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Military expenditures and quality of life in ASEAN: exploring the unexplored

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Abstract

Purpose – Improving the quality of life of the masses is the prime objective of all policymakers of both developed and developing countries. However, the determinants of improved quality of life are not well explored in the empirical literature. This study has, therefore, tried to identify the determinants of quality of life by focusing on military expenditures.

Design/methodology/approach – Panel data from 1990 to 2017 are collected from internationally reliable sources for the Association of Southeast Asian Nation (ASEAN hereafter) member countries, and suitable econometric techniques are employed to estimate the designed models.

Findings – The results show that military expenditures have affected the quality of life of the ASEAN member countries both negatively and significantly. Similarly, the inflation rate has also negatively affected the quality of life. In terms of magnitude, the negative impact of the inflation rate on quality of life has exceeded than the impact of military expenditures. On the other hand, trade openness, per capita income, urbanization and government expenditures have played a positive and significant role in improving the quality of life in the ASEAN region. Moreover, it is found that the positive impact of per capita income on quality of life is highest among other determinants.

Originality/value – This study provided comprehensive evidence about the relationship between military expenditures and quality of life in the ASEAN context. Consequently, the ASEAN member economies will benefit a lot from the results of this study.

Keywords Military expenditures, Quality of life, Panel data, ASEAN, Trade openness

Paper type Research paper

1. Introduction

Military expenditures have been on the rise both in the developed and developing countries during the last few decades especially after 9/11. Military expenditures were estimated to have been $1822 billion in 2018 which was 2.6% higher as compared to 2017 (SIPRI, 2019). Similarly, in 2018, military expenditures were 2.1% of global GDP. Compared to 1998 post-

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cold war, global military spending has been increased by 76 which is indeed a huge increase. Archer and Willi (2012) analyzed statistics on military expenditures for the year 2010 and reported that they were 12.7 times more than official development assistance (ODA), 604 times higher than the UN budget for peace and security, development, human rights, humanitarian affairs and international law and 2,508 times higher than the total expenditures of the UN International disaster and non-proliferation organization. A significant amount of resources was channeled toward military expenditures from the national exchequers especially by the developing countries in order to develop their armed forces and hence protect themselves from terrorism, extremism and foreign aggressions.

In the modern globalized world, the defense and sovereignty of countries are directly dependent on military expenditures. Expenditures on the military are an integral portion of government spending for the purpose of national defense and they are determined by fiscal policies Lobont *et al.* (2019). Hence, military expenditures are having significant diverse economic consequences. Hou and Chen (2013) endorsed that military expenditures are harmful to economic growth as they adversely influence productive expenditures. Collier (2006) argued that military expenditures and wars adversely impact the development process by diverting precious resources of the government from their best use. It is well understood that resources at the disposal of the government especially in developing countries not only are limited but also have alternative uses. So, it implies that there is always a tradeoff between increasing spending on the military and spending on education, health and welfare. Improved education, health and welfare are the main pillars of improved quality of life.

Diverting resources for the purpose of security matters from the productive sectors would definitely affect the economy while ignoring the security issues and focusing on economic performance would turn the economy's flow unstable (Raju and Ahmed, 2019). The developing countries are faced with numerous challenges including the presence of extreme poverty, ill health, sluggish economic performance and so on. At the same time, the developing countries are also faced with so many challenges related to their sovereignty and defense. However, to keep a proper balance between spending on the military and spending on other sectors of the economy is one of the great challenges for policymakers. Awaworyi and Yew (2014) pointed out that besides the positive impacts of military expenditures, they can also adversely impact economic growth through increased tax burden and government debt. Therefore, military expenditures should be closely monitored so that to avoid its adverse consequences for the economy.

In this article, we are interested to explore whether there is any relationship between military expenditures and quality of life. The aforementioned question has not been answered satisfactorily at least in the available empirical literature. Improved quality of life of the masses is considered as the ultimate goal of all economic activities globally. All policymakers of both the developing and developed countries are hence trying their level best to grow their economies using various growth-enhancing policies in order to enhance the quality of life of their masses. In terms of sample selection, we have focused on all member economies of Association of Southeast Asian Nations (hereafter ASEAN). The specific motivation behind focusing on the ASEAN region is that the region has decreased military expenditures significantly by approximately 56% during the last 3 decades, while at the same time quality of life has also been improved in ASEAN by more than 32% which is indeed remarkable. The ASEAN region is, therefore, an ideal case for exploring the relationship between military expenditures and quality of life as the region as a whole has shown declining in the former and a rising trend in the latter during the last 3 decades.

This paper is organized as follows. In Section 2, relevant literature is presented while in Section 3, we have provided a detailed discussion on relevant statistics of military expenditures and quality of life in the ASEAN region. In the next section, efforts are focused on model specification, data description and empirical methodology. In the second last section of the paper, we have discussed the results of estimated models. The results have provided

sound support in favor of a consistent negative relationship between increased military expenditures and improved quality of life. Conclusions and implications of the study are documented in the last section.

2. Literature review

The relationship between military expenditures and quality of life is of significant interest both for policymakers and researchers as improved quality of life is the ultimate objective of all economic activities in the modern globalized world. Azam (2020) endorsed that assessing the social and economic consequences of military expenditures is an interesting area for potential researchers. In a pioneering study, Looney (1990) pointed out that military regimes reduce expenses both on health and education due to defense burdens. It implies that increased expenditures for military purposes are detrimental to the quality of life as they are responsible for the decrease in education and health sector budgets. Both improved health and education are the basic ingredients of improved quality of life. Generally, military expenditures that are basically unproductive replace other productive public expenditures (productive). Kim (1996) commented that military expenditures precious resources from welfare activities such as education and health sectors. More to the point, Korotkin (1985) endorsed that policies related to the military of the federal government have adversely affected the abilities of the city and state governments to maintain the quality of life. Gillani *et al.* (2019) documented that military expenditures may positively impact economic growth through the mechanism of multiplier and spillover effects but may influence health outcomes adversely. On the other hand, Arshad *et al.* (2017) and Azam (2020) showed that military expenditures and arms imports have adversely influenced economic growth. Archer and Willi (2012) indicated that increased military expenditures and investment in weapons have left the world "over-armed and peace under-funded."

Recent related literature has also highlighted that increased military expenditures are responsible for the poor quality of life across the countries. For instance, military expenditures act as a burden which is imposed on the common people and on the nation economy by the defense policy (Ageli and Zaidan, 2013). According to Sekine (2020), increased military expenditures shift public resources from productive sectors toward non-productive sectors. For instance, Gillani *et al.* (2019) demonstrated empirically that increased military expenditures are responsible for low life expectancy and high infant mortality rates. Both low life expectancy and high infant mortality are indicators of the poor quality of life. Using data for 101 countries, Kim (1996) provided evidence about the adverse impacts of military expenditures on the quality of life. Moreover, the recent study of Golkhandan (2019) empirically proved that a one percent increase in defense expenditures reduces per capita health expenditures by 0.18% which is an alarming situation as far as the quality of life is concerned.

In the ASEAN's context, Huxley (1994) evaluated the defense policies of ASEAN economies and endorsed that military expenditures have increased historically. On the other hand, Hirnissa *et al.* (2009) showed that military expenditures have significantly declined due to the consequences of the financial crisis in all ASEAN economies except Singapore. Recent reports show that military expenditures have increased steadily in ASEAN economies between 2020 and 2014 (Abuza, 2015). The same study also indicated that the ASEAN economies have spent about 38.2 US dollars on defense in 2014. In 2020, the South East Asian economies spent $45.5 billion on defense that shows a net increase of 5.2%. Singapore, Thailand and Indonesia are the largest spenders on the military in ASEAN economies.

The brief review presented has highlighted the important role of military expenditures from the perspective of the quality of life. However, it is noted that the available literature is

indeed very limited. Similarly, in the context of ASEAN's economies, the available literature has largely ignored the relationship between military expenditures and quality of life. The lack of literature on the relationship between military expenditures and quality of life in ASEAN's context has provided motivation for the current study. Therefore, in the current study, we have conducted an empirical exercise to provide clear evidence about the relationship between military expenditures and quality of life. The outcome of the study would definitely benefit the policymakers of ASEAN economies to formulate appropriate policies both related to defense and quality of life simultaneously.

3. Statistics on military expenditures and quality of life

ASEAN was founded in 1960 with the purpose to promote economic growth and development and it is consisting of 10 diverse economies located in Asia. Some of the member economies of ASEAN such as Singapore, Brunei Darussalam and Malaysia are enjoying a good quality of life mostly due to their better economic performance and abundance of natural resources. On the other, some other economies are relatively poor such as Vietnam, Cambodia and Philippine. The economic performance of ASEAN members is remarkable over the years. The report of the economic community of 2019 shows that in 2018, the region has a combined GDP of 3 trillion US dollars which makes ASEAN as the 5th largest economy in the world. Further, the aforementioned report also endorsed that the ASEAN region has enjoyed average growth of 5.3% for a couple of decades persistently which is higher than the global growth average.

Before moving into the empirical analysis, we have provided some relevant statistics on both military expenditures and quality of life. Military expenditures are measured as a percentage of GDP while the quality of life is captured by the human development index (HDI hereafter). The HDI is basically the summary measure of three indicators such as life expectancy, means year of schooling and gross national income per capita (GNI). The HDI is simply the geometric mean of the three mentioned dimensions (Human Development Report, 2020). The values of HDI ranges from 0 to 1 where 0 represents the lowest human development while 1 stands for the highest human development.

Statistics are averaged for the start and end year of the panel. Columns 4 and 7 measure percentage changes in HDI and military expenditures, respectively. The main purpose behind this exercise is to highlight the behavior of variables during the study period.

The statistics provided in Table 1 have provided some interesting facts. It is inferred from Table 1 that overall the ASEAN region has shown significant improvement in quality of life

Variables	HDI 1990	HDI 2017	% change	MEX 1990	MEX 2017	% change
Overall	0.543	0.720	32.596	4.168	1.801	−56.789
Brunei Darussalam	0.768	0.843	9.765	6.437	2.879	−55.274
Cambodia	0.384	0.578	50.520	2.071	2.087	0.772
Indonesia	0.525	0.704	34.095	1.410	0.809	−42.624
Lao PDR	0.399	0.602	50.877	8.533	0.217	−97.456
Malaysia	0.644	0.802	24.534	2.555	1.125	−55.968
Myanmar	0.350	0.577	64.857	3.395	2.483	−26.863
Philippine	0.590	0.709	20.169	2.147	1.390	−35.258
Singapore	0.718	0.934	30.083	4.632	3.321	−28.303
Thailand	0.574	0.762	32.752	2.594	1.422	45.181
Vietnam	0.475	0.690	45.263	7.910	2.286	−71.099

Note(s): Authors calculation from the data of SPIRI and UNDP. HDI stands for human development index that is used as a proxy for quality of life. Military expenditures are measures as a percent of GDP

Table 1.
Basic statistics

during the study period. The quality of life measured by HDI has increased from 0.543 in 1990 to 0.720 in 2017 indicating a net increase of more than 32% which is indeed remarkable. It is also interesting to note that at the same time military expenditures for the overall ASEAN region have also declined significantly. Military expenditures that were 4.168% of the GDP in 1990 have been decreased to 1.801% in 2017. The last column of Table 1 shows that military expenditures have been decreased by more than 56% that is a good sign for the region as a whole. Therefore, it would be an interesting academic exercise to explore the potential relationship between military expenditures and quality of life.

Country-wise statistics provided in Table 1 have indicated that all member countries of the ASEAN region have shown significant improvement in their quality of life measured by HDI. It is inferred from the statistics that the HDI index for the economy of Myanmar has improved by more than 64%. The HDI index that was 0.350 in 1990 has increased to 0.577 in 2017 showing a net increase of more than 64% which is highest in the ASEAN region. Similarly, Lao PDR and the Cambodian economy also did well in terms of improving their quality of life as the HDI index has increased by more than 50% for both economies. Further, the economy of Vietnam has also improved its quality of life by more than 45% during 1990–2017 followed by Indonesia and Thailand. Moreover, the economy of Brunei Darussalam has witnessed a slight improvement in terms of quality of life.

The behavior of military expenditures in terms of statistics has been shown in the last three columns of Table 1. It can be seen from the statistics provided that military expenditures have been decreased remarkably for most of the countries except Cambodia. Lao PDR has witnessed the highest decreased in military expenditures followed by Vietnam in the ASEAN region. Military expenditures have been decreased by 97.456% for the economy of Lao PDR and 71.099% for the economy of Vietnam. The Malaysian and Bruneian economies have also demonstrated significant reductions in military expenditures over the study period. Military expenditures as a percentage of GDP have been declined by 55.968 and 55.274 for Malaysian and Bruneian economies, respectively. Similarly, a reduction of 42.624% in military expenditures as a percentage of GDP was observed for the economy of Indonesia. All other economies have also decreased their military expenditures except the Cambodian economy where military expenditures have been raised slightly.

4. Model, data and methodology

4.1 Specification of the model

This paper is intended to estimate the relationship that military expenditures have with the quality of life for the ASEAN member countries. The variables of interest, therefore, in the current study are quality of life and military expenditures. However, quality of life is also dependent on several other factors besides military expenditures. For example, income level is one of the major factors that can affect the quality of life as it enhances the purchasing power of people. A fast-growing economy is no doubt in a much better position to improve the quality of life of its masses, and hence it seems relevant to consider per capita income in a model where the dependent variables is the quality of life. Similarly, the inflation rate can also be considered an important indicator for the quality of life equation as it can influence the purchasing power of people adversely, and hence the quality of life would be affected negatively.

The study of Arisman (2018) has highlighted the role of both inflation and per capita income on the quality of life in ASEAN countries. Further, the recent study of Khan *et al.* (2019) has included trade openness and urbanization as important determinants of quality of life. Besides, we have also included government expenditures among the explanatory variables in order to explore their relationship with the quality of life. Based on the arguments presented and previous literature, the following are the hypothesis of the study:

H1. Military expenditures are negatively related to the quality of life.

H2. inflation rate is negatively related to the quality of life.

H3. Trade openness is positively related to the quality of life.

H4. Per capita income is positively related to the quality of life.

H5. Urbanization is positively related to the quality of life.

H6. Government expenditures are positively related to the quality of life.

For the purpose of empirical analysis, the following model is specified:

$$\text{lnhdi}_{it} = \beta_0 + \beta_1 \text{lnmex}_{it} + \beta_2 \text{lninf}_{it} + \beta_3 \text{lnopen}_{it} + \beta_4 \text{lnpcy}_{it} + \beta_1 \text{lnurb}_{it} + \beta_1 \text{lngex}_{it} + U_{it} \quad (1)$$

In model 1, we have captured the quality of life through HDI. The HDI index ranges from 0 to 1, where 0 represents the lowest human development while 1 stands for the highest human development. Military expenditures that are our main variable are measured as military expenditures as a percentage of GDP. Similarly, trade openness is measured as trade as a percentage of GDP while per capita income is measured in real terms. Moreover, inflation rate and government expenditures in the economy are approximated by the price level of household consumption and price level of government consumption, respectively. Finally, urbanization is captured through the total urban population. All variables are converted into the logarithmic form using natural logarithmic transformation in order to linearize the relationship between the dependent and independent variables.

4.2 Data sources and sample

The reliability of data matters the most in applied research. Therefore, we have focused on internationally reliable sources for data collection. Data on quality of life are taken from United Nations Development Programme (UNDP) which is available for researchers for free at (http://hdr.undp.org/en/data). Similarly, data on trade openness, per capita income and urbanization are taken from world development indicators (https://databank.worldbank.org/source/world-development-indicators). Moreover, the Penn World Tables version 9.1 (https://www.rug.nl/ggdc/productivity/pwt/) is utilized to collect data on inflation and government expenditures. Finally, military expenditures that are our main variable in the current study are obtained from the SIPRI database which is also freely accessible at (https://www.sipri.org/databases/milex).

Data are obtained for all member economies for ASEAN region. The inclusion of all countries in the analysis would be helpful in the generalization of results. The time dimension of the panel is spanning from 1990 to 2017. The number of observations is 280 as there are 10 countries and 28 annual observations per country. Hence, the criteria of Hyndman and Kostenko (2007) is satisfied as the number of observations exceeds the number of parameters. Table 2 includes the definition of variables and data sources.

4.3 Econometric methodology

This section is devoted to discussing the econometric methodology for the purpose of empirical estimation. The collected data for the period 1990–2017 for ten ASEAN member countries are panel structures by nature. Hence, the techniques of panel data would be employed to estimate the specified models and extract results. Different contending estimators are available for the estimation of panel data models. Fixed effects or least square dummy variable and random effects or error component models have been used extensively

Brief	Variables	Definition	Data sources
$lnhdi_{it}$	Quality of life	Quality of life is approximated by HDI which ranges from 0 to 1 where 0 indicates the lowest level of human development while 1 reflects the highest level of human development	UNDP
$lnmex_{it}$	Military expenditures	Military expenditures as a percentage of GDP	SIPRI military expenditures database
$lninf_{it}$	Inflation	Price level of household consumption, price level of USA GDP in 2011 = 1	Penn world tables
$lnopen_{it}$	Trade openness	Trade as (% GDP)	World development indicators
$lnpcy_{it}$	Per capita income	Real per capita GDP	World development indicators (WDI)
$lnurb_{it}$	Urbanization	Total urban population	WDI
$lngex_{it}$	Government expenditures	Price level of government consumption, price level of USA GDP in 2011 = 1	Penn world tables

Table 2.
Variables and data sources

in literature in the framework of panel data (Tahir *et al.*, 2019; Tahir and Azid, 2015; Dewan and Hussein, 2001). In fixed effects model, it is possible that the intercept may vary across individual entities, but each entity's intercept remains constant over time (Gujrati, 2004). On the other hand, in random effects modeling, the intercept stands for the mean value of all entities while the disturbance term stands for the random deviation of entities from the mean. Gujrati (2004) further argued that if error term and independent variables are uncorrelated, fixed effects model is suitable while the use of random effects modeling is preferable in the situation where independent variables and regressors are not correlated.

Choosing between the fixed and random effects modeling is normally done with the help of Hausman test (1978). The test is based on Chi-Square statistics and its associated probability. The rejection of null hypothesis is the indication to use the fixed effects and ignore the random effects model. Likewise, the acceptance of the null hypothesis would mean to prefer the random effects model over the fixed effects. We have carried out the Hausman test and its results provided in Table 3 have provided solid evidence to estimate the specified models using the fixed effects framework. Similarly, the redundant test shown in Table 4 has suggested using both time and cross-section fixed effects model as data are not poolable.

Test summary	Chi-Sq. Statistic	Chi-Sq- d.f	Prob
Cross-section random	102.978	6	0.000

Table 3.
The Haussmann test

Effects test	Statistic	d.f	Prob
Cross-section *F*	99.997	(9,204)	0.000
Cross-section Chi-square	408.884	9	0.000
Period *F*	1.657	(27,204)	0.026
Period Chi-square	48.995	27	0.005
Cross-section/period *F*	53.416	(36,204)	0.000
Cross-section/period Chi-square	579.053	36	0.000

Table 4.
Redundant fixed effects test (pool vs. panel)

Besides the aforementioned methodologies, we have also employed the generalized least square (GLS, hereafter) for estimation purposes as it is treated in the literature as the robustness of traditional fixed effects. Apart from that, the two-stages least squares estimating tool (2SLS, hereafter) is also utilized with the purpose to get rid of the potential endogeneity problem.

5. Results and discussions

5.1 Descriptive statistics

In this section, descriptive statistics of variables chosen for the study are presented in Table 5.The average value of HDI is 0.654 which is the indication of improved quality of life in ASEAN economies. The maximum and minimum values of HDI are 0.934 and 0.374, respectively, while the standard deviation is 0.133. Similarly, military expenditures as a percent of GDP are 2.409% while the maximum values are 8.7 and 0.20%, respectively, for ASEAN economies. The maximum and minimum values of military expenditures are recorded for Lao PDR for the years 1992 and 2010, respectively. In terms of per capita income, the ASEAN economies are enjoying relatively higher per capita income. The mean value per capita GDP is 10,420.83 US dollars while the maximum values of 56,740.75 US dollars and 321.2812 US dollars are recorded for Singapore and Cambodia, respectively. The ASEAN economies have done well in terms of trade openness as the average value of trade openness is 128.219% which is excellent. The highest value of trade openness is observed for the economy of Singapore while the lowest value is recorded for the economy of Myanmar, respectively. Similarly, the mean value of urbanization is 23,320,728 while the maximum and minimum values are 145,000,000 and 171,889, respectively. As far as inflation is concerned, the mean value is 0.40 while the maximum and minimum values are 1.158 and 0.079, respectively, with a standard deviation of 0.192. Finally, in terms of government expenditures, the average value is 0.265 with a standard deviation of 0.178. The maximum and minimum values of government expenditures are observed for Singapore and Vietnam for the years 1996 and 1991, respectively.

5.2 Discussion on main findings

In this section, the results of the estimated models are shown in different columns of Table 6. Column 2 of Table 6 includes estimated results based on the traditional pooled least squares. Similarly, the results extracted with the fixed effects approach are shown in the final column of Table 6.

The pooled least square results shown in the second column of Table 6 have provided a general idea about the variables included in model 1. Military expenditures appeared to be the main hurdle to improved quality of life as it possesses a negative coefficient, and further it is also significant at a standard level. Besides military expenditures, the inflation rate has also negatively affected the quality of life. On the other hand, per capita income, urbanization,

	hdi_{it}	mex_{it}	pcy_{it}	$open_{it}$	urb_{it}	inf_{it}	gex_{it}
Mean	0.654	2.409	10420.83	128.219	23,320,728	0.404	0.265
Maximum	0.934	8.700	56740.75	437.326	145,000,000	1.158	0.872
Minimum	0.374	0.200	321.2812	0.273	171889.0	0.079	0.031
SD	0.133	1.685	14985.63	91.833	31,116,685	0.192	0.178
Observations	280	280	280	280	280	280	280

Source(s): Authors own calculations

Table 5.
Descriptive statistics

Variables	Pooled OLS Coefficients	Fixed effects Coefficients
$lnmex_{it}$	−0.021*** (0.005)	−0.007* (0.003)
$lninf_{it}$	−0.114*** (0.021)	−0.020*** (0.004)
$lnopen_{it}$	0.025*** (0.004)	0.007*** (0.002)
$lnpcy_{it}$	0.125*** (0.005)	0.195*** (0.013)
$lnurb_{it}$	0.022*** (0.002)	0.045* (0.026)
$lngce_{it}$	0.092*** (0.015)	0.014*** (0.003)
Constant	−2.001 (0.079)	−2.829 (0.327)
Diagnostic tests	*R*-squared: 0.933	*R*-squared: 0.993
	Adj-*R*-Squared: 0.931	Adj-*R*-Squared: 0.992
	F-test: 559.184	*F*-test: 753.753
	P(*F*-test): 0.000	*P*(*F*-test): 0.000

Table 6.
Main regression findings

Note(s): The dependent variable is the natural logarithm of HDI. The statistics in parentheses are the standard errors. (***) and (*) measure significance level at 1 percent and 10 percent level

government expenditures and trade openness have helped the ASEAN region in improving the quality of life over the years.

Next, we turn to the fixed effects results demonstrated in the last column of Table 6. The results indicated that variables included in the model are relevant determinants of quality of life. According to results, military expenditures have cast a significant negative impact on the quality of life. It implies that increased military expenditures are harmful to the improved quality of life. Increased military expenditures, therefore, need to be curtailed if the goal of ASEAN member countries is to enhance the quality of life of the masses. Although increased military expenditures ensure sovereignty and hence are important, however, they need to be kept to certain limits so that the quality of life is unaffected.

The results also showed that the inflation rate has also influenced the quality of life both negatively and significantly at the standard level. The inflation rate normally adversely affects the real income of the people and hence their purchasing ability decreases drastically. In terms of magnitude, it appeared that the adverse impacts of inflation are higher than military expenditures on quality of life. The negative relationship between inflation rate and quality of life is also consistent with the findings of Arisman (2018). Therefore, extra efforts are required on the part of policymakers to control and monitor higher inflation in the economy so that to protect the quality of life from falling down. Control over inflation would also add to the growth process positively besides improving the quality of life in ASEAN economies.

Trade openness that is considered as the engine of growth in the literature has also affected the quality of life positively which is consistent to our prior expectations. Trade openness brings down prices significantly owing to the presence of competition and hence real income of the common people flourishes remarkably. It is well understood that increased real income would enable the common people to spend more on good quality products, and hence the quality of life would be affected positively. Further, trade openness also ensures access to a variety of good quality products due to which the quality of life would be improved. Therefore, the ASEAN member economies are suggested to speed up the trade liberalization efforts in order to not only improve economic growth but also enhance the quality of life of the masses which is desirable.

Urbanization that is used as one of the determinants of improved quality of life has demonstrated a positive relationship with quality of life in the estimated model. The coefficient of urbanization is positive and statistically significant. It implies that urbanization is an important factor for an improved quality of life. Urban centers are full of facilities

required for the improved quality of life. However, urbanization also leads to some socio-economic problems as it degrades the environment and also exerts pressure on the existing scarce resources. Therefore, urbanization should be monitored carefully by policymakers in order to avoid its adverse consequences for the environment.

Further, the findings showed that government expenditures in the economy are important from the perspective of improved quality of life. The coefficient of government expenditures in the estimated model is both positive and statistically significant. Government expenditures most of the time are targeted for the wellbeing of the masses and hence indirectly they affect the quality of life positively. Specifically, in the ASEAN region, the majority of the governments are spending significantly owing to their better economic performance for the welfare of the masses over the years. Therefore, based on the findings it is suggested that governments of ASEAN member countries target their spending toward the wellbeing projects of the masses.

Per person income entered to the estimated regression model with an expected positive coefficient indicating that it matters from improved quality of life. Higher per person enhances the purchasing capacity of the masses and hence the quality of life would be moved in an upward direction. It is a fact that per person income is relatively higher in the ASEAN region, and hence it could be one of the possible explanations of improved quality of life. In terms of magnitude, the positive impact of per person income on the quality of life is highest among other determinants of quality of life. Arisman (2018) also showed that per capita income and quality of life are positively related to ASEAN economies. Policymakers are, therefore, suggested to bring significant improvements in per person incomes of the individuals so that to enhance the quality of life.

The adjusted R-squared is excellent to all the estimated models and hence it is the indication of a suitable selection of variables. Similarly, the difference between the R-squared and adjusted R-squared is minimal which is the endorsement of inclusion of relevant variables in the model. Lastly, the F-test and its associated probability have confirmed the fitness of all estimated models.

5.3 Robustness testing

In this section, we have changed the methodology of estimation for the purpose of carrying out robustness testing of the findings reported earlier in Table 6. Following practices of previous literature, we have employed the GLS and two stage least squares (TSLS) estimators to estimate the specified models. The GLS estimator is considered as a robustness test for the traditional fixed effects estimator (Chen and Gupta, 2009). On the other hand, the TSLS estimator is efficient and capable to handle the potential endogeneity problem that may exist in the model. We have used lagged values of variables as instruments to tackle the potential endogeneity problem. Results for both the GLS and TSLS estimator are shown in the following Table 7.

In Table 7, results for GLS and TSLS estimator are shown. It could be seen from the results demonstrated in column 2 that both military expenditures and inflation are negatively and significantly related to the quality of life like the previous results. On the other hand, trade openness, per person income, urbanization and government expenditures have also maintained their significant positive relationship with quality of life in the GLS-based estimation.

Moving to the TSLS-based results reported in the last column of Table 7, it is witnessed that the results reported earlier remained unaffected. In the TSLS approach, we found that again military expenditures and inflation are harmful from the perspective of the quality of life. Both should be controlled and monitored by policymakers in order to enhance the quality of life. Moreover, in the TSLS-based estimation, the positive and significant impacts of trade openness, per person income, urbanization and government consumption did not change.

Variables	GLS estimator Coefficients	TSLS estimator Coefficients
$lnmex_{it}$	−0.030*** (0.002)	−0.020*** (0.003)
$lninf_{it}$	−0.127*** (0.014)	−0.119*** (0.022)
$lnopen_{it}$	0.015*** (0.003)	0.026*** (0.004)
$lnpcy_{it}$	0.125*** (0.003)	0.123*** (0.004)
$lnurb_{it}$	0.019*** (0.001)	0.021*** (0.002)
$lngce_{it}$	0.114*** (0.010)	0.097*** (0.015)
Constant	−1.923 (0.053)	−1.971 (0.080)
Diagnostic tests	*R*-squared: 0.979	*R*-squared: 0.935
	Adj-*R*-squared: 0.978	Adj-*R*-squared: 0.933
	F-test: 1876.480	*F*-test: 533.682
	P(*F*-test): 0.000	*P*(*F*-test): 0.000

Table 7. Robustness findings

Note(s): The dependent variable is the natural logarithm of HDI. The statistics in parentheses are the standard errors. (***) measures significance level at 1 percent and 10 percent level

6. Conclusions and implications

6.1 Concluding remarks

This paper was aimed to provide comprehensive empirical evidence about the relationship between military expenditures and quality of life. Panel data for the period 1990–2017 are taken from Penn World Tables, UNDP and WDI for ASEAN member economies. The collected data are utilized by employing relevant econometric tools in order to estimate models and obtain results.

The obtained findings have shown that military expenditures have adversely affected the quality of life of the masses residing in ASEAN economies. Military expenditures although may be necessary for sovereignty, however, they must be kept to certain limits in order to improve the quality of life of the people. Similarly, the inflation rate is also found to be one of the major hurdles for improved quality of life. The inflation rate adversely affects the purchasing power of the consumers owing to its negative impact on the real income of the consumers. Therefore, it is indeed necessary for policymakers to have strict control over inflation in order to protect the quality of life from deterioration. On the other hand, the results endorsed that trade openness, per capita income, government expenditures in the economy and urbanization are the main driving force behind the improved quality of life of the masses. Trade openness causes real income to rise and further gives access to a variety of good quality products due to which the quality of life improves. Urbanization is important for improved quality of life as urban centers are full of basic facilities while higher per capita income enables individuals to buy various goods and services required for improved quality of life. Moreover, a positive and statistically significant relationship is witnessed between increased government expenditures and improved quality of life. Government is an important pillar of the economy and normally most of its expenditures are targeted for the wellbeing of the masses due to which a positive relationship is observed between government expenditures and quality of life.

6.2 Policy implications

The results obtained are comprehensive, robust in terms of reliability. Therefore, the following points are suggested which could be considered by policymakers of the ASEAN member countries.

(1) Members of the ASEAN economies are suggested to have firm control over military expenditures as they can adversely impact the quality of life.

(2) Similarly, a stable macroeconomic system in the form of reduced inflation is needed for improved quality of life as higher inflation is determinantal for the purchasing power of the people.

(3) Liberalization of foreign trade is the key both for sustainable economic growth and improved quality of life and hence should be given priority by policymakers.

(4) The current government expenditures could be continued as they are affecting the quality of life positively. Further, the government should also take some policy steps to cast a positive impact on the income of the people so that to improve their quality of life indirectly.

(5) Lastly, urbanization needs to be controlled as it improves quality but at the same time it is also responsible for various socioeconomic problems.

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