1960-2015 in the form of five-year intervals. The standard errors are presented in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level.* significant at the 10 percent level.

Table C.5: Dynamic Fixed Effects (DFE) Long-Run Estimates With Democracy Indices

Variables	All Countries	High Income	Middle Income	Low Income
Mili exp	-8.47**	6.505***	9.992***	9.992***
	(3.65)	(1.923)	(3.803)	(3.803)
Confl	-3.060***	-2.281***	6.926	6.926
	(0.991)	(0.565)	(4.396)	(4.396)
Mili.Confl	1.009***	0.900***	-4.522**	-4.522**
	(0.309)	(0.035)	(1.914)	(1.914)
Corr	-0.256**	0.509***	0.048	0.048
	(0.130)	(0.136)	(0.190)	(0.190)
Mili Corr	0.110**	-0.147	0.006	-0.147
	(0.056)	(0.039)	(0.098)	(0.098)
GCF	0.040	0.148	-0.186	-0.186
	(0.093)	(0.101)	(0.253)	(0.253)
POP	-0.610	0.047	-1.639	-1.639
	(1.019)	(0.528)	(1.581)	(1.582)
Gov	0.450	-0.393**	-0.210	-0.210
	(0.336)	(0.177)	(0.335)	(0.253)
ELECT DEMO	45.902	-151.821	19.469	19.469
	(29.723)	(124.162)	(26.086)	(26.086)
LIBER DEMO	-67.515**	369.017**	-16.769	-16.769
	(32.593)	(0.393)	(28.171)	(28.171)
PARTI DEMO	-8.546	-10.292	22.496	22.496
	(18.098)	(25.284)	(29.166)	(29.166)
DELIB DEMO	1.356	-4.311	-25.043	-25.043
	(13.356)	(18.657)	(17.160)	(17.160)
EGAL DEMO	29.955	-258.075**	22.633	22.633
	(22.532)	(101.991)	(17.160)	(31.814)
Countries	61	27	16	18
Hausman T	0.000	0.000	0.000	0.000

GDP per capita growth is the dependent variable. Mili exp is the military expenditure percentage share of Government expenditure, and Conf is the cumulative sum of external and internal armed conflicts that happened in a given year. Mili.conf is an interactive term on military expenditure (% share of GDP) and armed conflicts.Corr represents Corruption Perception Index, which ranges from 0 (highly corrupt) to 100 (least corrupt). Mili Corr is an interactive term for military expenditure share of GDP and corruption. GCF is the gross capital formation percentage share of GDP, POP is population growth, and GOV is the final government expenditure percentage share of GDP. EGAL DEMO indicates the Egalitarian Democracy Index, ELECT DEMO represents Electoral Democracy Index, PARTI DEMO indicates Participatory Democracy Index, DELIB DEMO shows Deliberative Democracy Index and LIBER DEMO is Liberal Democracy Index. The optimal lag order is ARDL(1,1,0,0,1,1,1,1,1,0,0,0,0,0) for all the models. The standard errors are presented in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level.* significant at the 10 percent level.

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