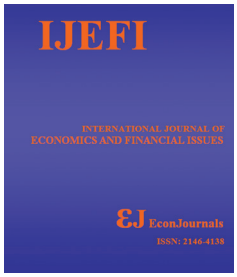

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The Relations of Defense Budget with Investment: Evidence from Indonesia

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ABSTRACT

There are two fundamental elements in building the strength of a country, the economy and defense. Both of these variables influence each other. A country with good economy will be able to provide sufficient defense budget. Meanwhile, good defense can provide indirect effect on the economy. The indirect impact of defense budget to economic growth is through investment. The study was conducted to examine whether the defense budget effected on the economy, particularly investment. Single equation set up to capture the effect of the defense budget on investment individually. The empirical results indicate that, the effect of the increase in the defense budget and the change in non-defense, led to the crowding out effect on investment.

Keywords: Investment, Defense Budget, Defense Economics
JEL Classifications: E65, E22, F52

1. INTRODUCTION

The defense budget does not directly affect the economy, but the impact is important for economic players, which creates a sense of security. With secure sense, economic agent can work optimally. Instead, the economy also affects defense through the amonunt of defense budget, that must be able to be provided by the government. Thus, defense will interact with the economy through the function of protecting the country from the threat.

Theoretically, defense budget must boost economic growth, although there is the possibility of the effect of opportunity cost as a result of policy choices with other welfare budget, and the possibility of crowding out effect to the investment. The economic actors must feel secure in their economic activities, but the defense budget is expected not depress the economy. The economy must be improved by the growth of national income which can increased the defense budget. Thus the economy and defense gives the relationship of reciprocal and mutual influence. Benoit (1978) is an early researchers who claimed the defense budget had a positive influence on economic growth, which is widely supported by other researchers. But many scientists who argue this. In addition, there are also findings that the relationship are neutral, or there are no effect. Various theories is still under debate by experts, through research that they have done.

Based on the description above, it can be expected there is a relationship between defense spending and the economy, through secure sense perception by economic actors. For these, it is necessary to know whether the defense budget policies affect the economy, particularly investment.

2. DEFENSE BUDGET AND INVESTMENT

The indirect impact of defense budget to economic growth is through investment. The investments are made either directly or indirectly, aimed to getting certain return or advantages as a result. Investment decisions are always dealing with the risks and benefits that caused investors will choose an investment that promises the highest return with the lowest risk level.

Investment is a very important factor in the growth of the economy, where production is highly dependent on future production capacity available today. In macro theory, the flow of investment here means expenditure which adds to the stock of physical capital. The stock of physical capital as a result of the investment and

its value is always reduced by depreciation, thus to maintain the value of the stock of physical capital expenditure this will require new investment.

Harrod Domar, in West and Thompson (1990) report that, an investment has two characters. On the one hand, investments contribute to the aggregate demand thereby helping to reach full employment and full capacity in the short term. While the other side on a long-term investment, involve in the increase of the stock of capital, thus contributing to the economic output of the deals that are able to do production.

In some studies, showed defense spending could lead the investment be pressed (crowd out). Heo and Eger (2005) concluded types of trade-offs between defense expenditure to investment. The first type, is increased competition from non proportion of consumption on consumption of total economic output. The workers will strongly resist the cuts of private consumption and social welfare budget, because the non-military government spending is usually directly substituted by private consumption. The second type, trade-offs on spending on military budgets and investment demand that refers to the same industry. For example, almost all military equipment produced by capital-intensive industries, such as engineering, electronics, aerospace, and others. The third type of trade-off between spending on defense with investment, is in the form of bugget induced budgetary trade-offs. Because spending on defense is one of the government spending, so any additional defense budget will increase the tax burden or heavy budget deficits, or both, resulting the lower savings, thereby reducing funds for investment.

Benoit (1978) gives his views on the effect of crowding out of investments. He explained that when defense spending crowd out investment, measures to cut defense spending does not lead to investments become larger. Because cutting it only impacts on consumption and social investment, not on productive investment. Benoit also convinced that the crowding-out in developing countries is very small, because it only affects the little resources compared to the entire private investment. It will provide a minimal reduction in the level of investment, even smaller impact on economic growth based on smaller capital output ratio. But Benoit continued to receive conventional assumption, that the improvement of the supply side is still more important than paying attention to the shortage of demand, particularly for growth in developing countries.

3. MODELLING THE DEFENSE-INVESTMENT RELATIONSHIP

In analyzing the defense and the economy as well as relationships or trade-offs that occur in them, we referring to the economics of defense study. Defense economics using economics as a tool to analyze the defense and other issues related to defense. In analyzing the defense economics, assembled various methods of economics, both theoretically and empirically, that are used in defense issues and policies, as well as view the institutional aspects and characteristics of the defense sector (Hartley and Sandler, 1995).

For more in-depth analyzes about the influence of the military budget on the economy, need to be evaluated the influence of the military budget to economic growth through investment. Investment is the element most frequently changing in gross domestic product (GDP) account. When spending on goods and services fell during the recession, most of the decline was associated with a drop in investment spending.

The increased investment in line with economic growth, it can be presumed that the economic performance in the previous year will be a positive influence on investment. Mintz and Huang (1990; 1991) assumes that the investment is a function of national income and capital stock in the previous year based on the model of flexible acceleration of investment from Clark (1979). Model of Investment (I) formed through the distribution lag national product (Y), plus the depreciation that rated exponentially. McDonald and Edger (2010) return represent this model to describe the relationship between defense spending and investment.

The basic assumption of the model accelerator, is contained the desired capital stock at any point of time multiplied by the constant output, Y, at those times, so:

$$K^d=\alpha Y \quad (1)$$

Where K^d is the "desired capital stock," or the capital stock selected by the entrepreneur if the capital increase occurs immediately at constant prices.

If appropriate capital stock immediate at the desired level without any additional costs, actual capital and desired capital will be the same. Variations in the output also provides a proportional variation in capital stock and directly related to the movement in net investment. But in fact, the change in the capital stock runs very slowly over time; while the net investment, although more volatile than output, can be explained using a model akselator. To explain the slow reaction of capital to output, then the added flexibility in the investment function. The reaction of the capital stock of the output is assumed to spread in some period of time through distribution lag coefficients (βs), so that it can be formed functions:

$$I^N \equiv K - K_{-1} = \sum_{s=0}^{\infty} \beta_s (K^d - K^d_{-s}) \text{ or } I^N = \alpha \sum_{s=0}^{\infty} \beta_s (\Delta Y_{-s}) \quad (2)$$

Where I^N is the net investment in a period of time t, and K is the actual capital stock. Flexible accelerator of above equation has been the representation of the empirical investment behavior are popular, mainly because of the observation that fit on a series of investment and output as well.

Explicit or implicit assumptions about the future level of output, contains the question whether the expectations static output will same with the actual level. If expectations of future output is not static, then the investment in period t is a function of all the expectations of output levels that will come. Implicitly or explicitly, the development of a modern interpretation of the

model accelerator assumes that levels of past output are the most important determinants to look at the expectations of output the future, and other variables included in the model despite having little impact and error is quite large, when put together in an empirical calculation.

By concerning the replacement investment, when the replacement of depreciated capital expected respond the current and past output in a linear, the gross investment, *I*, can be represented as a lag distribution in output plus a constant number, multiplied by the stock of capital in the past period, ie:

$$I_t = \sum_{i=0}^{\infty} \beta_i \Delta Y_{t-i} + dK_{t-1} \quad (3)$$

Mintz and Huang (1991) and McDonald and Edger (2010) represent this model in explaining the relationship between defense spending and investment. The model begins with a flexible accelerator investment, *I*, as a function of output *Y* from previous period and the capital stock, *K*, from the previous period. The formation of the following investment model expanded to include defense spending into the model.

Through the approach of neoclassical, where income gross national product is defined as the sum of, consumption (consumption, *C*), investment (investment, *I*), the issuing of government on goods and services (government purchase, *G*), and net exports representing total exports (total export, *EX*) minus total imports (total imports, *IM*). Then the national income (*Y*) is:

$$Y=C+I+G+(EX–IM) \quad (4)$$

Assuming that the private sector *P*, is the sum of consumption, investment and net export, obtained:

$$Y=P+G \quad (5)$$

The government sector, *G*, disaggregated into military budget (*M*) and spending on non military (*N*), the equation becomes:

$$Y=P+N+M \quad (6)$$

Under the laws of the distribution, then the rate of change in *Y* is equal to the sum of the rate of change of each of the *P, M* and *N,* or first difference. The first difference *Y* is the sum of these three components, namely:

$$\Delta Y=\Delta P+\Delta N+\Delta M \quad (7)$$

The above equation is inserted into the flexible accelerator model of investment (Equation 3), shown in the following forms:

$$I_t = \sum_{i=0}^{\infty} \beta_1 \Delta P_{t-i} + \sum_{i=0}^{\infty} \beta_2 \Delta M_{t-1} + \sum_{i=0}^{\infty} \beta_3 \Delta N_{t-i} + dK_{t-1} \quad (8)$$

If both sides are divided by Y, gives the proportion of each sector to the GDP. This gives a result that is (Mintz and Huang, 1990; 1991):

$$\frac{I_t}{Y_t} = \alpha + \sum_{i=0}^{n} \beta_1 \frac{\Delta P_{t-i}}{Y_t} + \sum_{i=0}^{n} \beta_2 \frac{\Delta M_{t-i}}{Y_t} + \sum_{i=0}^{n} \beta_3 \frac{\Delta N_{t-i}}{Y_t} + \beta_4 \frac{dK_{t-1}}{Y_t} + \varepsilon \quad (9)$$

Where *I* is the real domestic private investment in constant prices; *Y* is the real GDP in constant prices; *P* is a private real output in constant prices; *K* is the net value of the depreciation of real capital stock in constant prices; and *n* is the optimal lag that determined empirically.

The model is formed using a flexible accelerator that assumes the investment is a function of the difference between national income and the capital stock in the previous year. These variables are incremental or looks like the change of variables. Assuming the depreciation of the capital stock is zero, and also because of the availability of data, the model can be written in the form:

$$investy_t = \alpha + \beta_1 \sum_{i=0}^{n} dprivy_{t-i} + \beta_2 \sum_{i=0}^{n} dmily_{t-i} + \beta_3 \sum_{i=0}^{n} dnmily_{t-it} + \varepsilon_t \quad (10)$$

Where *investyt* is the amount of real investment per GDP real terms in period *t, dprivyt* is the change in real spending private sector per GDP real terms in period *t, dmilyt* is the change in real expenditures defense sector per GDP real terms in period *t, dnmilyt* is the change in real spending sector of non-defense per the real GDP in period *t.*

4. DATA

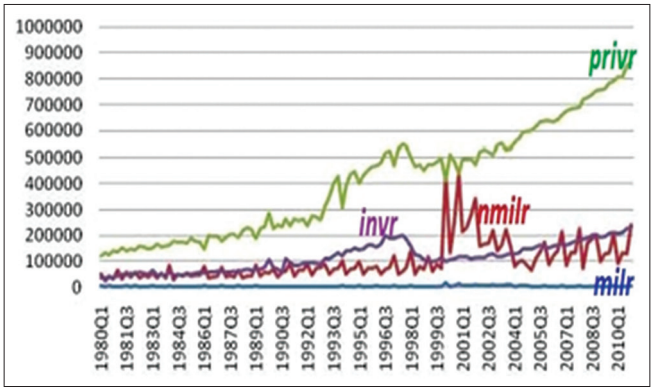
In this analysis will be tested whether the investment is affected by changes of private sector output, defense and non-defense spending. The analysis also aims to determine whether the defense budget changes directly affect investment or experiencing inertia. In the graph below, it appears that the real values from year to year for the amount of investment, output of the private sector, and government expenditure, that shows an ascending trend, but not for defense spending that relatively flat (Figure 1).

The data that used to analyze time series are quartile data, where the period of year 1981 as first quartile, and the period of year 2010 as the last quartile (fourth), with 120 number of observation data. In this study, will be tested the effect of changes in private sector output in real/real GDP, changes in government non-defense sector real/real GDP, and changes in real defense spending on private investment in real/real GDP. The movement of data from all variables involved, can be seen respectively in the Figure 2.

5. RESULTS

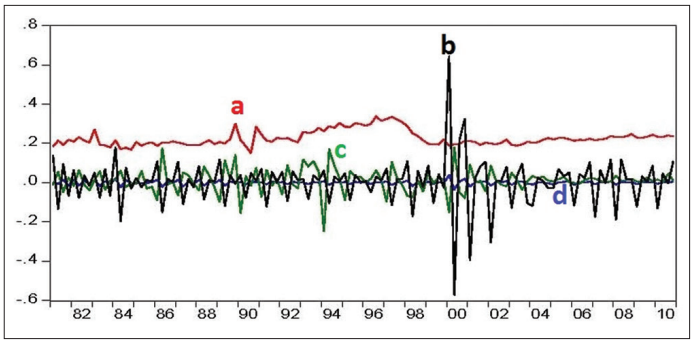
Based on the Figure 2, we want to know whether the defense sector affect the investment. Regression testing of the investment model shows the following results:

Figure 1: Total real investment (*invr*), real private output (*privr*), real defense budget (*milr*), and real non-defense budget (*nmilr*)



Source: Ministry of Finance of the Republic of Indonesia

Figure 2: Amount of real investment output/real gross domestic product or *invy* (a); Changes in real output of private sector/real GDP or *dprivy* (b); Changes in real output of non-military sector/real GDP or *dnmily*; (c) Changes in real output of military sector/real GDP or *dmily* (d)



Source: The data processing in period 1981-2010

$$invy=0.3201+0.3692.dprivy_t+0.1674.dprivy_{t-1}+0.2135.dprivy_{t-2}$$

$$SE \quad 0.1195 \quad 0.0523 \quad 0.0729 \quad 0.0506$$

$$(sig\ 0.01) \quad (sig\ 0.01) \quad (sig\ 0.05) \quad (sig\ 0.01)$$

$$-0.9745.dmily_{t-1}-0.0871.dnmily_t-0.0903.dummyZ+0.5966.AR(1)+0.3787.AR(3)$$

$$SE \quad 0.1977 \quad 0.0154 \quad 0.0112 \quad 0.0652 \quad 0.0702$$

$$(sig\ 0.01) \quad (sig\ 0.01) \quad (sig\ 0.01) \quad (sig\ 0.01) \quad (sig\ 0.01)$$

$$R^2=0.8401\ Inverted\ AR\ roots<0\ Prob\ F=0.000000\ DW=1.98 \quad (11)$$

SE is the standard of erros, sig is the significance level. Source: The data processing.

The data involved has passed stationary testing. Regression was conducted by generalized least square, which uses the first and third order of autoregressive. Autocorrelation problem has been eliminated depicted with its Durbin-Watson value. The regression results above also has passed the test of heterocedasticity and multicollinierity. Inverted AR roots smaller than zero indicates the absence of autocorrelation. The test of granger causality showed that among variables do not have a relationship of mutual influence and are influenced, so this single model can be used. The existence of a dummy variable is used to distinguish the periods before and after the crisis (dummy variable is 1 in the period 1999-2010, besides to this period, the dummy variable is 0).

From the results of the regression Equation 10 can be explained that: (a) Changes in output of private sector, all lag positively affect private investment; (b) changes in the defense budget does not directly affect the current investment, but experienced a lag period of inertia. Its influence was negative significantly; (c) changes in non-defense budget would directly affect investments in the period. Its influence was negative significantly. The empirical results indicate that the effect of the increase in the defense budget and the change in non-defense led to a crowding out effect on investment. As a comparison, Mintz and Huang (1990) examined the US economic data in the period from 1953 to 1987. They found similar results, there inertia effect of military spending in the current period and five the previous period that depress investment.

6. CONCLUSION

In this study we found that, changes to the defense budget negatively affect investment (crowding out effect) by the inertia of the period. This is possible because of military procurement contracts spread into several periods in Indonesia.

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