

# THE DEMAND MODELS OF NATIONAL DEFENSE BUDGET: A LITERATURE REVIEW

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**Submission date:** 20-Jul-2018 11:42AM (UTC+0700)

**Submission ID:** 983855468

**File name:** 9.SEABC\_DrPosma.pdf (450.52K)

**Word count:** 3533

**Character count:** 18449

## THE DEMAND MODELS OF NATIONAL DEFENSE BUDGET: A LITERATURE REVIEW

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### Abstract

Defense is the pure public goods that having main characteristics are its use does not compete and can not be applied the principle of exclusion for everybody. In this paper we develop the models of demand for defense budget. The model that developed are the bureaucratic model, strategic models and combined models. From these models we want to know what the variables that involved in the demand of national defense budget. All the models remains optimize social welfare except in bureaucratic model. In the bureaucratic model, defense spending is a characteristic of the degree of inertia of the budget period, because a group of actors who enter into or affect bureaucracies always want to maintain the status quo and their positions. In the strategic model, the perpetrator of the government think rationally to maximize social welfare by the constraints of existing resources. The combination of bureaucratic and strategic models explaining relative strength of attraction between internal influences (the actors) and external influences (traditional threat), which is reflected in the functioning of government satisfaction and welfare.

Keywords: Public Goods, Defense Economics, Defense Budget.

### INTRODUCTION

Defense is the first duty of the state, as well as organizing the judiciary, and carry out the public works. The type of goods as "national defense" is very much needed by the community, but no one is willing to produce it, or may be generated by the private sector but in limited amounts. The kind of goods is called pure public goods by having two main characteristics. First, its use does not compete, and second, can not be applied the principle of exclusion. In a pure public good, person is not willing to produce it for their ownership problems.

Protection to the whole nation and the whole country of Indonesia is defined as a security protection to all citizens and regions of Indonesia and all the resources in it. In this context, "security" is seen as a product, so that real security is "owned" by the citizens. In other words, security is a public good that should be enjoyed jointly by all members of the community. The security of the state must be transformed into a product called "security".

In the traditional sense, the definition of security is closely related to military force. Special characteristics of traditional security threats, is from outside the country, or external, with the actors who are threatening is a country. So it involves a heavy and modern weaponry to deal with it. This is what distinguishes it from internal threats, where the enemy is not the form of the state, but groups or individuals, weapons

facing opponents also tend to be more modest. Thus, the behavior to deal with internal threats will be very different from external threats. Speaking of defense, its connotation is the ability of the state in facing traditional threats, or external threat, in which the state must protect its citizens against threats from other countries, especially from their strategic environment.

The defense budget is a public budget allocated for all purposes related to the defense of a country and nation. The amount is related to the ability of a country and the priorities in development. According to the Department Pertahanan Indonesia (2008), the budget is defined as: "A financial work plan systematically arranged, covering the maximum amount of expenditures that may be required to finance the state's interest in a certain period and the estimated income (receipts) that may be acceptable in the future."

The cost of defense is still needed as an activity that is important to protect the very large resources, which are always faced with the interests and the uncertainty of the border states or the strategic environment. Attention to the economic aspects become very important, so make it as a separate study. This interest continues in the development of economics in applying economic methods, to solve the problems of defense and its budgeting. The budget for national defense is one of the important government's policies. Although government spending on defense relationship with the economy has been studied with a variety of economic models, but the result is still not been established in certain theory, whether military expenditures support or depress economic growth.

The main question in the policy of the defense budget is, what drives the amount of defence budget. Is the decision purely from internal actors or power holders, or are also influenced by external factors such as the traditional threats from the strategic environment of a country. If the policy is affected by the threat, whether the country is in certain situations. Everything was very decisive in the determination of the model and calculation of defense budget demand. Based on the picture above, this study aims to analyze whether traditional threats is the main variable in influencing Indonesia's defense budget. From the overall results of the testing would be a finding that can be developed in more depth to the policy of national defense planning better.

## THE THEORY

Demand models of defense budget in this study were divided into three models, namely the bureaucratic model, strategic model, and the combination of these two models. We will explain all models in the paragraphs below.

- a) In the bureaucratic model approach, Sandler and Hartley (1995) argues that there is an "interest group model" in determining the policy of the defense budget. The government is not composed of a single actor, but a lot of actors, even mutual interests in coalition with diverse political and bureaucratic environment. Policies military spending more because of lobbying, competition and even conflict that plays an important role in defense policy. He said that although the government is firmly controlled the rational actor, but obstacles to these assumptions is still very much, for example, are so complex and complicated problems, asymmetric information, and the capabilities of the actor itself. In bureaucratic models, defense spending is dominated by the influence of the internal actors of policy holders who see the building of long-term budget naturally. This model was

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introduced by Lucier (1979) which assumes that defense spending is a characteristic of the degree of inertia of the budget period. This is because a group of actors who enter into or affect bureaucracies always want to maintain the status quo and their positions. Bureaucracy tends to maintain the situation through budget decisions with a small adjustment to the spending levels of the past. Because of the defense program is very large and expensive, efforts to fulfill the program can reach several years or even decades.

- b) In the the strategic model, form of the defense budget should pay attention to social welfare. In this model, normally assumed to be the perpetrator of the government think rationally to maximize social welfare by the constraints of existing resources. Defense spending is determined by the balance between the opportunity cost and security benefits. Demand model of defense expenditure that established in this study is based on the modification of the standard neoclassical model developed by Smith (1989, 1995). To analyze the strategic model of militer budget demand, there is not seen political or bureaucratic process. But, assumes actors planners policy makers are "rational" in the model of the state, where they will maximize social welfare spending that influenced non-defense spending and defense spending. Welfare function is determined by the state that, is the view of policy makers based on the preferences of individual referrers voiced by the representatives in the House of Representatives (DPR). In the strategic model, the traditional threat has been included in the determination of the defense budget demand model. The main criticism of these models is, there are no visible interaction between rival military gap, for example, which explains the occurrence of an arms race.
- c) The combination of bureaucratic and strategic models explaining relative strength of attraction between internal influences (actors) and external influences (traditional threat level), which is reflected in the functioning of government satisfaction and well-being (welfare). This model is expansion of strategic model of Smith (1995). From equation strategic model of Smith (1995), we can derive inertia variable of the military budget.

## THE MODELS

The development of military power is always faced with the problem of resource constraints, including national sources. The existence of military force to adapt to these strategic environment changes is always faced with the choice of other national policy priorities. The strengthening of military power as an essential component of defense is through the steps of mobilization, expansion of military power and increase response capabilities/responses. An important asset in the development of all it is the defense budget. (Kusnanto, 2004). Therefore in determining the defense budget, a country have strategy in every different situation. In this paper, we divided into three models of strategies that have been mentioned earlier.

### A. The Bureaucratic Models

In bureaucratic models, defense spending is dominated by the influence of the internal actors of policy holders who see the build<sup>3</sup>g of long-term budget naturally. This model was introduced by Lucier (1979) which assumes that defense spending is a characteristic of the degree of inertia of the budget period. Bureaucracy tends to maintain the situation through budget decisions with a small adjustment to the

spending levels from the past. Bureaucratic model of Lucier (1979) for the defense budget is as a simple equation :

$$M_t = \beta_0 + \beta_1 M_{t-1} + e \quad (1)$$

Where  $M_t$  is the amount of the defense budget in year  $t$ . This model is suitable when the military controlled by state, where military actors have little influence in the running of the government, social and in budgeting.

## B. The Strategic Models

To see the military budget with strategic model, it is assumed that, the perpetrator of the government think rationally to maximize the social welfare based on the constraints of existing resources. Defense spending is determined by the balance between the opportunity cost and security benefits. The model of demand for defense spending are formed in this study, is based on the modification of the standard neoclassical model that developed by Ron Smith (1995).

Objective function of the welfare is a function of : safety (security,  $S$ ) and the other variables in the economy, such as total consumption ( $C$ ), population ( $N$ ), and other variables, including exogenous influence of politicians ( $ZW$ ), where the parameters engage in the welfare function. Thus, the implicit welfare function can be written as follows:

$$W = W(S, C, N, ZW) \quad (2)$$

To simplify the model, the aggregate of welfare ( $W$ ) is a function of : the security ( $S$ ), and the civilian output ( $C$ ), which is written as follows:

$$W = W(S, C) \quad (3)$$

Security can not be treated as the magnitude of the objective, but has subjective perception of freedom from threat. Security is formed from military spending that depends on the level of threat from the strategic environment. Such as utility or welfare, the data of security is can not be observed. So we must replace it with other data quantification, which can be formed with the function:

$$S = S(M, H, ZS) \quad (4)$$

Where  $H$  is the threat from strategic environmental. Other variables,  $ZS$ , is all the parameters that move on the security functions (security environment).

The production function for security can be simplified as:

$$S = S(M, H) \quad (5)$$

Where  $M$  is the number of military spending, and  $H$  is the threat level from the strategic environment. Finally, the total output is made up of civilian and military spending activity, which is an exogenous variable. Based on the assumption of a linear budget constraint, the budget constraint is simply given by:

$$Y = p_c C + p_m M \quad (6)$$

Where  $Y$  is aggregate demand, and the  $p_m$  and  $p_c$  show the relative price deflator to income.

Optimization problem is then used to obtain the value of  $M$  which is the level of military spending. Economic theory explains that this function must be homogeneous of degree zero in prices. Objective function of welfare based on the constant homogeneous homotetik Stone-Geary form, which is a monotonic transformation of a non-linear function of the Cobb Douglas. The form of the Cobb

Douglas has been selected to explain the output elasticity of substitution between civilian and security. It is easier to interpret and for some specific purpose.

The formal model used in the Cobb-Douglas form, that monotonic, transformed becomes:

$$W = \alpha \log(C) + (1 - \alpha) \log(S) \quad (7)$$

To describe the safety (security), the state assumed not aggressive, but prepare from their neighbors threat, H. Then, the security is the difference between the real military budget, M, and the minimal military budget, M\*. The military budget is assumed as a minimum of linear equations, where the intercept is the strategy of the military reserve. While the slope is the effectiveness of the military budget that facing threat from the strategic environment, so security equation can be formed as follows:

$$S = M - M^* = M - (\beta_0 + \beta_1.H) \quad (8)$$

M\* is a fixed element ( $\beta_0$ ) which has nothing to do with the strength of the opponent, but as a military reserve to face the opponent's attack. The other part is  $\beta_1$ , as the effectiveness of military spending in the face of threat. Thus, M and M\* are the variables that plays a role in maintaining optimal security.

Smith (1980, 1995) and Anderton (1990, 1992), describe two cases of strategic variables to maintain optimal security, namely:

- a. If the model obtained  $\beta_0 < 0$ , then the defense strategy undertaken is a natural strategy, where there is a low threat perception.
- b. If the model obtained  $\beta_0 > 0$ , then the state must do more preparation to anticipate traditional threats, because the perception of threat is high.

As we know before, the equation of defense budget demand derived from the welfare model. Formal form of welfare models and the constraint are:

$$\begin{aligned} \max \quad & W = \alpha \log(C) + (1 - \alpha) \log(S) \\ \text{subject to} \quad & Y = p_c.C + p_m.M \\ & S = M - M^* = M - (\beta_0 + \beta_1.H) \end{aligned} \quad (9)$$

By using the objective function and constraints as above, the Lagrangian function becomes:

$$L = \alpha \log(C) + (1 - \alpha) \log(M - M^*) + \lambda(Y - p_c.C - p_m.M) \quad (10)$$

First order condition is:

$$\frac{\partial L}{\partial C} = \frac{\alpha}{C} - \lambda p_c = 0 \Leftrightarrow C^* = \frac{\alpha}{\lambda.p_c} \quad (11)$$

$$\frac{\partial L}{\partial S} = \frac{1 - \alpha}{M - M^*} - \lambda p_m = 0 \Leftrightarrow M = \frac{1 - \alpha}{\lambda.p_m} + M^* \quad (12)$$

$$\frac{\partial L}{\partial \lambda} = Y - p_c.C - p_m.M = 0 \quad (13)$$

By combining the equation, it becomes:

$$Y - p_c \cdot \frac{\alpha}{\lambda \cdot p_c} - p_m \left( \frac{1-\alpha}{\lambda \cdot p_m} + M^* \right) = 0 \quad (14)$$

obtained:

$$\frac{1}{\lambda} = Y - p_m M^* \quad (15)$$

which is used to eliminate the lagrange multiplier.

By using the objective function and constraints as above, gives optimal demand equation, namely the military budget that optimize security

$$M = \frac{1-\alpha}{p_m} Y + \alpha(\beta_0 + \beta_1 \cdot H) \quad (16)$$

Where  $Y$  is real gross domestic income in period  $t$ ,  $p_m$  is the price of real military spending,  $M$  is the real defense budget in period  $t$  and  $H$  is an external threat level in period  $t$ .

### C. The Combination Model

The combination of bureaucratic and strategic models explaining relative strength of attraction between internal influences (actors) and external influences (traditional threat level), which is reflected in the functioning of government satisfaction and welfare. From equation of strategic model of Smith (1995), we can be derive variable inertia of the military budget.

To be more realistic, we assume security is affected by the reserve military force (the stock of military forces) that compared with the flow of military spending. Reserve of military forces (including, equipment, weapons and human resources) is defined as the sum of the depreciation expense of the past, namely:

$$K_t = (1-\delta)K_{t-1} + M_t \quad (17)$$

Where  $K_t$  is the parameter for the rate of depreciation. This depreciation variable is assumed in the concept of peacetime, not during the war. Thus, returning to the model of Smith (1995), equation of security is given as the following:

$$S_t = K_t - (\beta_0 + \beta_1 \cdot H) = M_t - M_t^* \quad (18)$$

so that:

$$M_t^* = M_t - K_t + (\beta_0 + \beta_1 H) \quad (19)$$

becomes:

$$M_t^* = \beta_0 + \beta_1 H - (1-\delta)K_{t-1} \quad (20)$$

If the reserve military force could not be observed, then the equation can be substituted with:

$$K_t = \frac{10}{1-(1-\delta)L} M_t \quad (21)$$

where  $L$  is the lag operator such that  $L_{M_t} = M_{t-1}$  behaves like a reserve military force ( $K_t$ ).

From the military functions of welfare optimization, then:

$$M_t = (1-\alpha) \frac{Y}{p_m} + \alpha M_t^* \quad (22)$$

so that:

$$M_t = (1-\alpha) \frac{Y}{p_m} + \alpha \cdot [\beta_0 + \beta_1 H - (1-\delta) \frac{M_{t-1}}{1-(1-\delta)L}] \quad (23)$$

The segment is multiplied by  $[1-(1-\delta)L]$ , then:

$$M_t \cdot [1-(1-\delta)L] = (1-\alpha) \frac{Y}{p_m} [1-(1-\delta)L] + \{ \alpha \cdot [\beta_0 + \beta_1 H - (1-\delta)K_{t-1}] \cdot [1-(1-\delta)L] \} \quad (24)$$

so that:

$$M_t \cdot [1-(1-\delta)L] - (1-\alpha) \frac{Y}{p_m} [1-(1-\delta)L] = (1-\alpha)(1-\delta) \left( \frac{Y}{p_m} \right)_{t-1} + \alpha \cdot \beta_0 [1-(1-\delta)L] + \alpha \cdot \beta_1 H [1-(1-\delta)L] - \alpha \cdot (1-\delta) M_{t-1} \quad (25)$$

Collect of the same forms, so that:

$$M_t = (1-\alpha) \frac{Y}{p_m} - (1-\alpha)(1-\delta) \left( \frac{Y}{p_m} \right)_{t-1} + \alpha \cdot \beta_0 - [(1-\delta)\alpha\beta_0] + \alpha \cdot \beta_1 H \cdot [(1-\delta)\alpha\beta_1 H] + -\alpha \cdot (1-\delta) M_{t-1} + [(1-\delta)M_{t-1}] \quad (26)$$

then:

$$M_t = (1-\alpha) \frac{Y}{p_m} + \alpha \delta \cdot \beta_0 + \alpha \delta \cdot \beta_1 H + (1-\alpha)(1-\delta) M_{t-1} - (1-\alpha)(1-\delta) \left( \frac{Y}{p_m} \right)_{t-1} \quad (27)$$

The final form of the equation of military spending are:

$$M_t = \alpha \beta_0 \delta + (1-\alpha) \frac{Y}{p_m} + \alpha \delta \cdot \beta_1 H + (1-\alpha)(1-\delta) \left[ M_{t-1} - \left( \frac{Y}{p_m} \right)_{t-1} \right] \quad (28)$$

Where  $Y$  is real gross domestic income in period  $t$ ,  $Y_{t-1}$  is real gross domestic income in period  $t-1$ ,  $p_m$  is the price of real military spending,  $M_t$  is the real defense budget in period  $t$ ,  $M_{t-1}$  is the real defense budget in period  $t-1$ , and  $H$  is an external threat level in period  $t$ .

### CONCLUSION

From the results of the bureaucratic model, shows that defense budget policies affected by last year's defense budget. These illustrate that the military actors can give influence to the defence budget policy. They will think two alternative strategy. First, offensive strategy to maximize their own strength, or second, think of the situation defensive strategic environment with emphasis on inter-state cooperation. If they think about cooperation among strategic environment, it can provide a positive atmosphere in an international environment with peace, through a strong commitment not to use force and fight each other. This peaceful atmosphere is also beneficial to calculate the optimal national defense spending.

In the strategic and combine model, suggests the provision of national defense budget aims to optimize social welfare. In strategic model, governments have limited flexibility, and should have the ability to predict behavior, including predicting the



optimal level of defense spending. Although sometimes influenced by other things, the government must determine the appropriate defense spending capability of real resources of the economy. Because there are constraints of limited resources in the supply of state expenditures. For this model, the defense budget demand is influenced by the amount of the national income and the level of traditional threat. In the combine model, national income and the level of threat influence on the amount of the defense budget. Also, last year's defense budget has effect on the amount of the defense budget.

As defense budgets demand model, it appears that there are relationship between the defense budget and the economy. Based on this, given the following recommendations:

- The government needs to improve the national economy by encouraging an increase in national production, because there is a relationship between the economy and defense.
- The need to create a development plan of the defense force through adequate budget so as to create a reliable defense capability.
- The government budget constraints, must be addressed in a balanced way between the purposes of the preparation of the defense budget with a budget provision of other capabilities in supporting the national economy.
- Increasing the utilization of the defense budget more effectively and efficiently. The government must work hard to eliminate the barriers of self, for example by eliminating distortions and inefficiency in the use of state finances, such as in the purchase of defense equipment.
- Alternative sources of financing should also be sought, for example by contributing to local government surplus, soft loans and purchases of defense equipment domestically.

## REFERENCES

- Departemen Pertahanan Indonesia. (2008). *Buku Putih Pertahanan Indonesia*. Jakarta.
- Koeswanto, T (Adm). (1994). Indonesia's naval policy for 1990s : territorial defence in the context of archipelagic doctrine, *Paper presented at MIMA*, Kuala Lumpur, 3 Dec 1994.
- Lucier, Charles E. (1979). Changes in The Values of Arms Race Parameters. *Journal of Conflict Resolution*. Vol.23(1) : 17-39.
- Sandler, Todd. & Hertley, Keith. 1995. *The Economics of Defence*, Cambridge surveys of Economic Literature, UK : Cambridge University Press.
- Smith, Ron P. (1979). Models of Military Expenditure. *Journal of Applied Econometrics*, Vol.4 (4) : 345-359.
- Smith, Ron P. (1995). The Demand for Military Expenditure. *Handbook of Defense Economic Volume I*. Amsterdam : North Holland.

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