Military Expenditures, Income Inequality and Economic Growth Interlinkages: An Empirical Assessment for Developing Countries

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ABSTRACT
The precise objective of the research is to empirically analyze the interdependence between military expenditure, income inequality and economic growth in 51 developing nations. For this purpose, study is used aggregate and disaggregate data analysis on the basis of democracy. To tackle the endogeneity between the variables, three-stage least squares (3SLS) econometric technique is used for the current analysis by using dataset spanning over 2000-2020. Data for the variables used is obtained from different sources including World Bank, World Governance Indicator, International Country Risk Guide and World Income Inequality Database. The 3SLS result for the military expenditure shows that higher level of military expenditure reduces the income inequality and economic growth. The result for income inequality shows that it impedes the economic growth and also reduces the military expenditure in developing countries. The results of the third model of economic growth shows that increase in economic growth will negatively affects the income inequality and military expenditure. In this study, the disaggregate analysis is done on the basis of democracy level by splitting the countries into two groups namely democratic countries and authoritarian countries. The results of the democratic countries are same with the results of combine data analysis, while in the case of authoritarian countries results are same with aggregate data analysis except the economic growth which has insignificant impact.

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1. Introduction

The government by taking the prosperity and welfare of the country under consideration must have to arrange some share of the budget for military in order to deal with the internal or external conflicts prevailing in the country. In case of threat from other country, the military expenditures can be increased, and investment level will be decreased which was planned for the welfare programs of the society (Korkmaz, 2015). The developing countries are rapidly diverting their resources toward the military sector instead of fulfilling the basic human requirements. As the time passing on, the military expenditures are increasing worldwide. And such increment opens the door for debate over the effects of military budgeting. Either these spending enhance or worsen the economic growth (Ahmed & Ismail, 2015). The military spending is indicative of a state’s threat perception and its intentions of possible aggressive and expansionist policies in the future.

The countries either developed or developing are influenced by numerous matters or factors occurring into the economy. Such factors and issues include the military budgeting, conflicts, economic capabilities like health, education, organizations and governance, all these forces acts together and effect the economic growth. Besides this, there are many poor nations having wars can spend a little amount on the military sector. In most of the African countries, the military burdens are low but those countries have many other obstacles to growth (Collier, 2007).

Military through capital, external relations, debt, conflicts channels can influence growth (Dunne & Uye, 2010). Benoit (1973) presented the pivotal work, which found that economic growth and military expenditure have positive association. Benoit for the very first time discovered that the economic growth can be increased by reducing the unemployment level, involving in many societal plan and technical inventions. If military wants to expand its infrastructure by making roads, highways and airports, the unemployed group of people will get the employment opportunities and it will further increase the economic growth level. It will lead the domestic investors as well as the foreign investors to invest, after the realization of the positive trade and investment climate in the country. However, it can be expected that the military spending have significant long run impacts on growth and the national security. In the hope of examining the different patterns between the military expenditure and economic growth the pivotal work done by Benoit (1978) has opened up a way for huge range of studies (Atesoglu & Mueller, 1990; Faini, Annez, & Taylor, 1984; Ram, 1986; Smith, 1980). Consequently the influential works of Benoit (1973, 1978), the literature on military expenditure and economic growth has used a variety of growth models, including the Feder-Ram (Biswas & Ram, 1986), the Deger (1986); Deger and Smith (1983) type model, the Barro (1990) model, the augmented Solow growth model(Mankiw, Romer, & Weil, 1992), and the new macroeconomic model of D. H. Romer (2000) and Taylor (2000). More or less of the earliest studies,Dunne (1996); Dunne, Smith, and Willenbockel (2005) as well as more recent ones Alptekin and Levine (2012); Dunne and Uye (2010) evaluate the considerable work on the military-economic growth link. The economic growth in reverse also has significant impact on military expenditure. It means that per capita GDP plays vital role in the determination of military expenditures(Looney, 1989). However,association between the economic growth and military expenditures might be convex when the log of GDP seems negative and it seems positive when it uses log of square of GDP(Hewitt, 1996).

Along with other macroeconomic variables, military expenditure also affects the income inequality. The military expenditures not only have impact on the growth of an economy but also have relationship with other aspects of the country. For instance, Keynesian theory postulates that
military expenditures positively affects the economic growth by increasing the military expenditures which results in upsurge of aggregate demand and ultimately the level of employment rises. This theory also proposed that the poor group of the country will get more benefits through such process as their living standards will be improved due to improvement in their income distribution. Whereas, microeconomic theory reveals that the labor force working into the military industries are paid better than those workers working in the civilian sectors. Due to this disparity among sectors the wage gap will rise (Ali, 2007). Moreover, the relationship among these two variables explained that the payments for both the less skilled labor and highly skilled personnel are included in military spending having different effects on the wage gap (Lin & Ali, 2009). Lastly, when the wealth is redistributed in a country the state usually faces hurdles. The government while keeping in mind the size of budget has to decide that which expenditures should be increased and decreased. In simple words it can be said that economies withgreater military expenditures will have less funds for other social spending like for health and education and so on.

On the basis of theoretical background, it is observed that growth and income inequality are negatively related to each other. Classical theory proposed that at the starting stages of the development, the inequality tends to rise as growth rises and at later stages with the expansion of the economy, the inequality tends to decrease. Furthermore, the growth remainsneutral among the developing countries and inequality tends to decline with frequent expansion in growth (Galasso & Ravallion, 2004). However, it is claimed that income inequality positively influences the economic growth as in future the higher growth can be expected by the small sections of individuals having income inequality and accretion of wealth. According to the trickle-down theory, the poor people are advised to wait and after that they will be rewarded by the accumulated wealth by redistributions. Such rearrangements put all in a better position as a result the income inequality would be acceptable (Clark, 1995). The claims discussed above were supported by Alberro Alesina and Perotti (1994); Persson and Tabellini (1994). Economic growth affects the income inequality and military expenditure. Higher level of economic growth will decrease the military expenditures and income inequality as well. When the economy boosts up the unemployment level will be decreased, the unemployed workers get jobs and start to earn, their basic necessities will be fulfilled and along with this the living standards of the population will be improved than before, and the prevailing income inequality environment will be negatively affected be the high economic growth.

The current study concentrates on the interlinkages between the military expenditure, income inequality and economic growth in developing countries. The study further makes the comparison of the countries on the basis of the democracy level prevailing in those economies. A huge strand of literature has examined the association between military expenditures and economic growth (Ahmed & Ismail, 2015; Dunne & Nikolaidou, 2012; Dunne et al., 2005; Hou & Chen, 2013) and income inequality and economic growth (Alberto Alesina & Rodrik, 1994; Cingano, 2014; Garcia-Penalosa & Turnovsky, 2006; Persson & Tabellini, 1994; Ravallion, 1995; Tongur & Elveren, 2017) among any of two variables used in the current study. Only Tongur and Elveren (2017) examined the interlink of three variables in Turkey. Nevertheless, none of the study has explored the relationship among these variables in case of Pakistan yet. The core intention of the study is to investigate the interdependence of the endogenous variables (military expenditure, income inequality and economic growth) for the panel dataset of developing economies. Objectives include (i) to estimate the effect of the income inequality and economic growth on military expenditure in developing countries (ii) To evaluate the effect of economic growth and military expenditure on income inequality in developing countries. (iii) to estimate the effect of income inequality and military expenditure on economic
growth in developing countries and (iv) to estimate the comparative interaction of military expenditure, income inequality and economic growth for non-democratic countries and democratic countries.

The remaining part of the study is organized as: Section 2 presents the review of available literature, Section 3 gives the theoretical framework, Section 4 explains the research method and data sources, Section 5 and 6 discusses the combined results and disaggregate analysis of the study respectively. Lastly, Section 7 concludes the policy implications regarding to the findings.

2. Literature Review

2.1 Military Expenditures and Economic Growth

A variety of theoretical approaches can be used to investigate the impact of military spending on economic growth (Dunne et al., 2005). The opportunity costs of military spending are explained using neoclassical models from a supply-side perspective, as resources used by the military are not accessible for civilian use. Crowding-out of investment, for example, may alter the capital stock. Military spending is included in Keynesian models as part of overall government spending. According to models that use a demand-side approach, increasing military investment boosts aggregate demand (multiplier impact) and increases resource utilization with spare capacity. Military spending, however, it is possible that investment will be crowded out and other sorts of spending. As a result, the extent and shape of crowding-out will be determined by how it is funded (i.e. Tax hikes and cuts to other government spending, borrowing, or expanding the money supply). The policy of employing military spending as a countercyclical and economic instrument is known as military Keynesianism. Military Keynesianism, on the other hand, does not have a distinct theory. On the other hand, the MIC (military-industrial complex) has a solid institutional perspective on military power and warfare (Dunne & Nikolaidou, 2012). The MIC is characterized as a symbiotic alliance of vested interests within a state that results in decisions that benefit those in power at the expense of national security objectives. This is a significant explanation for the Cold War's high military spending.

The MIC theory claims that military spending has a negative economic impact. This is due to the fact that defense spending does not appear to lead to increased economic growth, and in fact diverts resources away from more productive civilian enterprises (Melman, 1965). The Defense Department in the MIC de facto functions as a "planning ministry" (Melman, 1970), changing the economy into a military-based "state capitalism" (Melman, 1974). Melman (1974), on the other hand, emphasizes the 'positive' impact of military spending, claiming that they may have Keynesian economic effects. Even after the Cold War, many parts of the MIC have endured. The market continues to be dominated by major contractors which have a noteworthy effect on government policies. Despite the internationalization of the military business, contractors rely on domestic government assistance. In core areas of armaments production, new enterprises have been unable to displace incumbents (Dunne & Nikolaidou, 2012). As a result, the MIC theory remains useful for describing the impact of vested interests. Within a Marxian framework, some authors suggested that military spending had an influence on the economy in terms of capital productivity and organic capital composition, illustrating the contradicting function of military spending on the economy (Elveren & Hsu, 2016).

The Marxist literature on the economic impact of military spending proposes a variety of connections based on a variety of crisis theories and assumptions. For diverse groups of countries,
studies using Keynesian and neoclassical models have produced divergent conclusions (Dunne, 1996; Dunne & Watson, 2000; Hou & Chen, 2013; Knight, Loayza, & Villanueva, 1996; Yakovlev, 2007). Empirical studies that use a variety of models and assumptions within the confines of a single theoretical framework have produced mixed results when it comes to the military spending's effect on economic growth. To investigate the likely association between military spending and economic growth while accounting for the impact of income inequality, we use an upgraded Solow growth model proposed by (Mankiw et al., 1992).

2.2 Macroeconomic Determinants of Economic Growth

Ahmed and Ismail (2015) attempted to inspect the association between economic growth and military expenditures. The study used panel data of 56 countries spanning over 1995-2011. Results obtained from the 56 selected countries concluded that the raising of economic growth through higher military expenditure is not so effective or efficient way of achieving the higher growth. Similar line of work is done by Haseeb, Bakar, Azam, Hassan, and Hartani (2014) and Anwar, Rafique, and Joiya (2012) in case of Pakistan, China, Delgado (2013) in Angola and Dimitraki and Menla Ali (2015) in foundthat there exists long run relationship between economic growth and defense expenditure. While, Dunne and Uye (2010) found the short run impact of military expenditures on economic growth in Sub Saharan Africa whereas no long run association is found between them.

Biswas (1992) examined the impact of military spending on economic growth in the developing countries. This study used the sample of 74 less developed countries which covered the time span over 1981-1989. The countries are further divided into low-income and middle income less developed countries by following the World Banks classification. The model provided information relating to the effects of military spending on overall growth either through externality effects or due to sectoral factor productivity differential. On the whole the study suggested that military spending in low developing countries positively effects the economic growth.

2.3 Economic Growth and Income Inequality

One of the most important and contentious subjects among economists is the growth-inequality nexus. In general, there are five ways that disparity affects growth (Barro, 2000; Nissanke & Thorbecke, 2010). First, people with higher income equates to higher savings rates; specifically, their marginal inclination to save out of profit is larger than their marginal propensity to save out of wages; hence, income redistribution from poor to affluent leads in increased saves and physical capital investment. As a result, more disparity promotes economic growth. Second, because sunk costs are considerable in investment projects, and asset concentration is required for higher investment rates. In other words, larger inequality in wealth distribution increases the likelihood of investing, which boosts GDP. Third, great inequality encourages people to work more and invest in order to benefit from high rates of return. As a result, if everyone earns the same amount, there will be no incentive for anyone to put in the effort to produce more output. Alternatively, larger income dispersion is a natural byproduct of varying work efforts, and it benefits total production.

Two hypotheses, on the other hand, highlight that growth is harmed by inequality. To begin with, in the situation of imperfect financial markets, poor people have a tendency to spend less in human capital, which has relatively high rates of return and hence benefits society as a whole. As a result, in this situation, a distortion in wealth redistribution from poor to rich lowers the average investment productivity. In the situation of imperfect financial markets, under-investment by the
poor indicates that economic growth will be lower. Finally, new political economics theories of development (i.e. modern theories), inequality may slow economic growth because people demand more taxes and oppose pro-business measures in response to unacceptable inequality, resulting in political and social instability, which leads to increased uncertainty and decreased investment incentives (Alberto Alesina & Rodrik, 1994; Kanbur, 2000), rent-seeking behaviors that are unproductive, high transaction costs, increased transaction costs, increased transaction costs, increased transaction costs (Nissanke & Thorbecke, 2010).

The vast empirical literature on the relationship between growth and inequality is vague, with results varying depending on coverage, estimation method, data quality, and inequality measure used (Cingano, 2014; Tongur & Elveren, 2017). Although it has been demonstrated that the more unequal an economy is, the slower it grows (Alberto Alesina & Rodrik, 1994; Cingano, 2014; Garcia-Penalosa & Turnovsky, 2006; Persson & Tabellini, 1994; Ravallion, 1995), this negative relationship has also been suggested to be unreliable due to a lack of high-quality data and comparability (Ferreira, 1999). Forbes (2000), for example, discovered a positive association between inequality and growth, among other things, using better econometric approaches and a larger data set (Li & Zou, 1998; Lundberg & Squire, 2003). While inequality has a detrimental impact on growth in low and middle-income nations, it has a positive or minor impact in higher income countries, according to Barro (2000) and Castelló-Climent (2010). To summarize, the vast and rapidly expanding empirical literature on the relationship between economic growth and income disparity is inconclusive.

2.4 Research Gap

By reviewing all studies it is clear that many researchers examined the relationship among economic growth and military expenditures as well as among growth and inequality. But none of the study has investigated the interdependence among the three variables (military expenditures, income inequality and economic growth) in case of developing countries. This study is going to investigate the empirical relationship between the three variables; military expenditure, income inequality and economic growth in developing countries.

3. Theoretical Framework

According to the existing literature military expenditures and economic growth are negatively linked with each other. Military holds the important place in the budget of an economy being the major component. It is concluded on the basis of empirical work done on military and growth, that military spending can both positively or negatively affects the country. Such expenditures are called the unfertile expenditures. Firstly, because these expenditures have high opportunity cost and secondly it is concluded that it crowd out the investment. Military expenditure are considered as the brake to growth as it impedes the growth by altering the allocation of resources. If the other side is taken under consideration, it can be seen that these expenditures have potential to promote the economic growth. The military sector can generate the employment level into the economy, which results in the enlargement of aggregate demand and increased production level.

Benoit (1973) opened a great array of research on military sector. He concluded that there exist the significant correlation among the defense expenditure and economic growth. And also established that military expenditure causes the economic growth. This was the problem which was not investigated at that time so Benoit snatched the attention of many researchers. Since 1970s a large amount of literature emerged on the military and growth relationship. Several empirical
studies concluded same results which were in line with the theory while many researchers argued that if such expenditures increase the economic growth thwarts away.

There are two approaches which are going to be discussed under the context of military expenditure. One is the Keynesian approach and the other is neoclassical approach. The first approach totally depends on the major part of aggregate demand in the country. The Keynesian proposed an idea that increased defense expenditure will positively effects the economic growth by increasing the aggregate demand in the economy and it further causes the level of output and employment to rise. A great number of researchers have adopted this approach in their workings(Chletsos & Kollias, 1995; Lim, 1983; Shahbaz, Afza, & Shabbir, 2013).

While on other side the neoclassical approach totally depends on key role of aggregate supply. According to Neoclassical approach, if the military expenditures are increased it will ultimately cause rise in government expenditures which further crowd out the private investment. And in a case of rise in military expenditure by imposing taxes, the private investment crowds out. Because the high rate of tax will results in low level of savings due to which the domestic interest rate rises. It is concluded by the neoclassical approach that military expenditures have negative effect on the growth level of an economy. Many researches have implemented this approach(Alexander, 1990; Mintz & Stevenson, 1995; Murdoch, Sandler, & Sargent, 1997; Sezgin, 1997).

Some researchers concluded that military expenditure have insignificant effect on growth. On the basis of empirical work done by many researchers, few are discussed here; Biswas and Ram (1986) by using the cross sectional data of 58 less developing countries concluded that the military expenditures have no effect on the growth. Mintz and Stevenson (1995) applied the longitudinal estimation method on the data set of 103 different countries revealed that economic growth is not effected by the military expenditures made in those countries. The military expenditures not only have impact on the growth of an economy but also have relationship with other aspects of the country. Keeping in view the title of current study, the relationship between the military expenditure and income inequality is also of great importance. The relation among these two variables can be explained through different aspects but such aspects are not large in size. Thus the correlation between the two can be explained through following mechanisms (Lin & Ali, 2009; Meng, Lucyshyn, & Li, 2015; Tongur & Elveren, 2017).

Firstly, the Keynesian theory opposes that military expenditures positively effects the economic growth by increasing the military expenditures which results in to rise the aggregate demand and ultimately through such process the level of employment will be increased. This theory also proposed that the poor group of the country will get more benefits through such process as their living standards will be improved due to improvement in the income distribution. The second perspective under the head of microeconomic theory, revealed that the labor force working into the military industries are paid better than those workers working in the civilian sectors. Due to this disparity among sectors the wage gap will rise(Ali, 2007). The third perspective regarding the relationship among these two variables explained that the payments for both the less skilled labor and highly skilled personnel includes in military spending which have different effects on the wage gap(Lin & Ali, 2009). Lastly, when the wealth is redistributed in a country the state faces hurdles. The government while keeping in mind the size of budget has to decide that which expenditures should be increased and decreased. In simple words it can be said that those economies having higher military expenditures will have less funds for other social spending like health and education.
4. Data and Methodology

Current study is concerned with the interdependence of the military expenditures, income inequality and economic growth in developing countries. The annual panel data is used for the years spanning over 2000-2020 for 51 developing countries. The functional forms of the models for 3SLS are as follows:

\[
GDPC_{it} = \alpha_0 + \alpha_1 GINI_{it} + \alpha_2 MEXP_{it} + \alpha_3 POP_{it} + \alpha_4 LE_{it} + \alpha_5 GFCF_{it} + \varepsilon_{it}
\]  \hspace{1cm} (1)

\[
MEXP_{it} = \beta_0 + \beta_1 GDP_{it} + \beta_2 GINI_{it} + \beta_3 CORR_{it} + \beta_4 PLSTAB_{it} + \varepsilon_{it}
\]  \hspace{1cm} (2)

\[
GINI_{it} = \gamma_0 + \gamma_1 MEXP_{it} + \gamma_2 GDP_{it} + \gamma_3 CORR_{it} + \gamma_4 TRADE_{it} + \varepsilon_{it}
\]  \hspace{1cm} (3)

\(\alpha_0, \beta_0, \gamma_0\) = intercept, \(\alpha_i, \beta_i, \gamma_i\) coefficients indicate change in GDP per capita due to change in income inequality, military expenditures, population growth rate, life expectancy at birth and gross fixed capital formation respectively. \(\varepsilon\) indicates error term.

\[
MEXP_{it} = \beta_0 + \beta_1 GDP_{it} + \beta_2 GINI_{it} + \beta_3 CORR_{it} + \beta_4 PLSTAB_{it} + \varepsilon_{it}
\]  \hspace{1cm} (2)

\(\beta_0, \beta_1, \ldots, \beta_4\) = intercept, \(\beta_i\) coefficients indicate change in military expenditure due to change in GDP per capita, income inequality, corruption and political stability respectively. \(\varepsilon\) indicates error term.

\[
GINI_{it} = \gamma_0 + \gamma_1 MEXP_{it} + \gamma_2 GDP_{it} + \gamma_3 CORR_{it} + \gamma_4 TRADE_{it} + \varepsilon_{it}
\]  \hspace{1cm} (3)

\(\gamma_0, \gamma_1, \ldots, \gamma_4\) = intercept, \(\gamma_i\) coefficients indicate change in income inequality due to change in military expenditure, GDP per capita, corruption and trade respectively. \(\varepsilon\) indicates error term.

Table 1: Measurement, Source of Data and Expected Effects

<table>
<thead>
<tr>
<th>Variables</th>
<th>Measurement</th>
<th>Source of Data</th>
<th>Expected Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP per capita growth rate (GDPC)</td>
<td>Annual growth rate</td>
<td>WDI (2021)</td>
<td>+ve</td>
</tr>
<tr>
<td>Military Expenditure (MEXP)</td>
<td>Annual, Percentage of GDP</td>
<td>WDI (2021)</td>
<td>-ve</td>
</tr>
<tr>
<td>Income inequality (GINI)</td>
<td>Index, measures in Percentage</td>
<td>WIID (2021)</td>
<td>-ve</td>
</tr>
<tr>
<td>Population Growth (POP)</td>
<td>Annual growth rate</td>
<td>WDI (2021)</td>
<td>-ve</td>
</tr>
<tr>
<td>Gross fixed capital formation (GFCF)</td>
<td>Annual growth as percentage of GDP</td>
<td>WDI (2021)</td>
<td>+ve</td>
</tr>
<tr>
<td>Life expectancy (LE)</td>
<td>Average number of years</td>
<td>WDI (2021)</td>
<td>-ve</td>
</tr>
<tr>
<td>Corruption (CORR)</td>
<td>Annual corruption perception index</td>
<td>ICRG (2021)</td>
<td>-ve</td>
</tr>
<tr>
<td>Political stability and Absence of Violence/Terrorism (PLSTAB)</td>
<td>Index, ranges from -2.5 to 2.5.</td>
<td>WGI (2021)</td>
<td>+ve</td>
</tr>
<tr>
<td>Trade (TRADE)</td>
<td>Annual, Percentage of GDP</td>
<td>WDI (2021)</td>
<td>+ve</td>
</tr>
</tbody>
</table>

Note: “World Development Indicators (WDI), Worldwide Governance Indicators (WGI), International Country Risk Guide (ICRG) and World Income Inequality Database (WIID)”

5. Results and Discussion

This study empirically analyzes the interdependence of the military expenditure, economic growth and income inequality. The 3SLS (Three-stage least square) econometric technique is used to analyze the association among the variables. Summary statistics are mentioned in appendix.
5.1 Panel Unit Root Test

In order to check to the stationarity of the variables, Levin Lin & Chu test is used for the current analysis.

**Table 2: Panel Unit Root Test**

<table>
<thead>
<tr>
<th>Variables</th>
<th>At level</th>
<th>Statistics</th>
<th>Prob</th>
<th>At level Levin-Lin Chu</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP per capita growth rate</td>
<td>-8.68*</td>
<td>0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Military Expenditure</td>
<td>-7.47*</td>
<td>0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income inequality</td>
<td>-11.01*</td>
<td>0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population Growth</td>
<td>-6.25*</td>
<td>0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Political stability</td>
<td>-10.98*</td>
<td>0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross fixed capital formation</td>
<td>-2.51*</td>
<td>0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corruption</td>
<td>-5.25*</td>
<td>0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Life Expectancy</td>
<td>-35.59*</td>
<td>0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trade</td>
<td>-6.23*</td>
<td>0.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** “*, ** and *** shows 1 percent, 5 percent and 10 percent level of significance respectively.”

Table 2 shows that all the variables are stationary at level 1(0). If the variables are stationary at level 1(0) than the next step is to check the endogeneity among the variables. Several tests are available to check the endogeneity but ins our study, we used Durbin-Wu-Hausman test.

5.2 Durbin-Wu-Hausman Test

The current study used 3SLS technique, which is basically used to examine the endogeneity among the variables. Then, to check the endogeneity we apply Durbin-Wu-Hausman Test that whether the model needs the instruments or not. The results of the above table shows that the prob. value is less than 5% which means the null hypothesis is rejected (endogeneity exists in the model). As a result, the study used instruments to remove the endogeneity issue.

**Table 3: Durbin Hausman test**

<table>
<thead>
<tr>
<th>Hausman</th>
<th>Prob. &gt;chi2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.0000</td>
</tr>
</tbody>
</table>

**Note:** “*, ** and *** shows 1 percent, 5 percent and 10 percent level of significance respectively.”

5.3 Results of Economic Growth

The results for each equation is presented and discussed separately. In this section we are going to discuss the results that how the economic growth is influenced by the principal variables namely, military expenditures and income inequality along with the instrument variables. In this model the GDP per capita is the dependent variable where military expenditure, income inequality, population, gross fixed capital formation and life expectancy are independent variables.

**Table 4: Results of 3 SLS for economic growth**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>24.011*</td>
<td>0.000</td>
</tr>
<tr>
<td>Income inequality</td>
<td>-0.307*</td>
<td>0.000</td>
</tr>
<tr>
<td>Military Expenditure</td>
<td>-1.168*</td>
<td>0.000</td>
</tr>
<tr>
<td>Population Growth</td>
<td>-0.160**</td>
<td>0.017</td>
</tr>
<tr>
<td>Life Expectancy</td>
<td>-3.281**</td>
<td>0.025</td>
</tr>
<tr>
<td>Gross fixed capital formation</td>
<td>0.021**</td>
<td>0.017</td>
</tr>
</tbody>
</table>

**Note:** “*, ** and *** shows 1 percent, 5 percent and 10 percent level of significance respectively.”
Our results show that income inequality negatively affects the economic growth. It can be interpreted that inequality basically has negative impact on the economic performance. It reduces the investment in education of the poorest portions of the population. As a result, there will be less social mobility which basically acts as an indicator of income inequality which hinders the growth. Moreover, economic growth is deteriorated by income inequality due to having social conflicts in the societies (Alberro Alesina & Perotti, 1994). Because of such conflicts the unlawful exercises and crime rate increases which acts as a threat to investment and property privileges. Results are consistent with (Alberto Alesina & Rodrik, 1994; Persson & Tabellini, 1994; Tabassum & Majeed, 2008).

The result shows that military expenditures negatively affect the economic growth as it its effects on government deficit, military spending may crowd-out private investment. Apart from these affects, military expenditure negatively affects growth for ‘resource constrained’ developing countries (Looney, 1989). Our results are supported by mentioned studies (Chang, Huang, & Yang, 2011; Dunne & Tian, 2013). The coefficient of population having the negative sign shows that population negatively affects the economic growth in developing countries, as high population growth rate generates burden on the economy having limited natural resources. Rather of expanding the stock of capital per worker, it decreases private and public capital formation and diverts capital resources to keep the economy running (Bloom, Canning, & Finlay, 2010; Dao, 2012).

Life expectancy has negative effect on the economic growth which means that an increase of one year of life expectancy leads to decrease the GDP per capita by 3.28%. With high life expectancy, GDP per capita reduces as it divides among population. Our findings are supported by Acemoglu and Johnson (2007) and Barro (2000). Gross fixed capital formation has positive impact on the economic growth as capital formation is measured as an important aspect of economic growth. The physical capital growth adds to increase the level of production. The endogenous growth theory developed mainly by P. M. Romer (1994) and Barro (1990) reconsidered this allegation by adding other factors (human capital, infrastructure, research and development) which accelerate gross capital formation. The results of current analysis are supported by (Adenola & Saibu, 2017).

5.4 Results of Military Expenditures

In this model, income inequality and economic growth are principal variables where the corruption and political stability are used as instrument variables. The results revealed that high level of economic growth will leads to less spending on military. Our findings are supported by (Dudzeviciute, Peleckis, & Peleckiene, 2016). Result shows that income inequality negatively affects the military expenditures. Due to high income inequality the greater social and political unrest occurs. The government will be pressurized to implement such policies in which they get equal access to work, health, education and employment. As a result, the government at all levels implement social budgeting programs by giving heavy subsidies to the people to maintain their rule over the country. Ultimately, the share of military budgeting will be decreased.
Table 5: Results of 3SLS for Military Expenditure

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>9.901*</td>
<td>0.000</td>
</tr>
<tr>
<td>GDP per capita growth rate</td>
<td>-0.437*</td>
<td>0.000</td>
</tr>
<tr>
<td>Income inequality</td>
<td>-0.178*</td>
<td>0.000</td>
</tr>
<tr>
<td>Corruption</td>
<td>0.357*</td>
<td>0.000</td>
</tr>
<tr>
<td>Political stability</td>
<td>-0.157*</td>
<td>0.000</td>
</tr>
</tbody>
</table>

No of observations=1071

Note: “*, ** and *** shows 1 percent, 5 percent and 10 percent level of significance respectively.”

Further corruption has positive and significant impact on military spending as the corruption increases the military expenditure will also increase. In developing countries the level of corruption is relatively high. Corruption bounds budgetary balance depresses efficiency of government spending and disturbs the budget allocation among individual financial purposes (Barro, 1990; d'Agostino, Dunne, & Pieroni, 2019; Delavallade, 2006). Moreover, political stability negatively affects the military expenditures. It shows that the countries which are politically stable, the ratio of the military spending are low in those countries.

5.5 Results of Income Inequality

In this section the results of our third model will be discussed that how the principal variables namely economic growth and military expenditures affects the income inequality in developing countries.

Table 6: Results of 3SLS for income inequality

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>57.472*</td>
<td>0.000</td>
</tr>
<tr>
<td>Military Expenditure</td>
<td>-4.522*</td>
<td>0.000</td>
</tr>
<tr>
<td>GDP per capita growth rate</td>
<td>-2.717*</td>
<td>0.000</td>
</tr>
<tr>
<td>Corruption</td>
<td>0.781*</td>
<td>0.007</td>
</tr>
<tr>
<td>Trade</td>
<td>-0.002</td>
<td>0.384</td>
</tr>
</tbody>
</table>

No of observations=1071

Note: “*, ** and *** shows 1 percent, 5 percent and 10 percent level of significance respectively.”

The coefficient of military expenditure shows that as the military expenditure increases the income inequality decreases. In most of the developing countries the aggregate demand, employment and earning opportunities in military sectors can be increased by allocating the high budget on military spending. And such employment chances play significant role in dropping income inequality (Meng et al., 2015). Moreover, Inequality-narrowing hypothesis suggests that higher aggregate demand can be generated by higher military expenditures, and such expenditures can also enhance the employment level in any economy. If the military industries are labor demanding and also the defense production is home grown, the growth definitely welfares the poor population and leads to an improvement in income distribution (Hirnissa, Habibullah, & Baharom, 2009; Lin & Ali, 2009; Tongur & Elveren, 2017). The result of current analysis shows that the economic growth negatively affects the income inequality. It indicates that as the income per capita increases the inequality decreases. Due to the increase in income of the people, the living standard will be enhanced; they are
now able to fulfill their basic needs regarding health, food and clothing.

In our third model, corruption is taken as the independent variable to examine its effects on the income inequality prevailing in most of the developing countries. The result shows that there exists positive impact of corruption on income inequality. The tax collection and administration excessively favors the well-off groups, automatically the inequality level increase. Again, the rich groups of the society do corruption by funding those programs which are in their own favor. The corruption could be linked with contracted human capital formation through lesser education and health expenditure. Corruption makes higher risk rewards on investments that would ultimately reinforce income inequality (Gupta, Davoodi, & Alonso-Terme, 2002; Johnston & Ward, 1989).

6. Disaggregate Analysis

This section provides the disaggregation analysis of the selected countries on the basis of democracy. Here separately found the above results of 40 democratic and 11 authoritarian country separately.

6.1 Results of Democratic Countries

In this section, results of 3SLS for panel of 40 countries having democracy are given as follows:

6.1.1 Results of Economic Growth

Results of the above table show that income inequality, military expenditure, population, life expectancy and gross fixed capital formation have significant effects on the GDP per capita in democratic countries. It shows that the countries in which democracy prevails either to any extent high or low have same results with that of developing countries. The result shows that income inequality, military expenditure, population and life expectancy negatively affects the economic growth while the gross fixed capital formation positively affects the economic growth.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>23.469*</td>
<td>0.000</td>
</tr>
<tr>
<td>Income Inequality</td>
<td>-0.253*</td>
<td>0.000</td>
</tr>
<tr>
<td>Military Expenditure</td>
<td>-0.682**</td>
<td>0.019</td>
</tr>
<tr>
<td>Population growth</td>
<td>-0.236*</td>
<td>0.002</td>
</tr>
<tr>
<td>Life Expectancy</td>
<td>-5.005*</td>
<td>0.000</td>
</tr>
<tr>
<td>Gross fixed capital formation</td>
<td>0.045*</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Note: “*, ** and *** shows 1 percent, 5 percent and 10 percent level of significance respectively.”

6.1.2 Results of Military Expenditure

Here, the military expenditures are regressed against the GDP per capita, income inequality, corruption and political stability. In this model, income inequality and economic growth are principal variables where the corruption and political stability are used as instrument variables.
Table 8: 3 SLS results of military expenditures for the democratic countries

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>5.199*</td>
<td>0.000</td>
</tr>
<tr>
<td>GDP per capita growth rate</td>
<td>-0.159*</td>
<td>0.000</td>
</tr>
<tr>
<td>Income inequality</td>
<td>-0.095*</td>
<td>0.000</td>
</tr>
<tr>
<td>Corruption</td>
<td>0.414*</td>
<td>0.000</td>
</tr>
<tr>
<td>Political stability</td>
<td>-0.281*</td>
<td>0.000</td>
</tr>
</tbody>
</table>

No. of observations=840

Note: “*, ** and *** shows 1 percent, 5 percent and 10 percent level of significance respectively.”

The results of the above table shows that GDP per capita, income inequality, corruption and political stability have significant impact on the military expenditures of the developing countries having democracy powers. The above results are same with that of aggregate analysis. The results shows that GDP per capita, income inequality, corruption and political stability negatively effects the military expenditure. The mechanisms through such relations occurs are already discussed in the previous chapter.

6.1.3 Results of Income Inequality

Here, the results of our third model will be discussed that how the principal variables namely economic growth and military expenditures affects the income inequality in developing countries having democratic government.

The results of the above table show that military expenditure, GDP per capita, corruption and trade significantly affects the income inequality. The existing literature reveals that democracy reduces the level of inequality (Reuveny & Li, 2003). When the income of the people increases the living standard will be improved so that the inequality level comes down. All the results are same with that discussed in the combined data analysis except the trade. The trade has negative impact on the income inequality in the democratic countries. When the democratic government allows the flow of goods and services by not imposing the restrictions like high taxes, tariffs and non-tariff barriers, an economy can easily import goods and services at low cost than producing them at domestic level. By importing the necessary goods at low cost they can improve their living standards and save the other amount which is left to them. By this mechanism the level of income inequality would be minimize to some extent. In the democratic states there are more chances of crime and corruption (Dollar & Kraay, 2002).

Table 9: 3 SLS results of income inequality for democratic countries

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>56.382*</td>
<td>0.000</td>
</tr>
<tr>
<td>Military Expenditure</td>
<td>-4.424*</td>
<td>0.000</td>
</tr>
<tr>
<td>GDP per capita growth rate</td>
<td>-2.730*</td>
<td>0.000</td>
</tr>
<tr>
<td>Corruption</td>
<td>1.232*</td>
<td>0.000</td>
</tr>
<tr>
<td>Trade</td>
<td>-0.008***</td>
<td>0.060</td>
</tr>
</tbody>
</table>

No. of observations= 840

Note: “*, ** and *** shows 1 percent, 5 percent and 10 percent level of significance respectively.”
6.2 Results of Authoritarian Countries

Here, results of 3SLS for panel of 11 countries having dictatorship are given as follows:

6.2.1 Results of Economic Growth

The result shows that income inequality, military expenditure and population have significant effect on the GDP per capita growth where the life expectancy and gross fixed capital formation are insignificant in this model. The results showing that income inequality has positive relation with the economic growth which means that as the income inequality increase the GDP per capita increase.

<table>
<thead>
<tr>
<th>Table 10: Results of 3SLS for economic growth in authoritarian countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent variable: GDPC</td>
</tr>
<tr>
<td>Variables</td>
</tr>
<tr>
<td>Constant</td>
</tr>
<tr>
<td>Income inequality</td>
</tr>
<tr>
<td>Military Expenditure</td>
</tr>
<tr>
<td>Population Growth</td>
</tr>
<tr>
<td>Life Expectancy</td>
</tr>
<tr>
<td>Gross fixed capital formation</td>
</tr>
</tbody>
</table>

Note: “*, ** and *** shows 1 percent, 5 percent and 10 percent level of significance respectively.”

6.2.2 Results for Military Expenditure

The result shows that GDP per capita and income inequality have significant impact on the military spending in the dictatorship regimes. The coefficient sign of GDP per capita reveals that an increase in GDP per capita will reduce the military expenditure. Whereas the income inequality has positive relation with the military expenditure. Due to complete dictatorship the authority is totally in the hands of leader. The leaders usually make extra expenditures on military to rule on the world as the super power regardless of taking into account the prevalence of income inequality in their economies. The results further reveal that corruption and political stability have insignificant effects on the military expenditure.

<table>
<thead>
<tr>
<th>Table 11: Results of 3SLS for military expenditure in authoritarian countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent variable: MEXP</td>
</tr>
<tr>
<td>Variables</td>
</tr>
<tr>
<td>Constant</td>
</tr>
<tr>
<td>GDP per capita growth rate</td>
</tr>
<tr>
<td>Income inequality</td>
</tr>
<tr>
<td>Corruption</td>
</tr>
<tr>
<td>Political stability</td>
</tr>
</tbody>
</table>

Note: “*, ** and *** shows 1 percent, 5 percent and 10 percent level of significance respectively.”

6.2.3 Results of Income Inequality

The table 12 shows the results of 3SLS for income inequality in the authoritarian countries. The results of the above table show that the military expenditure, corruption and trade have significant impact on the income inequality. In authoritarian regimes when military expenditure increases the income inequality will also increase as shown by the coefficient sign. The result shows
as the corruption increases the income inequality also increase. But usually it is known that in authoritarian regimes there is only a single ruler so there is no chance of conflicts among the rulers so that the chances of corruption are low. But in case if the ruler itself is bad, the whole nation can be crippled by leader as there is no economic freedom and political freedom. While during any emergency it becomes easy for the ruler to take important decisions regarding to the problem. We can say the chances of crime will be less.

Table 12: Results of 3SLS for income inequality in authoritarian economies

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>27.822*</td>
<td>0.000</td>
</tr>
<tr>
<td>Military Expenditure</td>
<td>2.711*</td>
<td>0.000</td>
</tr>
<tr>
<td>GDP per capita growth rate</td>
<td>0.247</td>
<td>0.347</td>
</tr>
<tr>
<td>Corruption</td>
<td>1.673***</td>
<td>0.094</td>
</tr>
<tr>
<td>Trade</td>
<td>-0.045*</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Note: "*, ** and *** shows 1 percent, 5 percent and 10 percent level of significance respectively."

Whereas the GDP per capita has insignificant value (P>0.10). Although it is not possible that in any economy either high income or low income, growth doesn’t have any effect. But in case of authoritarian economies, we can say in China, the leader can impose such policies in which the growth level does not affected by the other spending.

7. Conclusion

The present study has made an attempt to investigate the interdependence of military expenditure, income inequality and economic growth in developing countries. The analysis is based on the panel data, covering the data of 51 developing countries. For the empirical analysis, 3SLS econometric technique is applied due to the existence of endogeneity among the military expenditure, income inequality and economic growth. This study makes two contributions; firstly, it based on the data analysis of overall developing countries. And secondly, it makes the disaggregate analysis of countries on the basis of democracy. The selected 51 developing countries are divided into two groups according to the Democracy Index distribution. The two groups are democratic countries and authoritarian countries. The 40 developing countries come under the democratic group and remaining 11 under the authoritarian group. The result obtained through 3SLS confirms the association between the variables and their relation with supporting variables. The notable findings of the analysis are as follows. The results of first model of 3SLS for economic growth revealed that both the military expenditure and income inequality have negative impact on economic growth. The second model’s results for military expenditure revealed that economic growth and income inequality have negative effect on the military spending. The third model results for income inequality shows that both the economic growth and military expenditure are negatively affecting the income inequality prevailing in the developing economies. In the disaggregate data analysis, the findings shows that 3SLS results of the democratic countries are same with the results of combine data. The findings of the study for authoritarian countries are in line with the literature except some points.

This study uses panel data to examine the relationship between military spending, growth, and inequality. Although there is a little body of scholarship on the military expenditure–growth
relationship, the potential influence of economic inequality has not gotten the attention it deserves. The current analysis concludes that, in developing nations, an increase in military expenditures, which are deemed non-productive expenditures, slows economic growth and lowers income inequality.

7.1 Policy Recommendations

In many developing nations due to the unrest faced the importance of security increases. The military expenditure can’t be reduced immediately. So for this reason the policy makers must revisit and rationalize the military expenditure. As a solution it is recommended that countries should create peaceful environment through efficient implementation of social and political programs, military expenditure be reduced and shift their investment resources to other sectors which will ensure their economic growth. To foster the growth in developing countries the military sector should generate income generating projects. According to the findings of the current study it is recommended for the developing countries that the government should enforce the high budget plans for capital formation as it plays vital role in the growth process. The other factor which negatively affects the economic growth is high population growth rate. It is the major issue which is faced by most of the developing countries. Due to the high population growth the resources are not utilized and distributed equally among the people which is ultimately increasing the income inequality. For that purpose, it is recommended that the government should first take this problem under consideration.

In order to remove inequality, governments should adopt measures to control population growth rate as soon as possible during their development process. The further policies include the support for education which includes the pre-school education. Public investment in education is considered necessary to address inequality. The workers income heavily depends on the level of his/her education. Higher the level of education the higher the wage gap occur which gives path to high income inequality. The anti-discrimination laws should be enforced to spread equality among nation.

References


Reuveny, R., & Li, Q. (2003). Economic openness, democracy, and income inequality: An empirical...
analysis. Comparative Political Studies, 36(5), 575-601. doi:https://doi.org/10.1177/0010414003036005004


