Relationship between Military Expenditure and Economic Growth in ASEAN: Evidence from Indonesia

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Abstract

World military expenditure in post-Cold War world shows increasing trend especially in ASEAN region; Indonesia is no exception. The trend may have been supported by the argument that military expenditure has positive multiplier effects on economic growth. Unfortunately, there have been not too many studies on the effect of military expenditure on economic growth in the Indonesia context. This paper examines the topic by first reviewing literature on the relationship between military expenditure and economic growth, then by empirically testing the causal relationship between the two variables by using the Augmented Sollow Growth Model. The result shows that Indonesia's military expenditure has positive effect on the country's economic growth, which is most possibly caused by development of human capital as effect of military expenditure.

Keywords: military expenditure, economic growth, Indonesia, Augmented Sollow Growth Model

Introduction

In the post-Cold War world, the global strategic environment endured changes, in which the intensity of inter-state conflicts has been decreasing while internal conflicts have been more emphasized. Along with the end of Cold War, global military expenditure constantly decreased from US$1,613 billion in 1988 to US$1,052 billion in 1996. However, after 1998, global military expenditure had been increasing again. In 2012, SIPRI estimated world total military expenditure at US$1,733 billion, increasing 51 percent from US$1,146 billion in 2001.

One of the regions that have been experiencing constant increase in military expenditure is the Southeast Asia. While global military expenditure fell by more than 40 percent in real terms between 1987 and 1997, the military budgets of the five original members of ASEAN (Indonesia, Malaysia, the Philippines, Singapore, and Thailand) increased by more than 75 percent in real terms over that period.

According to Andrew L. Ross (1990), Indonesia military expenditure is

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determined by two types of threats: internal and external threats. Indonesia military expenditure was fluctuating between 1988 and 2010. Before the 1997-98 economic crises, the share of military expenditure in the gross domestic product (GDP) had already decreased from 4.2 percent to 1.5 percent in the previous 15 years, despite annual GDP growth averaged to 5.5 percent. In 1998, Indonesia military expenditure increased by 38 percent in local currency from Rp4.78 trillion in 1997 to Rp6.60 trillion in 1998. However, the drop of Indonesia's currency exchange caused the military expenditure to decrease in real terms, from US$2.50 billion in 1997 to US$2.10 billion in 1998.

From 2001 to 2012, Indonesia military expenditure increased by 366 percent from US$1.93 billion to US$7.05 billion. It decreased in 2005 and 2008, but overall it experienced an absolute rise. In 2010, the country with the biggest relative increase of military expenditure in Asia is Indonesia by 28 percent, followed by Mongolia by 26 percent and Philippines by 12 percent (SIPRI, 2010).

This trend seems to be supported by the argument that military expenditure has positive multiplier effect on economic growth. Benoit (1973, 1978) concludes that military expenditure has positive relationship with economic growth. Eichenberg (1984), studies Germany military expenditure and finds that it has the smallest trade-off compared to other public expenditures. The study shows a more specific factor, i.e. the positive relationship between the increase of military expenditure and the urge to increase tax revenue that can consequently be used to fund social spending.

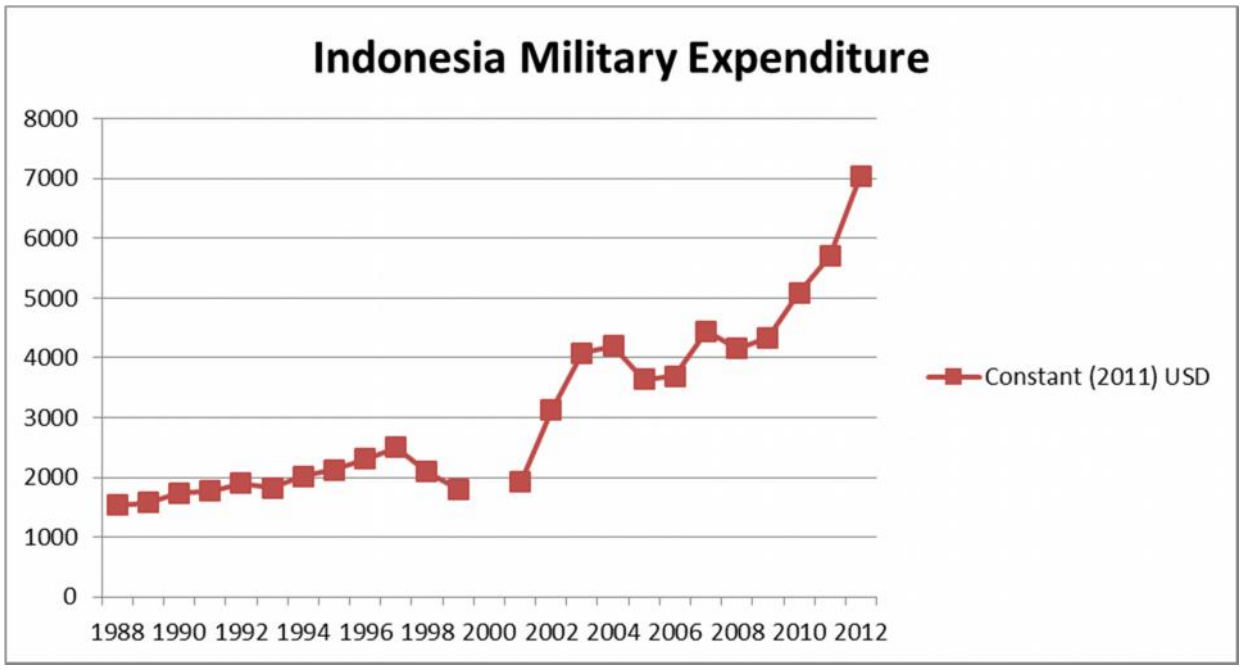
Contrary to that argument, there are also studies that show negative relationship between military expenditure and economic growth, e.g. Hong (1979), Lim (1983), Deger (1983), Smith and Dunne (1994), Heo (2010), and Dunne (2011). In line with this, Anggoro (2003) states that the relationship between the military expenditure will still be a never ending debate among defense economists.

So far, the increasing trend of Indonesia military expenditure has been caused less by the argument about the relationship between military expenditure and economic growth, and more by the needs to fulfill the Minimum Essential Force (MEF). MEF is "a force level that can guarantee the attainment of immediate strategic defense interests, with the procurement priority given to the improvement of minimum defense strength and/or the replacement of outdated main weapon systems/ equipment." In 2010-2014, Indonesia defense sector needs approximately Rp279.8 trillion, which will be allocated to developing the MEF (Sukma, 2012). In political aspect, Indonesia military expenditure is very changeable compared to other government expenditures.

It is because most stakeholders do not think that military expenditure will give much effect on economic growth. In some theories, government expenditures have heterogeneous effect (Pieroni, 2009). The effects can be either positive or negative to the economic growth.

The empirical phenomenon of the constant rise of Indonesia military expenditure, coupled with the various arguments about the relationship between military expenditure and economic growth, make the topic of the relationship in Indonesia context very interesting. The previous studies that discuss this topic specifically are not widely available and only in very few number. Therefore, this study aims to revisit the relationship between military expenditure and economic growth in Indonesia, given new theoretical development and newly available empirical data.

Graphic 1 Indonesia military expenditure in constant 2011 USD, 1988-2012



Source: SIPRI Military Expenditure Database

Literature Review

The following literature review sees several theoretical and empirical studies that discuss the relationship between military expenditure and economic growth specifically and between the defense sector and the economy generally. The results find three propositions:

1. the relationship between military expenditure and economic growth is significant and negative;
2. the relationship between military expenditure and economic growth is not significant;
3. the relationship between military expenditure and economic growth is significant and positive.

The explanation of each proposition is as follows.

First Preposition: Negative Relationship

The first proposition argues that military expenditure has negative effects on economic growth. This relationship is related to the Production Possibility Frontier model applied to the trade-off between the defense sector and the civilian sector, often termed as "guns versus butter". In this model, the state must choose between two sectors to spend its limited resources (represented by the GDP): the guns (defense sector) or the butter (civilian production). There are various explanations to this proposition, which have been clustered as follow.

Productivity

This explanation argues that the defense sector can decrease domestic productivity, caused by the trade-off between the productivity of the defense sector and of the civilian sector. Hong (1979; cited in Heo, 2010), shows empirical evidence of a U.S. productivity decline due to a resource shift

from civilian to military use. This explanation is in line with Ward and Davis (1992) who find that the factor productivity of the civilian sector in the U.S. is higher than that of both the military and the nonmilitary public sectors. Aizenman and Glick's study (2003) also tell that the impact of military expenditure on growth is found to be non-significant or negative.

Grobar and Porter (1989) study several empirical literatures and uncover the negative effect of defense spending and economic growth, e.g. Kaldor (1976), who samples 40 least developed countries (LDCs) for 1963-1973 and produces a correlation coefficient of -0.18 between military burden and the rate of growth. There was also Lim (1983), who reexamines Benoit's analysis (that military expenditure affects growth through aggregate demand) for 54LDCsover 1965-1973 period within the context of Harold-Domar growth model of the form, and concludes that military spending is detrimental to growth in LDCs. Nabe (1983) looks at the effects of military spending on growth in 26 African countries over the period of 1967-1976, and finds that military spending reduces manufacturing GDP through the indirect effects of military spending on social and economic development factors. Faini, Annez, and Taylor (1984) test for the effects of military spending on economic performance in the context of 69 countries over 1950-1970 with pooled time-series/cross-sectional data and find the coefficients on defense burden to be consistently negative except for the group of developed countries.

Smith (1977, 1978, 1980) finds statistical evidence for OECD countries that military expenditure has a substantial negative effect on capital formation and consequently significantly reduces growth rates even when "spin-off" effects are allowed for. Melman (1983) states that defense industries attract highly trained workers and engineers and thus have a draining effect on human resources for private industries. Deger (1986) similarly argues that military expenditure diverts the limited resources away from the civilian economy. Goldstein (1988) argues that a 1 percent increase in the defense share of Gross National Product (GNP) in the United States reduces economic growth by about 1.5 percent because of the opportunity costs, i.e. a trade-off in the budget and the bottleneck effect of defense spending on capital stock. Cuaresma and Reitschuler (2004) also argue that defense expenditure can be unproductive, although they provide insurance against wars. Dunne and Uye (2009) review several empirical literatures and find results showing negative or insignificant effects of military spending. Blond (1980) finds that the average 10 percent rise in military budget of the United States can reduce employment by 0.6 to 2.4 percent.

Another explanation regarding productivity topic sees that the defense sector has destructive effect on the productivity of civilian sector. Murdoch and Sandler (2002), in Alptekin (2009),look at countries experiencing civil war could not recover easily as their scarce physical and human capital has been destroyed, and as the intensity of civil war increases, the effect on growth is more negative.

Another explanation focuses on the relationship between monetary policy between the legislatures, armed forces, and the defense industry base that support it, referred as "military industrial complex" (MIC). Dunne and Skons (2011) reveal that MICs create inefficiencies in the economy and so can have negative economy effects, particularly as the nature of defense production changed during the cold war and became very different from civil production, which can also lead to other externality effects through influences on the civil sector and crowding out.

Investment

This explanation argues that the defense sector can hinder investment. Lim (1983) obtains that there is a negative effect of military expenditure on growth through Foreign Capital Inflow (FCI) that may control investment and military expenditure together. Faini *et. al.* (1984) also show that military expenditure can influence investment negatively, hence growth of output, through absorptive capacity. Lindgren (1984) reviews a dozen studies and reports that increase in defense expenditures result in the decline of private investment. Mintz and Huang (1990, 1991) report that defense spending and private investment vie for the non-consumption portion of the total capital available in the economy, which means that more spending on defense programs is likely to result in the decline of private investment. Heo and Eger (2005) also find that defense spending has a dampening effect on private investment with one-year delay.

More generally, this explanation also relates military expenditure with the peace dividend, i.e. the potential long-term benefit as budgets for defense spending are assumed to be at least partially redirected to social programs and/or a decrease in taxation rates. For example, Gleditsch *et. al.* (1996) use large structural models that tend to show the existence of a 'peace dividend' as the benefit of reducing military spending and reallocating it.

Fiscal

This explanation argues that the defense sector can worsen the fiscal condition of a country. Smith and Dunne (1994) state that military expenditure would be a very bad fiscal regulator because of the lags before it comes into effect: it takes too long to plan and implement to be an effective stabilizer.

Saving

This explanation argues that the scale of domestic saving will decrease in line with the increase of tax to fund military expenditure. Deger (1983) estimates the relationship between defense expenditure and economic development using national average data of 50 LDCs for the period of 1965-1973 and finds that military spending has a negative coefficient on saving.

Second Preposition: Insignificant Relationship

The second proposition argues that military expenditure bears no significant relationship with economic growth. This proposition is based on various empirical researches that find the regression analysis on both variables doesn't produce a statistically significant coefficient of correlation. Some of those researches include Biswas and Ram (1986) who re-estimate Benoit's equations for 58 countries over the periods 1960-1970 and 1970-1977 and find that the coefficient on military burden for the low-income LDCs is statistically insignificant. Biswas and Ram (1986) for asserting that defense expenditures in general may affect economic growth positively or negatively, but the effect is unlikely to be consistently significant on the grounds that the nature and the amount of the spending vary over time. Joerding (1986) even states that economic growth may be causally previous to defense expenditures. Landau (1986), in Grobar and Porter (1989), finds that the estimated impact of the share of military expenditure in GDP on the GDP growth rate is rarely, and never significantly, positive.

Heo (2010) as well as Payne and Ross (1992), conduct vector auto-regression analysis to test if U.S. defense spending and economic growth have a causal relationship, and both studies find results that indicate no causal relationship between

the two variables. Heo (2000) conducts an empirical analysis employing various versions of the Feder-Ram–based defense–growth models to test the direct effects of defense spending on economic growth in the United States for 1948 through 1996 and finds a consistently insignificant relationship between both variables. Gerace (2002) and Becker (1991) to argue that defense spending per capita in the United States is simply not large enough to have a statistically meaningful effect on economic growth.

Third Preposition: Positive Relationship

The third proposition argues that military expenditure is directly proportional with economic growth. There are various explanations to this proposition, which have been clustered as follow.

Security

This explanation argues that military expenditure is important to guard national security that is vital for supporting economic activities. Baran and Sweezy (1966), in Dunne (2011), see military spending as important in preventing realization crises, through absorption of surplus without raising wages or capital; other government expenditure could not do this. In line with the statement, Thompson (1974), in Mylonidis (2006), argues that government activities, such as the provision of national defense, which maintain property rights, can indirectly support growth by increasing citizens' incentive to accumulate capital and to produce. Dunne (1990) also notes that that war would have a negative impact upon the economy, and to prevent a war outbreak, military expenditure to provide defense is required. Sandler and Hartley (1995) point that defense spending contributes to maintaining both internal and external security, which is critical for economic activities. Hall and Jones (1999) explains that military expenditure in the developed countries is needed to maintain the fragile structure of the government, which will not be without any economic cost. In the study by Aizenman and Glick (2006), as quoted in Alptekin (2009), argue that the non-linear relationship between growth and military expenditure is associated with the degree of security and this is related to the level of threat. Their model specifies that if there is a threat (resulting insecurity) above a threshold value, then a country benefits by increasing its military expenditure.

Aggregate Demand

Benoit (1973, 1978), as quoted in Alptekin (2009), is the proponent of the idea that military expenditure may positively affect growth through aggregate demand. It is related to the capacity utilization, and also that when an economy is in a phase of recession an increase in military expenditure will boost the economy. Benoit's analysis (1978), quoted in Deger and Smith (1983), finds a significant, positive correlation between defense expenditure as a proportion of national income and the growth rate of civilian output between 1950 and 1965. Other studies that follow Benoit's methodological approach have also derived positive cross-sectional effect of military expenditure on growth. Chan (1995), in Heo (2010), similarly explains that the positive employment effects of defense spending also boost aggregate demand in the United States economy, in which those who earn income through defense programs or Department of Defense (DOD) contract awards consume their earnings, which enhances aggregate demand

Employment

This explanation argues that military expenditure leads to employment. Nincic and Cusack (1979) as well as Blank and Rothschild (1985) report that defense

programs generate employment in the U.S. because of the large size of the U.S. armed forces. This is in line with Former Secretary of Defense Casper Weinberger's argument (1983, p.68) that defense cutbacks of $1 billion would result in the loss of approximately 35,000 jobs in the U.S. alone. Cuaresma and Reitschuler (2004), in Heo (2010), report that the externality effects of U.S. defense spending on economic growth are positive, with one of the reasons commonly cited for it being the positive association between the two variables is job creation.

Technology

This explanation argues that military expenditure allocated to develop military technology will create spin-off to civilian technology. One of the literatures that argue likewise is Adams and Gold's research (1987) in which they contend that the defense industry has been a source of significant technological innovation in the U.S. and has promoted growth through a spin-off effect on the private sector. In line with this explanation, Deger and Sen (1995), in Stroup and Heckelman (2001), note that various studies have considered whether technology spin-offs arising from defense weapons production in countries with capital intensive military sectors might enhance growth.

Human Capital

This argument sees the relationship between a part of the military expenditure and the development of human capital. Barro (1990), in Heo (2010), notes that a portion of defense spending is used to support education, which enhances human capital. Weede (1983), in Grobar and Porter (1989), argues that military spending encourages economic growth because "the military teaches discipline and creates a useful habit of obeying orders" and "the more capable and disciplined the work force is, the better the economic performance should be." Weede estimates 95 LDCs using data from the period 1960-1977.

Economic Stimulus

This explanation argues that military expenditure can stimulate the economy. Pivetti (1992) and Cypher (1987) suggest that military spending is a conscious instrument of economic policy and has a stimulating effect on economy. Mueller and Atesoglu (1993), in their empirical analysis quoted in Heo (2010), also find that defense spending stimulates the U.S. economy.

The various explanations of the three propositions are summarized in the following table:

Table 1 Explanations of the relationship between military expenditure and economic growth

Significant, Negative Relationship	Insignificant Relationship	Significant, Positive Relationship
Defense sector can decrease domestic productivity	Regression analysis on both variables doesn't produce a statistically significant coefficient of correlation	Military expenditure is important to guarantee national security, which is vital to support economic activities
Defense sector may hinder investment	The nature and the amount of defense expenditures vary over time	Military expenditure can influence growth through aggregate demand related to the capital utilization
Defense sector can worsen fiscal conditions	Defense spending is not large enough to have a statistically meaningful effect on economic growth	In recession, rise of military expenditure may encourage the economy
The scale of domestic saving will decrease in line with the increase of tax to fund military expenditure		Military expenditure can lead to employment
		Military expenditure to develop military technology will create spin off to civilian technology
		A portion of defense spending is related to the development of human capital

Methodology

The main purpose of this study is to test the causality relationship between military expenditure and economic growth. The relationship will be tested by using the Augmented Solow growth model, as suggested by Dunne, Smith, and Willenbockel (2005). Another model often used to test the relationship between military expenditure and economic growth in the literatures of defense economics is the Feder-Ram model. According to Dumas (1986) and Heo (2010), this model can distinguish the effects of government expenditures for the military sector and nonmilitary sector (Heo, 2010). The Feder-Ram model also includes the externality factors from government expenditure (Heo, 2010). Despite that, Dunne, Smith, and Willenbockel (2005) criticize that there is a severe simultaneity problem between the dependent variable and the independent variables in this model (Heo, 2010).They further argue that this model has multicollinearity between independent variables (Heo, 2010). Therefore, they recommend the use of Augmented Solow

growth model commonly used in literatures about economic growth.

To see the complete explanation about the specifications of the Augmented Solow growth model for defense economics study, read Dunne, Smith, and Willenbockel (2005). The final model that is tested in this study is:

$$d(\ln(Y)) = \ln(Y_{t-1}) + \ln(s) + \ln(g + n + d) + \ln(M) + \ln(M_{t-1})$$

Note:

Y : Gross Domestic Product (GDP) at constant prices

s : share of investment (formation of gross domestic fixed capital) in GDP

M : share of military expenditure in GDP

g, n, d : factors determining the steady-state of an economy, in which g represents technological progress, measured by the share of population working in the industry sector in the total of workforce; n represents share of employment in the total population; d represents share of depreciation in GDP.

Table 2 Data source for variables used in this study

Variables	Data Source
Y	Using data of GDP (constant local currency unit) in the database of World Development Indicators (WDI) accessed from databank.worldbank.org
S	Taken from data of Gross Fixed Capital Formation (constant local currency unit)from the database of World Development Indicators (WDI) accessed from databank.worldbank.org
M	Using data of Military Expenditure taken from SIPRI(Stockholm International Peace Research Institute)Military Expenditure Database.
G	Proxy by using share of population working in the industry sector in total workforce. The data of the share of employment in the industry sector is taken from the database of World Development Indicators (WDI) accessed from databank.worldbank.org
N	Taken from data of Total Labor Force and Population from the database of World Development Indicators (WDI) accessed from databank.worldbank.org
D	Taken from data of depreciation in GDP based on expenditures in the database of Indonesian Economic and Financial Statistics (SEKI)accessed from www.bi.go.id

In social science, to conclude that there is a causal relationship between two variables, there are at least three requirements: association, non-spuriousness, and direction of influence (Singleton and Straits, 2010). Association is fulfilled when there is strong association or correlation between military expenditure and economic growth. Non-spuriousness requires this study to eliminate probability of association or relationship produced by other external factors. Direction of influence requires the direction of the causal relationship to be clear: meaning, this study

shall be capable to limit military expenditure as the cause of economic growth. If it appears that economic growth also in turn plays a causal role for military expenditure, the pattern of causal relationship between the two variables becomes unclear.

Results

Association can be evaluated by seeing the coefficient of correlation (*r*) betweenthe variable of military expenditure (**ln(*M*)**) and the variable of economic growth (**(*d*(ln(*Y*))**). The coefficient of correlation between both variables is 0.3612 (see attached *Stata*output). This shows that both variables have positive relationship, despite not too high. However, there is a probability that the correlation is significant in explaining the relationship between military expenditure and economic growth.

Spurious relationship is usually produced by non-stationary data that is not co-integrated in long term. Therefore, to test whether the data used in this study have the probability to produce spurious regression, this study conducts the Dickey–Fuller test (DF Test) for unit root, to test the data stationarity. The result is that all independent variables are non-stationary in level 0, but are stationary in level 1. Therefore, the regression model is further modified into:

$$d(\ln(Y)) = \mathrm{d}(\ln(Y_{t-1})) + d(\ln(s)) + d(\ln(g+n+d)) + d(\ln(M)) + d(\ln(M_{t-1}))$$

To test the pattern and direction of the relationship between the variables, this study conducts the Granger causality test. The result is that the variable of economic growth has simultaneous causality with military expenditure, meaning that not only economic growth is affected by military expenditure, but military expenditure is also affected by economic growth. To find the parameter that can estimate the simultaneous relationship between the variables, this study conducts a regression using the Three-Stage Least Squares(3SLS) model, which follows the following equations:

$$d(\ln(Y)) = \mathrm{d}(\ln(Y_{t-1})) + d(\ln(s)) + d(\ln(g+n+d)) + d(\ln(M)) + d(\ln(M_{t-1}))$$

$$d(\ln(M)) = d(\ln(Y)) + d(\ln(M_{t-1})) + d(\ln(Govt))$$

This study suspects that other than the independent variables in the system, there is also a linkage between the disturbance factor from both equations in the system that also explains the relationship between military expenditure and economic growth. To summarize it, the disturbance factor in each equation is suspected to affect the military expenditure and economic growth. Therefore, this study also conducts 3SLS model regression using the seemingly unrelated regression (SUR).

Prior to discussing the regression result, the descriptive statistics for each variable will be presented as follows.

Table 3 Descriptive statistics of variables used in this study

Variable	Mean	Std. Deviation	Median	Unit
Gross Domestic Product at constant prices (Y)	1,460	420	1,440	trillion rupiah
Share of investment (formation of gross domestic fixed capital) in GDP (s)	22.73	2.48	22.47	percentage
Share of military expenditure in GDP (M)	1.06	0.16	1.06	percentage
Share of employment in the total population (n)	62.58	0.93	63.00	percentage
Share of population working in the industry sector in the total of workforce (g)	17.09	2.75	18.00	percentage
Share of depreciation in GDP (d)	4.90	1.76	5.00	percentage
observations: 1988-2010 (23 units)				

In the above table, the median and mean of each variable is relatively the same, thus bias due to extreme lower or upper value needs not to be concerned. The share of investment in Indonesia is relatively small, only 22.73 percent of GDP. It is rather low compared to the number of other countries in the region: China's 35.76 percent, South Korea's 32.03 percent, Thailand's 30.55 percent, Singapore's 29.51 percent, Malaysia's 28.95 percent, and Japan's 25.87 percent (databank.worldbank.org). In an economy, investment encourages current GDP and develops productive capitals that the economy runs on: both physical infrastructures such as buildings, roads, and machines, and also soft infrastructures such as software and patents. The higher the share of investment, the higher the capacity of an economy to increase its productivity; thus increasing its economic growth.

The portion of military expenditure in Indonesia's GDP is relatively small. Indonesia's 1.06 percent is lower than the average 2.61 percent of 164 countries, especially to other countries in the region: Singapore's 4.51 percent, South Korea's 3.05 percent, Malaysia's 2.31 percent, China's 2.05 percent, Thailand's 1.90 percent, and the Philippines' 1.75 percent (SIPRI Military Expenditure Database). Only Japan's 0.94 percent figure is lower than Indonesia's since because of the Article 9 of its Constitution, which limits its defense spending to 1 percent of its GDP. With the small share of military expenditure in Indonesia's GDP, hence it is expected that the burden it may cause to the economy is also relatively small.

The 62.58 percent share of employment in the total population shows that more people works than the dependents. However, the 17.09 percent share of population working in the industry sector is medium-to-small. In 2010, 19.30 percent of total Indonesian employment was working in the industry sector, slightly above half of Czech Republic's 38 percent as the country with highest percentage of employment in industry. Among East Asian countries, China's 28.70 percent was top of the table and 15th among 93 countries with available data of share of employment in the total population from databank.worldbank.org, followed by 20th-place Malaysia's 27.60 percent, and 26th-place Japan's 25.30

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percent, while Indonesia was ranked 61th out of 93. Theoretically, the higher the number, the higher the technological progress of the economy.

The 4.90 percent share of depreciation shows degree of capital need to be replaced. Logically the higher the number, the higher the investment or technological advancement needed to produce economic growth.

Table 4 The results of the 3SLS regressions

	3SLS	3SLS, SUR
Dependent Variable: Economic Growth, $d(\ln(Y_t))$		
Economic growth of previous year, $d(\ln(Y_{t-1}))$	0.1613.	0.1496 .
Capital investment, $d(\ln(s_t))$	0.3032***	0.3147***
Growth of steady state factors (labor), $d(\ln(g_t+n_t+d_t))$	1.3155***	1.2741***
Growth of military expenditure, $d(\ln(M_t))$	0.1786 **	0.0652 **
Previous growth of military expenditure, $d(\ln(M_{t-1}))$	0.0020.	0.0188 .
"**R-square**"	0.6933.	0.8461 .
Chi-square	89.85.	116.71 .
Prob (**Chi-sq**)	0.0000.	0.0000 .
Dependent Variable: Growth of Military Expenditure, $d(\ln(M_t))$		
Economic growth, $d(\ln(Y_t))$	.1996 .	.7138 .
Previous growth of military expenditure, $d(\ln(M_{t-1}))$	.1647 .	.1641 .
Growth of government expenditure, $d(\ln(Gov_t))$	-.0222 .	-.0305 .
"**R-square**"	0.0471 .	0.0617 .
Chi-square	89.85 .	1.73 .
Prob (**Chi-sq**)	0.8763 .	0.6310 .

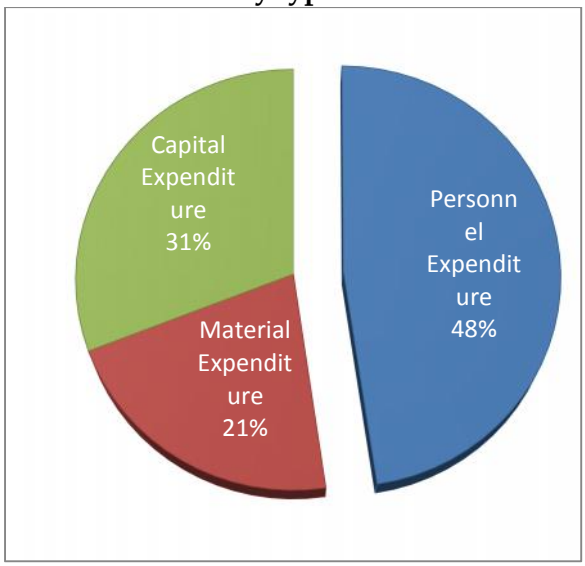
**** significant at α= 1%*
*** significant at α= 5%*
** significant at α= 10%*

Standard Solow growth model conceive that main engines of growth, are investment and steady state factor in which labor or human capital investment is the dominant element. Table 4 shows that the steady state factor has greater positive impacts (1.3155 or 1.2741) than investment (0.3032 or 0.3147). It can be interpreted that for Indonesian economy, in order to boost growth, investment in human capital and other factors affecting the steady state level postulated by Solow is needed more than additional physical capital or gross fixed capital formation. Therefore, it is expected that allocation of resources to this factor will result in a higher economic growth than the one allocated to physical capital.

From the regression results, it can be seen that military expenditure has positive effects on economic growth in Indonesia. The positive relationship between military expenditure and economic growth is most

probably caused by the development of human capital as a portion of defense spending. In military expenditure, personnel expenditure can contribute in developing the human capital through means of training and community involvement conducted by military personnel in the forms of Military Operations Other Than War (MOOTW).The share of personnel expenditure is the highest compared to other types of spending in military expenditure: capital and goods expenditures. Personnel expenditure makes up to 48 percent of the total military expenditure in 2011, while capital spending only makes up to 31 percent and goods spending up to 21 percent.

Graphic 2 Indonesia military expenditure by types



Source: Appendix 1 of the Presidential Decree No. 26 Year 2010

A look at Gyimah-Brempong (1989)'s study can help to elaborate more discussion on the results. Using cross-national data for 39 Sub-Saharan African countries during the 1973 to 1983 period, Gyimah-Brempong also arrives at a relatively similar conclusion to his study regarding labor factor. He uses a four-equation simultaneous model and 3SLS estimation procedure to investigate the relationship between defense spending and economic growth in Sub-Saharan Africa, and withdraws the following conclusions from his econometric analysis:

1. the total effects of defense spending on economic growth are negative and statistically significant,
2. defense spending affects economic growth through increased supply of skilled labor and decreased investment,
3. defense spending does not have significant effect on economic growth while it has positive effects on labor's skill formation.

Having found that African countries' defense spending contributes to the development of human capital in the form of skilled labors, Gyimah-Brempong (1989, p.88) then suggests that defense policy shall focus on labor-intensive armed forces. This will result in increasing stock of skilled personnel while attending to the defense needs of the country. "Emphasis on weapons acquisition at the expense of skill formation is also likely to slow economic growth in foreign exchange scarce economies" (p.88).

Conclusion

Military expenditure is a public spending by governments that has influence beyond the resources it takes up, and consequently beyond the defense sector itself; Indonesia is no exception. Whether the influence is positive, negative, or insignificant does not in Indonesia's case, since Indonesia must inevitably increase its military expenditure gradually to meet its MEF requirements. As the Director-General of Defense Potential (*Pothan*) of the

Indonesian Ministry of Defense, Dr. Ir. Pos M. Hutabarat, explained, the MEF would be fulfilled approximately in 2024 with a nominal approximately Rp300 trillion. He added that the ideal budget to fulfill defense requirements, especially in developed countries, was around 2 to 3 percent of the GDP, while Indonesia military expenditure had merely been under 1 percent. To null this gap, Indonesia military expenditure has been increased gradually each year, notwithstanding the effect it may cast upon economic growth.

However, it is best for Indonesia's interests to know the nature of the relationship between its military expenditure and economic growth, so that the future policy regarding defense spending can be based upon this understanding. This study concludes that the relationship between military expenditure and economic growth in Indonesia is positive. This is because most of Indonesia military expenditure is used for personnel expenditure, which consequently increases the human capital and eventually affects the economy positively. The findings tell us that Indonesia needs not to worry about the damaging trade-off between defense and other government spending on civilian goods, because the former also reinforces the latter, in the form of the development of human capital as a portion of military expenditure. This may be the case in Indonesia, where the National Armed Forces (TNI) holds the doctrine of "*Manunggal TNI dengan Rakyat*" (Unified Armed Forces with the People) and conducts many community development activities, one of which is humanitarian assistance disaster relief operations. The task is the implementation of Law No. 34 of 2004 on the Indonesian Armed Forces, Article 7, Paragraph 2, Item 12.

Other sectors in which military expenditure may have influence show no other significant effect from Indonesia military expenditure. In developed countries, military spending tends to have an impact on growth through its effects on technology. The findings tell us that Indonesia defense industry still cannot contribute to the advancement of technology in Indonesia. This is where Indonesia military expenditure should be highlighted. By the enactment of Law No. 16 of 2012 on Defense Industry, Indonesia needs to put more emphasis on the military technologies that can also affect growth positively.

Another interesting find in this study is that the augmented Solow growth model recommended by Dunne, Smith, and Willenbockel (2005) still has simultaneity problems for the Indonesia study case, requiring the model to be further modified in order to obtain more robust results.

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