

Trade off Between Military Expenditure and Fixed Capital Formation on Economic Growth: Panel Study of Some SAARC and ASEAN Countries

Dil Nath Dangal, PhD

Lecturer of Economics

TU, RR Campus, Kathmandu, TU,

E-mail: dangaldilnath@gmail.com

Ram Prasad Gajurel

Lecturer of Economics

Mahendra Multiple Campus, Dharan,

E-mail : ram.gajurel@mahmc.tu.edu.np

Abstract

This paper intends to investigate the relationship between military expenditure and fixed capital formation on economic growth of some SAARC and ASEAN countries including Nepal with balanced yearly panel data of military expenditure (MILEX), gross fixed capital formation (GFCF) and constant GDP as the proxied for the variables of interest over the period of 2001 to 2020. The quantitative strategy is applied to establish the presumed relationship. The paper employs the cross-sectional dependency test, then panel generalized least square (GLS), fully modified ordinary least square (FMOLS), and finally Dumitrescu-Hurlin panel causality approaches. The CD test shows the cross-section dependency among the panel groups. The panel GLS reveals that there is positive relationship between both military expenditure and fixed capital formation on economic growth. However fixed capital formation is more crucial than military expenditure on economic growth. FMOLS suggests that military expenditure and fixed capital formation can promote economic growth but more by fixed capital formation. However, D-H panel causality does not support the view of casual relationship between military expenditure and fixed capital formation on economic growth. But there is unidirectional relationship between economic growth on explanatory variables and there is bidirectional causality between military expenditure and fixed capital formation. The stylized facts suggest to sampled countries that they need to focused on fixed capital formation with maintaining the minimal level of military to accelerate the growth. This paper has an attempt to fill the empirical gaps in Asian countries with Nepal. The updated panel data and comparative studies support to scientific communities cum policy makers of respective countries.

“Keywords:” military expenditure, capital formation, growth, Asian, panel GLS, causality

1. Introduction

Every economy of across the world is intended to promote long-term economic growth. Thus, they are involved in strategic growth game by employing resources in appropriate channels. For that, military and capital formation both are ongoing concerned in the economic literature. Defense economics are growing concern in the field of economics. Wahid (2009) mentioned that humans have been primarily shaped by force in their existence and surroundings since antiquity. It has been recognized that collective force in the form of military activity is required to protect and expand existing civilizations. Thus, military expenditure is the part of national economy. Nevertheless, high defense costs could be achieved at the expense of investment, economic growth, and capital formation (Rasler & Thompson, 1988).

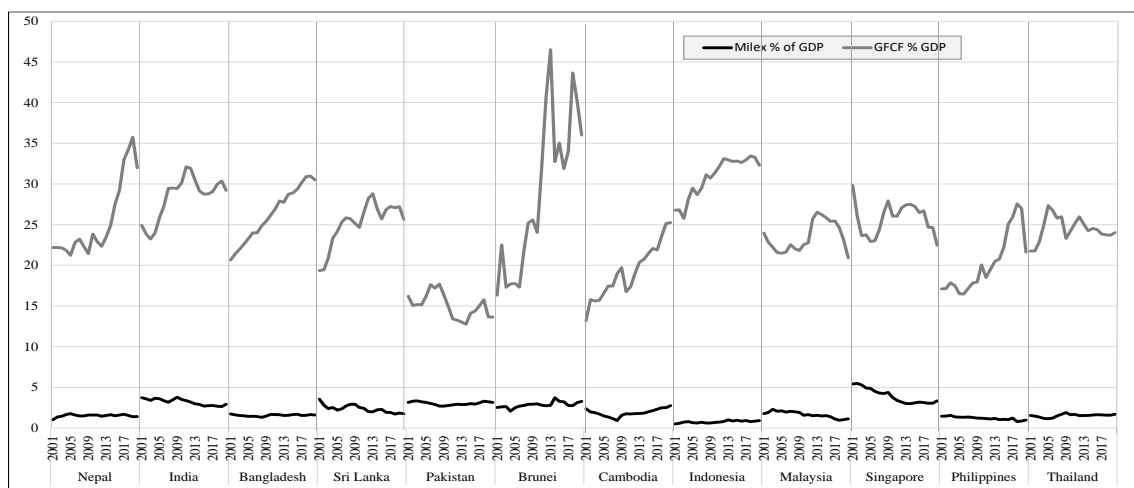
Economic growth is derived from the productive and optimal arrangement of scare resources. Due to the resource constraints, every economy is focused to manage resources properly. In this context, every economic decision face tradeoff. There is also tradeoff between military expenditure and rate fixed capital formation. Indeed, military and capital formation are needed to accelerator the economic growth of the nation. Fixed capital formation is the part of the domestic investment that accelerates the economic growth and in contrary, military expenses provides the secured environment to invest resources in productive channel. Thus, both of them are the crucial factors of economic development of the country.

Several literatures have concluded that there is positive relationship between military expenditure and economic growth of any nation (Benoit, 1978; Raju & Ahmed, 2019; Azam, 2020). Similarly, Keynes believed that increase in stock of capital or creation of new investment leads to increase the aggregate demand in the economy (Tobin, 1965) and that induces to rise employment opportunities. Some prior studies have evident to support the view that investment or capital formation and economic growth are positively related (Levine & Renelt, 1992; Mankiw, Romer, & Weil, 1992; [Uneze](#), 2013). Thus, military expenditure and fixed capital formation helps to mobilize the factors of production properly and thereby enhance the economic growth of the countries.

Military expenditure is increasing in recent years. On the other hand, fixed capital formation is also in increasing trend in SAARC and ASEAN countries as increases in gross domestic product.

Figure 1

Military Expenditure and Gross Fixed Capital Formation as % of GDP (US\$)



Note. World Development Indicators, Stockholm International Peace Research Institute (SIPRI)

Figure 1 shows the military expenditure and gross fixed capital formation as % of GDP among the selected countries. As shown in the figure, military expenditure of Singapore, India, and Pakistan are relatively higher than other countries. Meantime, Brunei has the highest gross fixed capital formation in recent years than other countries. Some countries have less tendency to spend in military expenditure. Almost no country spends more than 5% of its gross domestic product on military spending. However, fixed capital formation is in fluctuating trends of all countries. Fixed capital formation of all countries is decreasing in recent years. Due to COVID and internal causes, all the countries have lower level of fixed capital formation in recent years.

The increasing expenditure on military and lower the rate of the capital formation of any developing SAARC and ASEAN nations are the motivators of this paper. Thus, this paper is motivated by the tradeoff between military and investment (capital formation) and the lack of satisfactory level of economic growth of 12 Asian (SAARC and ASEAN) countries for the period 2001 to 2020. Both military expenditure and capital formation are the essential ingredients of the economic development, however, it is assumed that there is positively influence these on economic growth but military expenditure poses less. The objective of this paper is to evaluate the degree of impact of military expenditure and fixed capital formation on economic growth. The rest of the paper is structured as literature review, data and methodology, results and analysis respectively, and finally, last section concludes the research findings.

2. Literature Review

Benoit's (1978) defense-growth nexus for 44 least developing countries revealed that the military expenditure has positive effect on economic growth. Using dynamic panel estimations, Yildirim et al. (2005) examined the effects of military expenditures on economic growth for Middle Eastern countries and Turkey for the period 1989 to 1999, and the study found that military expenditures contribute to economic growth. Dunne et al. (2002) studied with two countries, Greece and Turkey and found that, in Greece, there is a positive effect of military burden, but in case of Turkey, there is a negative impact of military burden on economic growth.

Khalid and Noor (2018) studied 67 developing countries for the period of 2002 to 2010 employing GMM estimation and they concluded that military expenditure has a positive relationship with economics growth. Sheikh and Chaudhry (2016) applied GMM techniques to study the relationship between defense spending and growth in Pakistan and India found that there is positive effect in Pakisatan and negative effect in India. Mohanty et al. (2020) applied ARDL and Toda-Yamamoto Granger Causality method to investigate the linkage between growth and defense expenditure from 1970-2016 in India. The results of this paper revealed that there is statistically positive relationship between capital defense expenditure and economic growth but negative with revenue defense expenditure. Chairil et al. (2013) studied the economy of ASEAN economy especially focused on Indonesia concluded that the military expenditure has positive effect on economic growth.

Several past literatures had sufficient evidence there there is positive and significant relationship between military expenditure and economic growth and also defense expenditure caused the economic growth (Atesoglu, 200; Narayan & Singh, 200; Borch & Wallace, 2010; Malizard, 2010; Farzanegan, 2014). In contrary, some past studies (Hou & Chen, 2013; Azam, 2020; Abdel-Khalek et al., 2019; Aizenman & Glick, 2003; Arshad et al., 2017; Deger, 1986; Klein, 2004; D'Agostino et al., 2017; Saba & Ngepah, 2019) found the

negative effects of military expenditure and economic growth and no casual linkage between them by employing different econometric models. However, some of other studies including Apanisile et al. (2014), Raju and Ahmed (2019), Looney and Frederiksen (1986) showed the mixed results and midway between short and long run relationship between military expenditure and growth.

On the other hand, several past studies (e. g. De Long & Summers, 1991; Podrecca & Carmeci, 2001; Keller & Yeaple, 2009; Bakare, 2011; Meyer & Sanusia, 2019) found that there is positive and casual relationship between fixed capital formation or domestic investment on economic growth.

Most of the reviewed existing empirical literature have an evident that there is positive as well as negative effect of military expenditure and capital formation on economic growth. There are also mixed results in short and long-run effect. To confirm the relationship between military spending and economic growth as well as fixed capital formation and economic growth, this paper has employed cross-sectional panel regression approach with some ASEAN and SAARC countries covering the data from 2001 to 2020.

3. Data and Methodology

Purpose of this paper is to evaluate the tradeoff between military expenditure and capital formation on economic growth. In this paper, economic growth (RGDP) proxied by GDP (constant 2015 US\$) was taken as dependent variable and then military expenditure (*MILEX*) and capital formation (GFCF) proxied by respectively military expenditure (constant 2019 US\$) and gross fixed capital formation (constant 2015 US\$) were taken as explanatory variables. The annually observed cross-countries panel data—GDP and gross fixed capital formation were retrieved from World Development Indicators (WDI) from website of World Bank and military expenditure was inserted from Stockholm International Peace Research Institute (SIPRI) over the period of 2001 to 2020. This study was selected 12 different SAARC and ASEAN countries comprising Nepal, India, Bangladesh, Sri Lanka, Pakistan, Brunei Darussalam, Cambodia, Indonesia, Malaysia, Singapore, Philippines, and Thailand.

The general specified model (equation 1) for the analysis of tradeoff between military expenditure and capital formation on economic growth is

$$\text{LnRGDP} = f(\text{LnMILEX}, \text{LnGFCF}) \quad \dots(1)$$

To detect the problem of cross-sectional dependency (correlation) among countries under study, the cross-section dependence (CD) test popularized by Pesaran (2004) is employed. Furthermore, to find the weak-cross sectional dependency test based on Pesaran (2015) is also applied. In this paper, first generation (Pesaran, 2007) and second generation (Pesaran et al., 2009) unit tests are employed due to the presence of interdependency among the countries under study to test the cross-sectional stationarity of the variable of interest. These econometric methods were applied to estimate South Asian remittances and economic growth in Islam (2022).

Equations 2, 3, and 4 specify pooled OLS, fixed effects, and random effects models, respectively.

$$\text{LnRGDP}_{it} = a_0 + a_1 \text{LnMILEX}_{it} + a_2 \text{LnGFCF}_{it} + \varepsilon_{it} \quad \dots(2)$$

$$\text{LnRGDP}_{it} = a_0 + a_1 \text{LnMILEX}_{it} + a_2 \text{LnGFCF}_{it} + \upsilon_{it} \quad \dots(3)$$

$$\text{LnRGDP}_{it} = a_0 + \upsilon_{it} + a_1 \text{LnMILEX}_{it} + a_2 \text{LnGFCF}_{it} + \varepsilon_{it} \quad \dots(4)$$

However, redundant fixed-effects and Hausman tests suggest to apply pooled OLS regression. Due to heteroskedasticity problem, this paper applies the GLS estimators, then the pooled OLS equation can be written as,

$$\frac{\text{LnRGDP}_{it}}{\sigma_i} = \frac{a_0}{\sigma_i} + \frac{a_1 \text{LnMILEX}_{it}}{\sigma_i} + \frac{a_2 \text{LnGFCF}_{it}}{\sigma_i} + \frac{\varepsilon_{it}}{\sigma_i}$$

It can be written as

$$\text{LnRGDP}_{it}^* = a_0^* + a_1 \text{LnMILEX}_{it}^* + a_2 \text{LnGFCF}_{it}^* + u_{it}$$

Pesaran (2015) test for weak cross-sectional dependence suggests the panel FMOLS is applied for the robustness of the GLS estimation developed by Kao and Chiang (2000). It also estimates the long-run relationship between variable of interest. Consider the following model:

$$Y_{it} = a_i + b_i X_{it} + u_{it}$$

Where, a_i is the individual fixed effect, b is the vector coefficient, and u_{it} is the stationary disturbance term. Now, Y_{it} and X_{it} are cointegrated, the FMOLS estimator is given by

$$\hat{b}_{FMOLS} = \left[\sum_{i=n}^N \sum_{t=n}^T (X_{it} - \bar{X}_i)' \right]^{-1} \left[\sum_{i=n}^N \left\{ \sum_{t=n}^T (X_{it} - \bar{X}_i) \right\} \hat{Y}_{it}^* + T \hat{\varphi}_{\varepsilon u}^* \right]$$

Here, the autocorrelation term is $\hat{\varphi}_{\varepsilon u}^*$ and transformation of Y_{it} is \hat{Y}_{it}^* which are used for correcting serial correlation and removing endogeneity problem.

Eventually, panel causality test of Dumitrescu–Hurlin (D–H) (2012) is employed to estimate the causality among variables of interest. The D–H model is given by

$$Y_{it} = a_i + \sum_{i=1}^k b_i Y_{i,t-k} + \sum_{i=1}^k c_i X_{i,t-k} + \varepsilon_{i,t}$$

where parameters a_i , b_i and c_i represent the constant term, lag parameter, and coefficient slope, respectively. For the nonhomogenous Granger causality for all cross countries, the null hypothesis for $c_i = 0$ is tested.

4. Results and Analysis

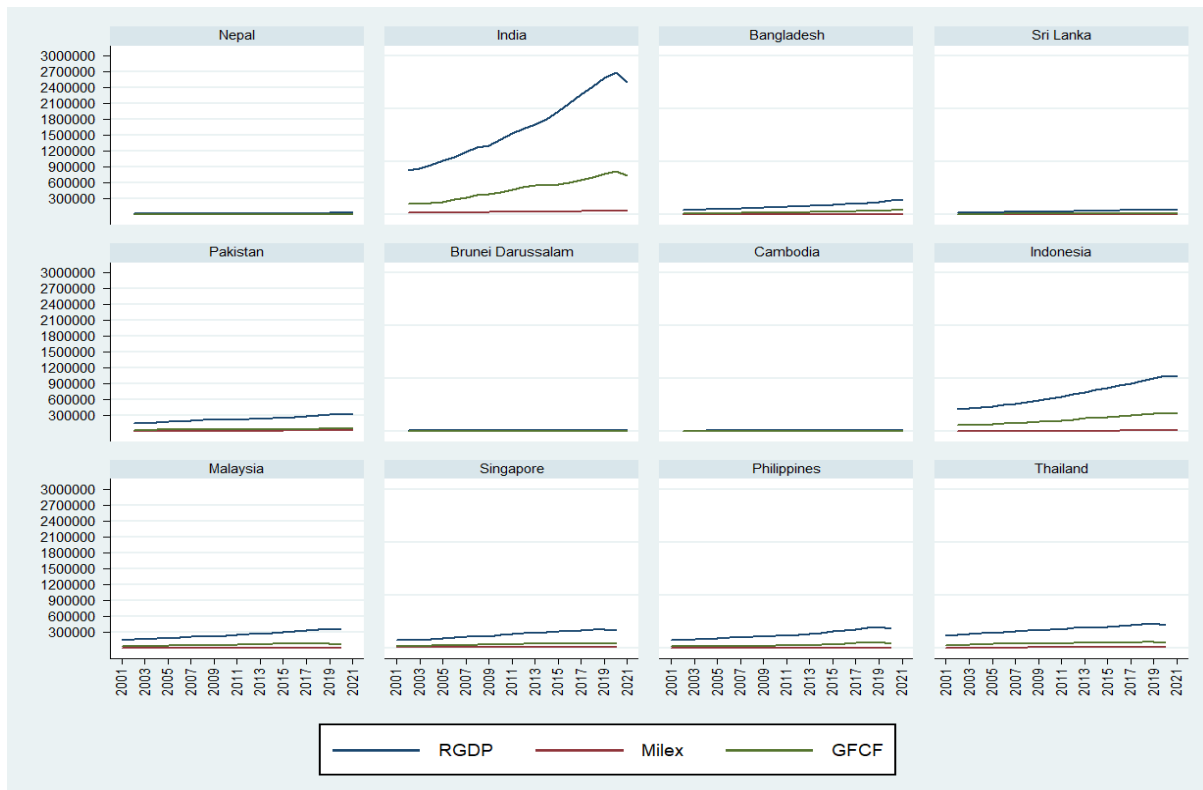
In this section, the descriptive as well as inferential analysis have conducted from the observed panel data.

Trends of GDP, MILEX, and GFCF

The aim of this paper is to evaluate the effect of military expenditure and capital formation in economic growth of selected SAARC and ASIAN countries. The national military and fixed capital formation are the debatable issues in the recent era. The trends of these variables are presented in the Figure 1.

Figure 2

GDP, Military Expenses, and Gross Capital Formation (in millions US\$) of Selected Countries from 2001 to 2020



Note. Data is adopted from World Bank Indicators (WDI) and Stockholm International Peace Research Institute (SIPRI)

Figure 2 presents the trends of the RGDP, *MILEX* and GFCF over the period 2001 to 2020. *MILEX* and GFCF both are upward trending but rate of increasing GFCF is higher than *MILEX* of all the sample countries. GDP of sampled countries is also in increasing trend. As increasing in GDP, *MILEX* and GFCF are also increasing over the period of the study. The Figure 1 clearly reveals that the *MILEX* and GFCF are increasing as increasing in GDP of respective countries.

5. Descriptive Summary

The descriptive statistics including mean, median, maximum, minimum, standard deviation, and number of observations show the nature of the data under the study. Table 1 shows the results of descriptive statistics of natural logarithm of all the variables of interest—GDP, *MILEX*, and GFCF.

Table 1

Summary of Descriptive Statistics

	<i>LnRGDP</i>	<i>LnMILEX</i>	<i>LnGFCF</i>
Mean	11.80853	7.848067	10.37094
Median	12.23101	8.119377	10.56640
Maximum	14.80714	11.19823	13.61552
Minimum	8.763416	4.709530	6.738924
Std. Dev.	1.500422	1.527796	1.568200
Observations	240	240	240

Table 1 summarizes the 20 annually observed data of 12 selected countries with three variables of interest from 2001 to 2020. The total number of observations is 240. The balanced panel data shows the mean value of *LN*GDP is 11.80, median is 12.23, standard deviation is 1.50. While mean value of *LN*MILEX and *LN*GFCF are 7.84 and 10.37 respectively. Likewise, standard deviation of *LN*MILEX and *LN*GFCF are 1.52 and 1.56 respectively.

Cross-Section Dependence (CD) Test

Cross-section dependence tests the existence of the cross-sectional interdependence among the economies under study. It shows the correlation between variables across the panel groups. Table 2 presents the results of the Pesaran cross-sectional dependency test.

Table 2
Results of Cross-Section Dependence Test

Variables	Pesaran CD	Prob.	Remarks
<i>Ln</i> RGDP	33.73319	0.000*	Cross-section dependence (Correlated)
<i>Ln</i> MILEX	27.4727	0.000*	Cross-section dependence (Correlated)
<i>Ln</i> GFCF	33.38383	0.000*	Cross-section dependence (Correlated)

Note. * Significant at 1% level of significance

Table 2 shows the different variables with Pesaran CD coefficient and their probability values. The probability values are less than 0.01 then the null hypothesis of no cross-sectional dependence or correlation is rejected. Thus, the CD results reveal that the panel cross-sections are not independent and they are correlated across countries at 1% level of significant. To test whether the errors are weakly cross-sectionally dependent, Pesaran (2015) test is also applied. The result of CD, -2.405 (p = 0.016) rejects null hypothesis at 5% level of significant. The result suggests that there is no weak cross-sectional dependence across panel variables.

First- and Second-Generation Panel Unit Root Test

Due to the presence of interdependency among the panel cross-sections, first-generation unit root—Im, Pesara and Shin W-statistic (IPS) and ADF - Fisher Chi-square (FADF) and second-generation unit root—cross-sectional ADF (CADF) and cross sectional (CIPS) are employed. The results of those tests are presented in the Table 3.

Table 3
Panel Unit Root

Variables	IPS		FADF		CIPS		CADF	
	<i>I</i> (0)	<i>I</i> (1)	<i>I</i> (0)	<i>I</i> (1)	<i>I</i> (0)	<i>I</i> (1)	<i>I</i> (0)	<i>I</i> (1)
<i>Ln</i> RGDP	-0.874	-1.578***	30.002	38.981**	-1.876	-2.501*	-1.928	-1.559
<i>Ln</i> MILEX	1.130	6.354*	18.642	85.114*	-2.696*	-2.783*
<i>Ln</i> GFCF	-0.559	-4.714*	28.115	66.684*	-1.712	-3.650*	-1.617	-2.185***

Note. * significant at 1%, ** significant at 5%, ***significance at 10%; IPS = Im, Pesaran and Shin W-stat, FADF = ADF - Fisher Chi-square, CIPS = Cross-sectional IPS, CADF = Cross-sectional ADF.

Results of IPS and FADF show the *LNRGDP*, *LNMLEX*, and *LNGFCF* are not stationary at level but they are stationary at first difference. In second-generation unit root tests, *LNRGDP* and *LNGFCF* are stationary at first difference or integrated at $I(1)$ and *LNMLEX* is stationary at level or integrated at $I(0)$ order.

Cross- section fixed and random effects test

To estimate the tradeoff between military expenditure and gross capital formation on economic growth among panel groups, different cross-sectional fixed and random effects test are employed. The test results of cross-section fixed and random effects are presented below.

Table 4

Summary of Cross- section Fixed and Random Effects Test Results

Test Summary	Statistic	d.f.	Prob.
<i>Redundant Fixed Effects Tests:</i>			
Cross-section F	80.420193	(11,226)	0.0000
Cross-section χ^2	382.113746	11	0.0000
<i>Correlated Random Effects - Hausman Test:</i>			
Cross-section random χ^2	25.936029	2	0.0000
<i>Cross-section Heteroskedasticity LR Test:</i>			
Likelihood ratio (LR)	170.2084	12	0.0000

To select the panel data model, the cross-section fixed effect, random effect and heteroskedasticity LR test are applied. Redundant fixed effects tests—cross-section F and Cross-section χ^2 —are significant at 1% level of significant which is not sufficient evidence to run the cross-section fixed effect model. Moreover, cross-sectional correlated random effects-Hausmen test, χ^2 , statistic is also significant at 1% level of significant, which is not support to apply the cross-sector random effect model. Thus, the panel pooled OLS model is more fitted to fulfil the objective of the paper. The cross-section heteroskedasticity LR test based on pooled OLS is also significant at 1% level of significant. Thus, due to the problem of heteroskedasticity, in this paper, to overcome it, panel GLS estimation is applied.

Panel Generalized Least Square (GLS)

To overcome the problem heteroskedasticity, GLS weights (cross-section SUR) is employed in panel regression. The result of panel pooled GLS estimation is presented in the following table.

Table 5

Results of Panel GLS (Cross-section SUR) Estimation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
<i>LnMILEX</i>	0.182749	0.005202	35.12800	0.0000
<i>LnGFCF</i>	0.592726	0.004552	130.2160	0.0000
<i>C</i>	4.227173	0.020835	202.8924	0.0000
R-squared	0.999804	Adjusted R-squared		0.999793
F-statistic	88857.63	Durbin-Watson stat		1.642931
Prob(F-statistic)	0.000000	Jarque-Bera		2.601715
Prob. (JB)	0.272298	Pesaran CD		0.042929
Prob.(CD)	0.9658			

Table 5 shows the coefficient of panel pooled GLS estimations and some results of residual diagnostic. In this estimation, *LnRGDP* is regressed with *LnMILEX* and *LnGFCF*. The coefficients of both regressors are positively significant at 1% level of significance. Thus, both *LnMILEX* and *LnGFCF* are positively affect the *LnRGDP*. However, *LNGFCF* greatly influences on the *LnRGDP* than *LnMILEX*. When 1% increase in *LnMILEX* then 0.182749% changes in *LnRGDP* and when 1% change in *LnGFCF* then 0.592726% changes in *LnRGDP*. Thus, the result of pooled GLS regression reveals that the SAARC and ASIAN countries are to focused on capital formation on fixed capital formation rather than military expenditure. The gross fixed capital formation accelerates of the selected countries but not sufficiently by military expenditure.

The residual diagnostic tests support the panel pooled GLS is the best model to estimate the effect of military expenditure and gross fixed capital formation on national output of selected countries. Value of adjusted $R^2 = 0.999793$ reveals that the explanatory variables—*MILEX* and *GFCF* explained 99.98% of the change in *RGDP*. The P-value (F-statistic) is significant at 1% which means that there is significant relationship between regressors—*MILEX* and *GFCF* and dependent variable—*LnRGDP*. Durbin-Watson statistic is in acceptable ranges (1.5 to 2.5) which means that the model is free from autocorrelation problem. Jarque-Bera statistics is also evidence to fail the rejection of null hypothesis. It reveals that the residuals are normally distributed. Pesaran CD for no cross-section dependence or correlation in weighted residuals fails to reject the null hypothesis which suggests that there is no cross- section dependency among panel groups. All the residual diagnostic test reveals the estimated panel GLS is the best fitted model.

Panel Pooled FMOLS

The observed balanced panel cross-sectional data are not stationary at level. Panel pooled FMOLS estimation insights the long run relationship among the variables across the panel groups. Pooled FMOLS estimations is employed to inspect the robustness of the results of panel GLS estimation. The results of panel pooled FMOLS estimation are presented in the Table 6.

Table 6

Results of Panel Pooled FMOLS

Variable	Coefficient	Std. Error	t-Statistic	Prob.
<i>LNMLEX</i>	0.177978	0.054637	3.257482	0.0013
<i>LNGFCF</i>	0.596717	0.042090	14.17700	0.0000

<i>R</i> -squared	0.996791	Adjusted <i>R</i> -squared	0.996596
-------------------	----------	----------------------------	----------

Table 6 provides the results of panel pooled FMOLS estimations. The results reveal that there are more or less same direction of panel GLS estimation. Table shows that both regressors are significantly positive with LNRGDP. However, *LNGFCF* is more desirable for economic growth than *LNMLEX*. The outcome of panel FMOLS, thus, helps to validate the results of panel GLS estimation.

Pairwise Dumitrescu-Hurlin Panel Causality Test

Dumitrescu and Hurlin (2012) proposed the pairwise panel causality tests. It is helpful to test the causality between variables of interest. The test results of pairwise D-H panel causality tests with 2 lags are presented in the Table 7.

Table 7

Results of Pairwise Dumitrescu-Hurlin Panel Causality Tests

Null Hypothesis:	W-Stat.	Zbar-Stat.	Prob.	Remarks
LNMLEX does not homogeneously cause LNRGDP	2.99027	0.76414	0.4448	LNRGDP → LNMLEX
LNRGDP does not homogeneously cause LNMLEX	8.30689	7.24743	0.0000*	unidirectional
LNGFCF does not homogeneously cause LNRGDP	3.64535	1.56298	0.1181	LNRGDP → LNGFCF
LNRGDP does not homogeneously cause LNGFCF	8.20947	7.12863	0.0000*	unidirectional
LNGFCF does not homogeneously cause LNMLEX	6.99331	5.64560	0.0000*	LNGFCF ↔ LNMLEX
LNMLEX does not homogeneously cause LNGFCF	4.28456	2.34245	0.0192**	bidirectional

Note. * Significant at 1%, ** significant at 5%.

Table 7 shows the results of pairwise Dumitrescu-Hurlin panel causality tests. The results, which is significant at 1% level of significant, show the unidirectional as well as bidirectional causality between variables of interest. Table shows that there is unidirectional causality between *LNRGDP* and *LNMLEX*. The test shows that the *LNRGDP* causes *LNMLEX*. However, *LNMLEX* does not homogeneously cause *LNRGDP*. Similarly, *LNRGDP* homogeneously causes *LNGFCF* unidirectionally. However, there is bidirectional causality between *LNMLEX* and *LNGFCF*. It means that there is tradeoff between *LNGFCF* and *LNMLEX* because

LNGFCF affects *LNMLEX* and vice versa. Thus, overall causality test results are not strongly support the *LNMLEX* and *LNGFCF* cause the *LNRGDP*.

6. Conclusion

Military and domestic investment are the interesting field of the recent literature of economics. It is quite conflicting issues in the economic development of the developing countries. This study has focused to estimate the impact of military expenditure and fixed capital formation on economic growth by employing panel GLS and D-H causality tests with 12 countries of SAARC and ASEAN region over the period of 2001 to 2020. Military expenditure and gross fixed capital formation are the proxied as explanatory variables and constant value of GDP is the proxied as dependent variable.

The CD test shows the cross-section dependency or correlation among the panel groups may be due to the economic dependency among the countries. The panel GLS robust estimation reveals that military expenses and gross fixed capital formation both enhance the economic growth. However, the capital formation is more crucial than military on economy. Military expenses have long-term impact on economic growth which is supported by the significant coefficient of FMOLS estimations. The same evidence found between capital formation and economic growth. These results are supported by the most of the cited empirical literature. Although, D-H panel causality rejects the military expenditure or fixed capital formation caused the economic growth. However, there is only unidirectional causality of economic growth to regressors and regressors have bidirectional causality. It implies that there is no directly caused the military expenditure and fixed capital formation to economic growth but military expenditure and fixed capital formation caused each other. Thus, there is no strong evidence that the military expenses and capital formation accelerate economic growth but indirectly it is helpful.

Finally, the stylized facts suggest that the government of ASEAN and SAARC countries should be focused on fixed capital formation with maintaining the minimal level of military to accelerate the growth in long-run.

References

- Abdel-Khalek, G., Mazloun, M. G., El Zeiny, M. R. M. (2019). Military expenditure and economic growth: the case of India. *Rev. Econom. Political Sci.* 5 (2), 116–135.
- Aizenman, J., & Glick, R. (2003). Military expenditure, threats, and growth. *NBER Working Paper No. 9618*. https://www.nber.org/system/files/working_papers/w9618/w9618.pdf
- Apanisile, T. O., & Okunlola, C. O. (2014). Does military expenditure influence economic growth in Nigeria during 1989 - 2013? A bound testing approach, *Romanian Journal of Fiscal Policy (RJFP)*, 5(2), 56-71
- Arshad, A., Syed, S. H., Shabbir, G. (2017). Military expenditure and economic growth: a panel data analysis. *Forman J. Econom. Stud.* 13, 161–175.
- Atesoglu, H.S. (2002). Defense spending promotes aggregate output in the United States evidence from cointegration analysis. *Defence Peace Econ.* 13(1), 55–60.
- Azam, M. (2020). Does military spending stifle economic growth? The empirical evidence from non-OECD countries. *Heliyon*, 6 (12), e05853, Doi: <https://doi.org/10.1016/j.heliyon.2020.e05853>
- Bakare, A. S. (2011). A theoretical analysis of capital formation and growth in Nigeria. *Far East Journal of Psychology and Business*, 3(2), 11-24.

- Benoit, E. (1978). Growth and defence in developing countries. *Econ. Dev. Cult. Change* 26, 271–280.
- Benoit, E. (1978). Growth and defence in LDCs. *Economic Development and Cultural Change*, 26: 271–280.
- Borch, C., Wallace, M. (2010). Military spending and economic well-being in the American states: the post-vietnam war era. *Soc. Forces* 88(4), 1727–1752.
- Chairil, T., Sinaga, D., & Febrianti, A. (2013). Relationship between military expenditure and economic growth in ASEAN: *evidence from Indonesia*. *Journal of ASEAN Studies*, 1(2), 106-121. <https://nbn-resolving.org/urn:nbn:de:0168-ssoar-441818>
- D' Agostino, G., Dunne, J. P., Pieroni, L. (2017). Does military spending matter for long-run growth? *Defence Peace Econ.* 28(4), 429–436.
- De Long J. B., & Summers L. H. (1991). Equipment investment and economic growth, *Quarterly Journal of Economics*, 106, 445-502.
- Deger, S. (1986). Economic development and defense expenditure. *Econ. Dev. Cult. Change* 35(1), 179–196.
- Dumitrescu, E. I., & Hurlin, C. (2012). Testing for Granger non-causality in heterogeneous panels. *Economic Modelling*, 29(4), 1450–1460. <https://doi.org/10.1016/j.econmod.2012.02.014>
- Dunne, J. P., Nikolaiodu, E. and Voguas, D. (2001). Defence spending and economic growth: a causal analysis for Greece and Turkey. *Defence and Peace Economics Special Issue* 12(1), 5–26.
- Farzanegan, M. R. (2014). Military spending and economic growth: the case of Iran. *Defence Peace Econ.* 25(3), 247–269.
- Hou, N., Chen, B. (2013). Military expenditure and economic growth in developing countries: evidence from system GMM estimates. *Defence Peace Econ.* 24(3), 183–193.
- Islam, M. S. (2022). Do personal remittances influence economic growth in South Asia? A panel analysis. *Review of Development Economics*, 26(1), 242-258.
- Kao, C., & Chiang, M. H. (2000). On the estimation and inference of a cointegrated regression in panel data. In B. Baltagi (Ed.), *Nonstationary panels, panel cointegration, and dynamic panels, advances in econometrics* (pp. 161– 178). Amsterdam: JAI Press.
- Keller, W., Yeaple, S. R. (2009). Multinational enterprises, international trade, and productivity growth: firm-level evidence from the United States. *The Review of Economics and Statistics*, 91(4): 821-831.
- Khalid, M. A., Noor, Z. M. (2018). Military expenditure and economic growth in developing countries: evidence from system GMM estimates. *J. Emerg. Trends Econ. Manag. Sci.* 9(2), 90–98.
- Klein, T. (2004). Military expenditure and economic growth: Peru 1970–1996. *Defence Peace Econ.* 15(3), 275–288.
- Levine, R., Renelt, D. (1992) A sensitivity analysis of cross-country growth regressions, *American Economic Review*, 82: 942- 963.
- Looney, R. E., Frederiksen, P. C. (1986). Defense expenditures, external public debt and growth in developing countries. *J. Peace Res.* 23(4), 329–338.
- Malizard, J. (2010). Causality between economic growth and military expenditure: the case of France. *Defense Secur. Anal.* 26(4), 401–413.
- Mankiw, N. G., Romer, D., Weil, D. (1992). A contribution to the empirics of economic growth. *Quarterly Journal of Economics*, 107: 407- 437.

- Meyer, D. F., & Sanusia, K. A. (2019). Causality analysis of the relationships between gross fixed capital formation, economic growth and employment in South Africa. *Studia Universitatis Babeş-Bolyai Oeconomica*, 64(1), 33-44 DOI: 10.2478/subboec-2019-0003
- Mohanty, R. K., Panda, S., Bhuyan, B., (2020). Does defence spending and its composition affect economic growth in India? *Margin. J. Appl. Econom. Res.* 14(1), 62–85.
- Narayan, P. K., Singh, B. (2007). Modelling the relationship between defense spending and economic growth for the *Fiji Islands*. *Defence Peace Econ.* 18(4), 391–401.
- Pesaran, M. H. (2004). General diagnostic tests for cross-section dependence in panels (IZA Discussion Paper No. 1240). The Institute for the Study of Labor (IZA).
- Pesaran, M. H. (2007). A simple panel unit root test in the presence of cross-section dependence. *Journal of Applied Econometrics*, 22(2), 265–312. <https://doi.org/10.1002/jae.951>
- Pesaran, M. H. (2015). Testing weak cross-sectional dependence in large panels. *Econometric Reviews*, 34(6–10), 1089–1117. <https://doi.org/10.1080/07474938.2014.956623>
- Pesaran, M. H., Smith, V., & Yamagata, T. (2009, September). Panel unit root tests in the presence of a multifactor error structure (Unpublished working paper). Cambridge University.
- Podrecca, E., Carmeci, G. (2001). Fixed investment and economic growth: New results on causality. *Applied Economics*, 33: 177-182.
- Raju, M. H., Ahmed, Z. (2019). Effect of military expenditure on economic growth: evidences from India Pakistan and China using cointegration and causality analysis. *Asian J. German Eur. Stud.* 4(3), 1–8.
- Rasler, K., & Thompson, W. R. (1988). Defense burdens, capital formation, and economic growth: The systemic leader case. *The Journal of Conflict Resolution*, 32(1), 61-86 <http://www.jstor.org/stable/174088>
- Saba, C. S., Ngepah, N. (2019). Military expenditure and economic growth: evidence from a heterogeneous panel of African countries. *Econ. Res.* 32(1), 3586–3606
- Sheikh, M. R., & Chaudhry, I. S. (2016). Do defense expenditures augment economic growth in Pakistan and India? A Deger-type analysis using GMM approach. *Pakistan Journal of Commerce and Social Sciences*, 10(3), 525-546
- SIPRI (2020). Trends in World Military Expenditure, 2019. Retrieved from <https://sipri.org/sites/default/files/Data%20for%20all%20countries%20from%201988%E2%80%932020%20in%20constant%202019%29%20USD%20%28pdf%29.pdf>
- Tobin, J. (1965). Money and economic growth. *Econometrica: Journal of the Econometric Society*, 671-684.
- Uneze, E. (2013). The relation between capital formation and economic growth: Evidence from sub-Saharan African countries. *Journal of Economic Policy Reform.* 16 (3). 272-286. Doi: <https://doi.org/10.1080/17487870.2013.799916>
- Wahid, L. (2009). *Military Expenditure and Economic Growth in the Middle East*. Palgrave Macmillan