MILITARY-GROWTH CORRELATION: NEW EVIDENCE FROM DEVELOPING COUNTRIES

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It is generally believed that high levels of military expenditures hamper economic growth because it crowds out investment. In this study, we investigate how defense spending affects economic growth in the 50 developing countries over the period 2010 to 2016. The results reveal that there is a positive and significant relationship between defense spending and economic growth in the developing countries. It means that, when economic growth, it encourages military sector to spend more, and also population is directly related to economic growth, meaning that when population increase, it rises military expenditure in the developing countries.

Key words: *Military expenditure; Economic growth; Developing countries; and Pooled Regression Model.*

1. INTRODUCTION

Since Benoit's (1973) seminal work, in developing countries, the economic effect of defense spending has been the subject of comprehensive empirical analysis. Theoretically, however, there is no straightforward predictor of the direction of causation between defense spending and economic growth. On the one hand, defense spending may retard growth through what is popularly referred to as a "crowding-out" impact on investment or a displacement of the same amount of civilian resource use. Additionally, defense spending can also boost growth through aggregate demand effects of Keynesian form. An increase in demand generated by higher defense spending causes increased utilization of capital stock, increased employment and profits, and, therefore, higher investment, that further creates short-run multiplier effects. Moreover, growth can also trigger spin-off effects, such as building socioeconomic structures conducive to growth (Deger, 1986) though military spending can have an effect on growth through these mechanisms, Joerding (1986) Contends that economic growth

can be causal before spending on defense. For example, a country with high growth rates might want to reinforce itself against foreign or domestic threats through increased spending on defense. In contrast, it is equally plausible that high-growth countries could divert funds from defense into other productive purposes (Kollias, 1997 and Khalid, M. A., et al. (2015). It is also possible that defense spending can rise less than proportionally at low GDP rates, then higher than economic growth at moderate per capita income levels and, ultimately, less than proportionally again at very higher growth levels. This would produce a nonlinear response to economic growth and even the existence of a negative relationship over different periods of time between the two variables for certain countries. The above review gives rise to four possible results in relation to the statistical correlation between economic growth and defense spending: Unidirectional causality from defense spending to economic growth or vice versa; two-way causality between the two variables; and, lastly, a lack of any causal relationship. In addition, there are both negative and positive net effects, so that unidirectional causality may emerge from military spending to economic growth, which is either positive or negative. Various policy consequences can be extracted from an understanding of the direction and degree of causality between military spending and economic growth. The easiest inferences are made when defense expenditures precede growth in the economy. A positive causal relationship implies that the aggregate effects on demand are dominant, while crowding out is the main effect when negative causality occurs. If the direction goes from economic growth in military spending and is positive, countries try to protect growth or are at a stage of development where defense spending is seen as a positive social gain. If this is negative, some economies of scale can exceed. A review of the wide range of empirical evidence indicates little agreement about the existence of a relationship between defense spending and economic growth, or the extent and direction of such a relationship when it occurs. Studies such as Chowdhury, 1991 and Mohammed, N. A. (1993) are examples. Such analyzes, however, ignored the question of spurious regression in the presence of non-stationary variables and the additional insights that come from analyzing the role of co-integration in causality analyses. This paper therefore expands this literature by deliberately taking these problems into account when conducting causality analyses.

Researchers have been working for developed, emerging

and developing countries to explain the contribution of military spending. These studies are more accurate from the start for countries that have gained their autonomy from neighboring countries and countries that have mutual cooperation with other countries (Farzanegan 2014 and Khalid, M. A et al. (2014).). So the aim of this study is to justify the relationship between military expenditure and economic growth for 50 developing countries.

2. LITERATURE REVIEW

Because military spending is an important part of government spending researchers around the world were keen to examine the role of military spending in the economy and this interest will continue. From the beginning to the present time, many researchers have carried out their research and obtained some valuable findings which ultimately enriched the field of the peace economy.

A number of researchers have had a positive correlation between military spending and economic growth. Researcher Asseery (1996) found that Iraq has robust evidence of long-term causality between defense spending and economic growth, and that economic growth is highly dependent on defense spending, he obtained empirical evidence using Cointegration analysis and granger causality testing. In 1973 and 1978 (Benoit 1973, 1978) proved that Defense spending improves literacy, medical facilities and incentives for education, scientific and technological advancement. Atesoglu (2002) also applied a Cointegration analysis for United States and gained quantitative and positive effect on economic growth from defense spending. Following that, (Kollias et al. 2004b) investigated the correlation between military spending and economic growth, using a causality approach and a bi-directional causality between military expenditure and growth from 1964 to 1999. In 2004 (Kollias et al. 2004a) observed the relationship between EU 15 countries‘ military expenditure and economic growth using the Cointegration model and Causality test for the period of 1961–2000, almost all cases they got positive causality from economic growth to defense spending and not vice-versa. They also concluded that EU countries decide on defense spending in view of their economic status. To justify the relationship of military expenditure and economic growth for 65 countries from 1975 to 2004 (Dicle and Dicle 2010) run the causality approach and finally they got bidirectional positive causality between the variables in 54 of the 65 countries. In 2001 (Dakurah et al. 2001) proved that in 23 countries there is a unidirectional causality from defense expenditure to economic growth or vice versa and bidirectional causality in 7 countries.

Abu-qarn (2010) in 2010 studied the Arab-Israel conflict but he did not find any persistent adverse impact of defense spending on economic growth. Feridun et al. (2011) examined the relationship of the defense spending-growth for the case of North Cyprus from 1977 to 2007. Their analysis obtained a strong positive unidirectional causality that ranged from military spending to economic growth. Yildirim et al. (2005) investigated the impact of military expenditure on economic growth in the Near East and Turkey panel. Their study employed a dynamic panel data (1989–1999) estimation method and found positive growth effects of military spending.

The other research group has found a negative growth impact of military spending across various aspects such as higher budget deficits, higher public debt, higher tax rates, lower private sector capital formation, investment and efficiency, lower savings rate, lower education, health, research and development expenditure. (Ball 1983; Deger 1986; Khalid, M. A et al. (2015)., Faini et al. 1984; Lim 1983; Ram 1995; Dunne and Vougas 1999; Gupta et al. 2001; and Dunne et al. 2002, Khalid, M. A., et al. (2014).) all of the studies obtained the negative growth effect of military expenditure the negative growth impact of military expenditure was observed in all tests.

Moreover, some other research also concluded that there is insufficient correlation between military spending and economic growth; some of them are (Adams et al. 1991; Alexander 1990; Ram 1995; Park 1993 and Khalid, M. A., et al. (2015).). According to them, defense spending has no significant impact on economic growth as the spillover effect underlined by the defense spending advocates is indistinct. In fact, the concern that it would destroy private investment is not evident.

There have been some recent studies in South Asia that have had a positive growth impact. In 2013 (Shahbaz et al. 2013) got unidirectional causality from defense spending to economic growth for Pakistan using the ARDL bounds testing approach to Co-integration. The authors (Khalid and Mustapha 2014) found and obtained a positive relationship for India using ARDL model and ganger causality test, they found that 1% increase in military expenditure increases real GDP by 0.04% in short run but in long run the correlations are inconclusive. Chen (1993) conducted an empirical econometric analysis based on a Barro-style growth model for China; His results underpin the presence of a single long-term balance relationship between variables.

3. DATA AND METHODOLOGY

3.1. The Data

In order to examine the military-growth relationship in the 50 developing countries over the period 2010-2016 and a balanced panel of cross section data was constructed. The data set is balanced and the same time periods are available for all cross section units. The data are taken from the SIPRI Yearbooks for military expenditure (Stockholm International Peace Research Institute, various years) and the data on GDP and population are drawn from the World Development Indicator (WDI).

Table 1. Variables descriptions: Annual data: (2010-2016; N=50)

Variable	Description	Source
ME	Military expenditure	SIPRI (2021)
RGDPC	Real Gross domestic product per Capita	WDI (2021)
POP	Population	WDI (2021)

Albania, Algeria, Argentina, Benin, Bolivia, Botswana, Burkina Faso, Cambodia, Cameroon, Central African, Chad, Chile, China, Colombia, Congo, Cuba, Dominican, Ecuador, El Salvador, Guinea, Ethiopia, Fiji, Gabon, Gambia, Guatemala, Haiti, India, Indonesia, Iran, Iraq, Jordan, Kenya, Laos, Lebanon, Madagascar, Malawi, Malaysia, Morocco, Mozambique, Nigeria, Pakistan, Panama, Papua Guinea, Paraguay, Peru, Saudi Arabia, South Africa, Thailand, Tunisia, Viet Nam.

3.2. Econometric methodology

The empirical specification of this study is aimed at explaining the military- growth correlation in the developing nations. Thus, the empirical model employed in the analysis is as follows:

$$ME_{it} = \alpha_1 + \alpha_2 ME_{it-1} + \alpha_3 RGDPC_{it-1} + \alpha_4 POP_{it-1} + \lambda_i + \varepsilon_{it}, \quad i =$$

Equivalently, Eq. (1) may be written as follows:

$$ME_{it-1} = \alpha_1 + \alpha_2 ME_{it-2} + \alpha_3 RGDPC_{it-1} + \alpha_4 POP_{it-1} + \lambda_i + \varepsilon_{it-1}, \quad i = 1, \dots N; t = 1, \dots T \qquad (2)$$

Where *ME* is military expenditure, *RGDPC* is real gross domestic product (GDP) per capita, *POP* is population, and the subscripts *i* and *t* index countries and time, respectively. In addition, the specification also contains an unobservable country-specific effect μ and error-term ε.

Moreover, in this paper we employ Generalized Method of Moments (GMM) which is a semi-parametrically efficient estimation

model and since Hansen (1982) has established its large sample properties, GMM has gained abundant deal of attention in the field of economics. The GMM methodology begins from a set of over-identified population of moment conditions and seeks to find an estimator that minimizes a quadratic norm of the sample moment vector.

The resulting estimation has been shown to be consistent and asymptotically normal under many circumstances. However, the GMM first difference estimator suffers from a significant weakness. Blundell and Bond (1998) found that when the independent variable is persistent over time, lagged levels of these variables are weak instruments for the regression equation expressed in first differences. Blundell and Bond (1998) also found that the instrument variable used with the first-difference GMM method (i.e. the endogenous variables lagged two or more periods) become less informative in models where the variance of the fixed effects is mainly relative to the variance of the transitory shocks. This is likely to lead to biased coefficients, and the issue is generally intensified in small samples size. To avoid this bias, Blundell and Bond (1998) suggested a system GMM (SGMM) estimator.

This method essentially combines in a system the first-differenced with the same equation expressed in levels. The instruments for the regression in differences are the same as those labeled above, while the instruments for the equation in levels are lagged differences of the corresponding variables. The main advantage of the SGMM method comprises in the fact that unlike (between or within - first differences) approaches, it does use the estimation in levels for estimation and this exploits not only the variation in data but also between the countries as well. It therefore allows preserving more information to identify the parameters of interest. Arellano and Bond (1991) display on the basis of Monte-Carlo simulation that this additional information results in a considerable gain in the precision of the estimates.

4. THE EMPIRICAL RESULT

Our sample countries include 50 developing nations for which data are available for over period 2010–2016. We report first estimates of Eq. (2) for the whole sample period with the standard panel data estimates, cross section estimates, random effects models REM, between and within the fixed effects models. Moreover, we shall use the systems GMM approach (SGMM) of Blundell and Bond (1998) in

which the specifications in the first-step GMM, second-step GMM with robust SE of the variables are estimated simultaneously. Estimates with these alternative methods are illustrated in Table 2. Two sets of subsample estimates with REM and SGMM are reported in Table 3, Table 4 and Table 5.

In order to specify whether a fixed and random effects model are appropriate for our study we performed the Hausman test which is distributed as x^2, where the degrees of freedom are equal to the number of regressors. The results illustrate that the fixed effects model is rejected, and this finding is consistent with Murdoch et al. (1997) since random effect models are considered more appropriate than fixed effect models. Thus, the fixed effects model is not necessary in our case. Parameter estimates from the random effect and fixed effect are presented in Table II and Table III for the 50 developing countries. The results obtained, similar to Smith and Dunne (2001); who found a positive and significant correlation between economic growth and military spending.

Furthermore, we have employed System GMM analysis based on balanced data-set, to examine the military-growth relationship in the context of different political and welfare developing nations. We have used an AR (1) and an AR (2) model to capture the persistence in our sample data. Moreover, AR (1) and AR (2) models are desirable based on the Arellano and Bond (1991) test for AR (2).

The system GMM estimation results of this study, presented in Table IV, and it indicates that there is a positive relationship between military expenditure, economic growth and population for the rest of the sample countries, and it's statistically significant, it means that, when economic growth exist, it encourages military sector to spend more on it, and also population is directly related to economic growth, meaning that when population increase, it rises military expenditure in the developing countries. All diagnostics for the models in each table is satisfactory. Generally, GDP and population are positively related with military spending in this study, and all variables are statistically significant at different level such as the 1%, 5% and 10% level. The results illustrate that as economic growth (GDP) and population are increase military expenditures as a percentage of government expenditures are increased as well. Furthermore, this finding suggests that military spending plays a significant role in the developing nations despite of many problems such as civil war,

conflicts and border tensions, and this result supported by earlier works done by Benoit (1973&1978) for 44 developing nations. Moreover, our findings are also confirmed and supported by Ali's (2007) findings in the developing countries. Moreover, these net positive relationships support the belief that military spending and economic growth are related through an expansion of aggregate demand in less developed countries. Moreover, investment in infrastructure and human capital development in LDC economies operating below full employment thus, it has positive Benoit-type spillover impacts from military expenditures. There is less evidence to suggest that military spending in developing nations negatively related to economic growth. The positive impacts that arise when relationship runs from economic growth to military spending imply that many LDCs are still at a stage where military expenditures are constrained by low income and will grow along with the economy. They are not yet in a position to have defense expenditures grow less than proportionally with economic growth.

Table 2. Random Effects Results: Dependent variable is ME.

Variable	*Coefficient*	*T ratio*
Constant	-35.2685	0.000*
Ln RGDPC	.6600842	0.000*
Ln POP	2.200533	0.000*
Hausman test	0.1139	-
N	450	
Countries	50	
Min obs	7	
Max obs	7	
Av obs	7.0	
Rsq within	0.6947	
Rsq between	0.8126	
Rsq overall	0.6587	

*, **, *** denote significance at 10%, 5% and 1%, respectively. Values in parentheses are heteroscedaticity consistent *t*-statistics and values in brackets are *p*-values.

Table 3. Fixed Effects Results Dependent variable is ME.

Variable	*Coefficient*	*T ratio*
Constant	-35.2685	0.000*
Ln RGDPC	.6600842	0.000*
Ln POP	2.200533	0.000*
Hausman test	0.1139	
N	450	-
Countries	50	-
Min obs	7	
Max obs	7	
Av obs	7.0	
Rsq within	0.6947	
Rsq between	0.6587	
Rsq overall	0.6543	

*, denote significance at 1%, level. Values in parentheses are heteroscedaticity consistent *t*-statistics and values in brackets are *p*-values.

Table 4. Results of Two Step system GMM estimations

Variable	One-Step System GMM	Two-Step System GMM	Two-Step System GMM with Robust SE
CONSTANT	.6478708*	-1.480849	-1.480849
	(0.000)	(0.401)	(0.736)
LnMIXit-1	.783148**	.6413527*	.6413527*
	(0.04)	(0.000)	(0.002)
Ln	.1112433***	.2016423*	.2016423
RGDPCit-1	(0.070)	(0.000)	(0.326)
Ln POP1t	.3607867*	.2861577**	.2861577
	(0.005)	(0.021)	(0.373)
Sargant Test	84.66462	22.37417	-
	(0.0000)	(0.0498)	
AR(1)	-	-1.8481	-1.5967
		(0.0646)	(0.1103)
AR(2)	-	.56618	.56044
		(0.5713)	(0.5752)
N	50		
T	7		

Notes: All models are estimated using the Arellano and Bond dynamic panel GMM estimations (Stata xtabond command). The variables are defined as follows: ME

= Military expenditure; RGDPC = real GDP per capita (in US dollars; POP = Population. Figures in the parentheses are t-statistics. (*), (**), (***), indicate significance at *1%, 5%, 10%* respectively. Time dummies were jointly significant and are not reported here to save space.

5. CONCLUSIONS

The military-growth nexus was a matter of great concern in the defense economy and a large amount of literature explores the development impact of military spending in developing countries. The current literature does not, however, conclude that the impact of military spending on economic growth is due to the application of different theoretical models, different methodological techniques and different samples. After reviewing some literature on defense growth that incorporates defense variables into the augmented Solow growth model, this paper examines the impact of defense on economic growth in 50 developing countries.

Our panel regressions present reasonable and positive results by applying more recent econometric techniques such as the dynamic panel System GMM estimators. The empirical panel results indicate that defense expenditure has a significant and positive effect on economic growth in 50 developing countries.

The empirical results thus support the positive impact of military spending on economic growth. Moreover, Deger, S., & Smith, R. (1983) found that the single and most important barrier to growth is spending on national defense programs worldwide. However, the proper regression model and more sophisticated econometric methodologies in this article strengthen the empirical findings that could add to the literature on defense economics correlation.

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