

EVALUATION OF NATIONAL DEFENSE FROM AN ECONOMIC PERSPECTIVE

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Abstract:

Measuring the defense product (or national defense as a public good) is a necessary step in determining the efficient use of public funds in the defense sector. In this paper, the final product obtained by the military field is analyzed from a macroeconomic perspective. The defense sector absorbs a substantial part of the state's resources, limited resources that could have multiple alternative uses for society (education, health, infrastructure, etc.). While defense expenditure (considered as input or consumption of resources) is known for each state, for now there is no internationally established standard indicator of the defense product (benefit) obtained. This is in contrast to how performance is evaluated in the private sector economy. In the field of defence, the solution proposed by economists for measuring "defense output" assumes that defense output equals "resource inputs" (a convention widely used in the public sector) or that the value of defense output equals be roughly equal to the expenses incurred to achieve that result. Measuring the value of production in the free market economy is not viewed as a matter of policy. Market economies solve this problem through the method of market prices, and the supply-demand mechanism, which actually reflects the options existing between a certain number of buyers and sellers. However, in the field of defense things differ from the private markets model, which leads to an understanding of the challenge in measuring and evaluating the defense product. Economic theory provides some guidelines for determining the optimal outcome of the defense product. Analyzing these aspects from the perspective of an optimization problem, it is necessary to identify the socially desired level of defense, and to track the resulting (achieved) level of defense. This is done by equating the additional or marginal costs of the proposed defense spending with the additional or marginal benefits obtained. Although the economic approach is difficult to translate into a set of clear policy guidelines, it nevertheless provides a framework for designing defense performance assessment.

Keywords: National Defense, Efficiency, Measuring, Defense Production

JEL classification: H41, H56

1. Introduction

In this article, the final product obtained by the military field is analyzed from a macroeconomic perspective. The defense sector absorbs a substantial part of the state's resources, limited resources, which could have multiple alternative, useful and valuable uses for society (education, health, infrastructure, etc.). While defense expenditure (considered as input or consumption of resources) is known for each state, there is still no internationally established standard indicator of the defense product (benefit) obtained. This is in contrast to how performance is evaluated in the private sector economy. In the field of defence, the solution proposed by economists for measuring "defense output" assumes that defense output equals "resource inputs" (a convention widely used in the public sector) or that the value of defense output equals be roughly equal to the expenses incurred to achieve that result.

Measuring the value of production in the free market economy is not viewed as a matter of policy. Market economies solve this problem through the method of market prices, and the supply-demand mechanism, which actually reflects the options existing between a certain number of buyers and sellers. However, in the field of defense things differ from the private markets model, which leads to an understanding of the challenge in measuring and evaluating the defense product.

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An important step in carrying out an economic analysis in the military field, and subsequently for evaluating the efficiency of the use of public funds in the defense field, is the discussion of the production dimension. Specifically, it is necessary to identify the key points that need to be addressed in measuring the outcome of the defense. Economic theory provides some guidelines for determining the optimal outcome of the defense product. Analyzing these aspects from the perspective of an optimization problem, it is necessary to identify the socially desired level of defense, and to track the resulting (achieved) level of defense. This is done by equating the additional or marginal costs of the proposed defense spending with the additional or marginal benefits obtained. Although the economic approach is difficult to translate into a set of clear policy guidelines, an economic approach provides a framework for designing defense performance assessment.

Defense is generally considered a public good, meaning it is a type of good or service that is produced and consumed collectively by society as a whole, rather than by individual consumers. Starting from these aspects, the characteristics of public goods that differ from private goods are also applicable in the case of defense, thus:

- Non-excludability: It is not possible to exclude people from consuming the benefits of a public good. For example, everyone in a society benefits from the protection provided by the military, regardless of whether they contributed to the production of that service;
- Non-rivalry: consumption of a public good by an individual does not reduce the quantity available for consumption by others;
- Collective benefit: the benefits of a public good are enjoyed by society as a whole, rather than individual consumers;

In general, defense is considered a public good because it provides benefits to society as a whole, and the consumption of those benefits cannot be limited only to those who contributed to the cost of producing the national defense service. Next, national defense, viewed as a public good, will be approached from an economic perspective.

2. The economic theory of the public good of defense

2.1. Approaching national defense as an economic issue

National defense depends on many factors, in the approach of which military specialists make different classifications. Among these factors, the most important are often considered to be the following: the morale of a country's soldiers, the ingenuity of its scientists, the character and skill of its political and military leaders, the country's geographical position vis-à-vis other countries, etc. But national defense also depends to a great extent on economic factors (Michael D., 2007), equally important factors, but which can be defined and interpreted in a very extensive manner. Most specialists emphasize the importance and influence of the economic factor on defense, and refer to the economic power of the nation (Aizenman & Glick, 2006), in correlation with its military forces. Other experts use the concept of economic factors in a much narrower way, referring to the constraints imposed on the armed forces, through the budget, showing the need for cost containment and the implications of defense spending on the economy (d'Agostino, et al., 2018).

In the present article, attention is directed to the economic factors of defense, in a broader sense. Being truly economical does not mean being stingy, but rather reducing expenses, no matter how important the goods or services to be purchased may be. Rather, defense economics involves allocating resources efficiently, choosing doctrines and techniques, so as to make the most of available resources. Saving in this sense can mean spending less on some things and more on others, but always the notion of economy or saving involves trying to use the available resources as efficiently as possible, in all activities and in all circumstances.

The problem of effectively combining the limited amounts of military personnel, weaponry, combat equipment, military bases, training and maintenance facilities necessary to produce a strategic force that will maximize deterrence of enemy attack is as much an economic problem as and a matter of combining a company's resources in such a way that the company maximizes its profits.

Economy and efficiency are two ways of looking at the same characteristic of an operation. If a producer, or a military commander has a fixed budget (or other fixed resources) and tries to maximize his production or the achievement of his objective, we say that his goal is to use his resources efficiently. But if the production objective is established or has already established a military objective, its task is to bring economy in the use of resources, i.e. to minimize its costs. These matters may sound like different problems; but in fact they are logically equivalent. For any level of either budget or objective, the choices that maximize the achievement of an objective for a given budget are the same choices that minimize the cost of achieving the objective.

Saving also involves deciding, at a political level, how many resources should be directed from the budget, in the interest of the armed forces, at the expense of other public sectors. Within the defense sector, economics, strategy and technology are interrelated elements of the same problem. Strategies are ways of using budgets or resources to achieve military objectives. Through existing technology, possible strategies can be defined. And the economic problem consists in choosing that strategy, including the technology embodied in the necessary equipment and resources, in the most efficient way (maximizes the achievement of the objective with the given resources) or in the most economical way (minimizes the cost of achieving the given objective). In this way, the problem of national defense could be seen, theoretically, as a problem of an economic nature.

2.2. Public goods and private goods

The government provides a wide variety of goods, from national defense, to education, to police and fire protection, etc. Some of these goods, such as education or health, are also provided privately; others, such as national defence, are the sole responsibility of the Government. Basic standard definitions of public goods have been formulated since the 1950s (Kaul, 2006), definitions that answer questions such as: What are the economic characteristics of some public goods? How does a public good differ from goods like ice cream, automobiles, and the multitude of other goods that are provided in private markets?

When we talk about private goods the central role in defining these goods is played by price and the market economy (Smith,A., 2011). Because of the price system, markets result in an efficient allocation of resources. Prices ration private goods. Those consumers who want a particular good and are able to pay the necessary price get the desired good.

To distinguish between private and public goods, economists ask two basic questions. First, does the good have the property of the "rival consumer"? When there is rivalry for a good, it means that if one person consumes a good, that good cannot also be consumed by another person. Conversely, when a good has the property of "non-rivalry" (Nordhaus & Paul, 2006), the consumption of a good by one person does not diminish or prevent the consumption of that good by other people. The second question that can be asked to distinguish between private and public goods concerns the property of exclusion. Is it possible for an individual to be excluded from the benefits of the public good (without incurring high costs – such as court costs, court orders, etc.)? Clearly, if exclusion is impossible, then using the pricing system is impossible, because consumers have no incentive (or interest) to pay more. In contrast, private goods always have the property of exclusion: people can be excluded from enjoying a good if they do not pay for it.

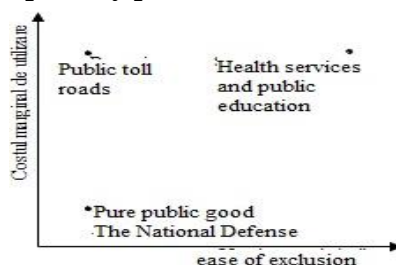
In general, private goods have the properties of rival consumption and exclusion, while public goods are characterized by non-rival consumption and non-excludability (Holcombe, 1997). Moreover, goods for which there is no rivalry in consumption and for which exclusion is impossible are defined as pure public goods. To develop a broader picture of public goods (and pure public goods), the properties of non-rivalry and non-excludability are detailed in the following.

A pure public good is a public good for which the marginal costs of providing it, when an additional person is added, is strictly zero and in whose provision it is impossible to exclude consumers of that benefit. National defense is one of the few examples of a pure public good. Many public goods that the government provides are not pure public goods. For example, the cost of a person additionally

using a public road is quite small, but not zero, and at the same time it is difficult to exclude people from using a public road if that road is not a toll road.

In figure no. 1 examples of publicly provided goods are compared from the perspective of the definition of a pure public good. In this figure, the ease of exclusion from consumption of the public good is shown along the horizontal axis from left to right. Along the vertical axis, from bottom to top, is shown how the marginal cost generated by people who use the good additionally increases. The lower left corner represents a pure public good, and as already noted, of the major public expenditures, only national defense comes close to being a pure public good. The upper right corner represents a good (health services or public education) for which the ease of exclusion is high and the marginal cost of an additional person using the good is high. For example, for each additional patient who benefits from the health services, additional costs are generated, a larger number of doctors are required, larger hospital spaces, additional beds are required, which creates a premise of exclusion through the limits of the physical capacity of the medical system.

Figure 1: Goods/services that are publicly provided viewed through the lens of a pure public good



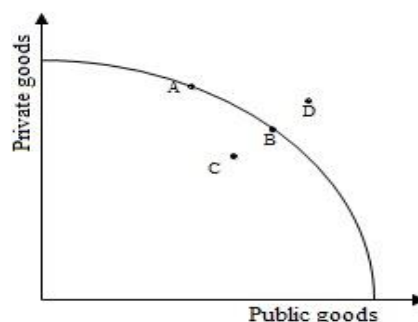
Source: authors own processing

Many goods are not pure public goods but have one of the properties (non-rivalry or non-excludability) to some extent.

There are other major differences between private goods markets and public goods markets. Goods that are "private" compared to public goods are characterized by both exclusion and rivalry; by a large number of consumers and private buyers; of rivalry between companies; of motivation and rewards through profits; and by a capital market that imposes sanctions on poor economic performance (managers often lose their jobs; unproductive employees are replaced; inefficient processes are improved, etc.).

But in the public (or bureaucratic) system, there are no such incentive or penalty mechanisms, therefore, these systems tend to adapt to change more slowly. Often, change in the public domain comes as a result of budgetary pressure, new technologies appearing in the field and occasionally from the vision of some leaders involved (Solomon, et al., 2008). Thus, public services are less likely to undertake changes like the private market (Tisdell & Hartley, 2008). These aspects have an impact on efficiency. Balancing these issues, the natural question arises: How much of a nation's resources should be devoted to the production of public goods, and how much of such resources should be allocated to the production of private goods? Often this choice is known as the production possibility curve (frontier) (Stiglitz, 2000), which tracks the quantities of two goods that can be efficiently produced with a given existing technology and given resources. In this case, the two goods are the public goods and the private goods that society can produce. Figure no. 2 shows the various possible combinations of public goods and private goods that society can efficiently produce along a curve. This graph describes the maximum level of private goods that society can enjoy, for each given level of public goods. If society wants to enjoy more public goods, it must give up some private goods.

Figure 2: The firm's production possibility graph



Source: authors own processing

Society can spend more on public goods, but only by reducing the resources available for private consumption. Thus, in the translation from point A to point B, along the production possibilities curve, public goods increase and private goods decrease. A point such as C, which lies below the production possibilities graph, is said to be inefficient: society could obtain more public goods and more private goods with the same resources and technology. A point such as D, which is above the production possibilities graph, is said to be unrealizable: given existing resources and technology, it is not possible to have achieved such a point and have that amount of public goods and that amount of private goods at the same time. It is thus understood that maintaining an optimal balance between the allocation of resources to the public or private sector is vital for the good functioning of society.

When it comes to specific differences between the defense field and the private sector, things can look different, even harder to explain. Defense aims at peace and conflict avoidance. However, where conflict occurs, often the private sector and valuable state infrastructure are destroyed, and an additional imbalance is created as resources are allocated primarily to military forces in order to gain strategic advantages, which has adverse consequences on the costs of opportunity for other goods and services. While wars involve the devastation of labor and capital, private markets are always seeking the optimal balance between labor and capital to provide goods and services through trade and voluntary exchange. In the private sector the allocation of resources is based on price, and profit, which lead to a "creative development" reflected in continuous investment, in new innovations, in inventions and the production of new goods and services.

2.3. The public good resulting from the field of defense

The defense public good, unlike many other public goods and services, is a classic example of a pure public good, which legally can only be provided by the government, in this case it can be discussed as a public monopoly (Grechenig & Kolmar, 2014). Also, the fact that defense services are not available on the free market, or the fact that they are not listed on the stock exchange, leaves political decision-makers and citizens without information specific to the price mechanism or economic value, necessary for the objective assessment of the efficient use of resources. Lack of information, resulting from a lack of price or value, is an aspect of public service production that the armed forces share with other public service providers.

Secondly, an essential difference between other public services, such as education, public health or social services, and national defense, is the fact that the production of the defense good does not have obvious (direct) recipients, as e.g. students or pupils, patients, social workers, or pensioners, as in the case of the former. This means that for the armed forces there are few, if any, objective instruments or beneficiaries who can provide feedback on the quantity and quality of services provided.

Thirdly, noting the essential objective of the armed forces, which is to deter (MApN, 2021) potential threats and hostile actions of a possible aggressor, it follows that one of the essential and desirable characteristics of an effective and "strong enough" defense system is that it is never actually used. But in the situation of a possible aggression, the defense system based on the existing military capabilities, to be able to retaliate against that possible aggressor, in a way that would weigh that aggression against the state, far too expensive to be attempted. In this context assessing whether armed

forces or other factors contribute to peace and stability is indeed a difficult task. And making assessments, or measurements of the level of deterrence felt by a possible aggressor, based on a set of considerations is particularly difficult to put into practice.

Fourth, there are studies (Førsund, 2017) who argue that if "the results obtained by state agencies are pure public goods, it is possible that the public does not request the level (coefficients) of production (or output) of the goods/services offered, being interested only in the final result itself". This also applies to the production of the defense public good produced by the military services. The general public has preferences for the end results to which the military organization contributes, such as peace and security, state sovereignty, and the peaceful relations of a nation. Few citizens show a particular interest in defense-specific information, such as information on troop sizes, exercises conducted, equipment in the endowment, or various other specific activities. This public information is indeed limited, and the degree of confidentiality or secrecy of certain information, which is disseminated to the press or the general public based on regulations regarding the protection of classified information and the "need to know" principle. Therefore, there is a degree of asymmetry in access to information and skills between defense experts and citizens.

Another aspect related to military output and outcomes, important for other public service providers as well, is the role played by environmental variables. In the macroeconomic equation, environmental variables could cause military production outcomes to be outside the control of decision makers. The results do not always depend on the performance of military organizations, but obviously depend as much on factors such as neighboring countries or membership of a military alliance. Economics provides tools for evaluating the performance, efficiency, and effectiveness of the armed forces (Hanson, 2016), and provides a new perspective on the issues mentioned above.

As mentioned above, defense is a classic example of a pure public good, and the desired outcome of this type of public good is an assurance that comes in the form of national peace and security. If the government creates military structures that protect the country from attack, all citizens are protected. National defense costs are essentially unaffected when a child is born or an immigrant settles in the country. To illustrate a defense public good, the following example is given: for two neighbors living in the same city, the consumption of the public service of air defense against air attacks does not affect the mutual consumption of either of them. Once the public service is provided, the first neighbor cannot exclude the second by his consumption, nor vice versa. In contrast to this situation, we find private goods (such as the consumption of motor vehicles), the consumption of these goods implies that they cannot be used simultaneously by several consumers, and property rights guarantee the right of exclusive ownership, so that the consumer x can legally exclude consumer y from using these goods.

By extension, from the aspect described above, the public goods characteristic of defense, acquire premises for the appearance of a phenomenon particular to the field of defense, namely, the appearance of "free-riding" type behavior. This phenomenon occurs when state x cannot exclude state y from its own defense benefits, nor can state y exclude state x from its own defense benefits, as long as these states are in a common defense system, military alliance type. S-observed thus, that each state has a tendency to let the other state, or the other allied states pay (more) for defense. Free-riding behavior is a problem that has been identified in military alliances, including NATO. But in NATO these aspects were corrected by regulations (Council, 2014), starting from 2014.

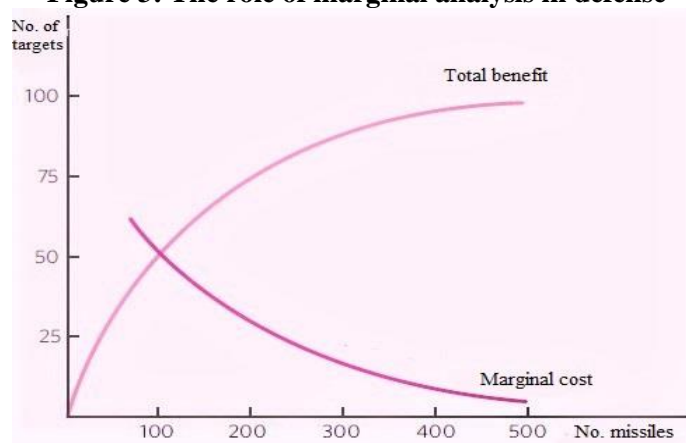
Ultimately, all these aspects lead to the fact that the citizens of a nation fail to exercise their true preferences, in determining the allocation of resources, or the achievement of a desired level of defense. A challenge for the state in providing and financing the defense service is that it cannot know the true preferences of the beneficiaries of the defense service because: "the volume of the defense public good demanded by consumers cannot be easily quantified and the real price cannot be estimated that the beneficiaries would be willing to pay" (Engerer, 2011). Attempts have been made to find theoretical solutions for estimating the optimal amount of a public good, but these solutions are still difficult to translate into practice (Cornes & Sandler, 1996). Among the most popular solutions or methods for estimating the optimal amount of a public good are public opinion polls, or public voting. But these tools

offer a limited mechanism in correctly assessing society's opinion on the determination of defense spending, or expressing society's options on defense policy, as there is no opportunity for citizens to choose how much to pay for defense (Zaller & Feldman, 1992).

Starting from these aspects, a natural question arises: "what is the optimal level of defense needed by a state?" The answer should come in the form of an optimization equation, when the criterion underlying the economic decision is to achieve a social desired, or to obtain an "optimal" output of the defense product. In principle, this is observed by equating marginal costs with marginal benefits through a marginal analysis (Stiglitz, 2000). However, this approach is difficult to "operationalize" without a set of clear political guidelines. And the marginal costs, and especially the marginal benefits of defense investments are difficult to quantify and not immediately apparent. In evaluating whether we should spend more on defense, it would be advisable to determine as clearly as possible how much "additional defense" is obtained from an "additional expenditure" made, even if that expenditure is a dollar, a million dollars, or even a billion dollars.

Next example (Hitch, 1966), by Charles Hitch, former US Assistant Secretary of Defense from 1961-1965, illustrates the importance of understanding the role played by marginal analysis, even in the field of defense. In his example, it is assumed that there are 100 targets, which are intended to be destroyed by the missile strike. Each missile has a 50% chance of hitting targets. Thus, the expectation for a hundred missiles launched at the targets would be 50 destructions. At 200 missiles, the success rate would be 75 destructions, at 300 missiles the success rate would be 87 destructions, and so on, as can also be seen in figure no. 3.

Figure 3: The role of marginal analysis in defense



Source: authors own processing

Certainly, in this example the yield decreases very strongly. Each target can only be destroyed once, and some of the additional missiles sent later can land on a target that has already been destroyed. While the first 100 missiles do 50 damage, increasing the number of missiles from 400 to 500 increases the number of targets destroyed by only 3. At the global level it is observed that 500 missiles were used for 97 destructions, but from the perspective of economic reasoning it is worth asking the question: is the cost of using 100 additional missiles to achieve only 3 additional destructions justified? is this cost effective or ineffective? This type of analysis is not easy to do. However, by correlating expenditure with objectives and showing what additional benefits are gained from additional expenditure, it can be hoped that more rational decisions will be made about the question "how much is enough?".

An economic model must also assume a social function, identifying and showing society's preferences between defense (security) and other goods (public/civilian): again, this approach is a seemingly simple concept, but it is more difficult to put into practice. Moreover, the benefits of defense are difficult to determine, both due to the nature of a pure public good and the "free-rider" characteristics. Also, public voting systems may not be reliable and accurate methods of identifying and observing society's preferences for some specific public goods and services. On the other hand, the process of

public elections (public vote) is a vast one, which usually only involves elections between political parties that offer various fiscal policies and public policies and programs, where budgets and defense policies represent a small strip of interest and are often caught up in a much wider platform of public policies. Problems can also arise in trying to aggregate voters' preferences into a ranking of society as a whole (the paradox of voting) (Tisdell & Hartley, 2008). In this approach, other problems arise, because the economic model assumes the maximization of individuals' behavior towards the chosen field (defense), while in reality most individuals could exhibit satisfactory behavior, or they could be willing to settle for acceptable solutions even outside the optimal model (Hartley, 2010).

Thus it is observed that the production of the defense asset is characterized by several complex aspects, which make it difficult both for political decision-makers and other interested parties, to identify the efficiency of the armed forces and the effectiveness in transforming the resources consumed to achieve the expected results.

2.4. Defining defense outcomes and defense benefits

In principle, defense provides an output in the form of services that bring a stream of current and future benefits to the citizens of a nation and the citizens of allied nations. The benefits are both economic and non-economic. The economic benefits of defense usually take the form of the purchase of goods and services that contribute to national output. Non-economic benefits of defense include foreign policy benefits, peacekeeping and its contribution to the stability factor of a nation.

The benefits of defense may differ between developed and less developed countries, but the possible economic benefits of defense spending include:

1. During periods of high unemployment, both developed, and less developed economies can experience stimulus effects generated by defense spending (ie, defense spending adds to aggregate demand in the economy). However, there are other types of government spending that could, stimulate the economy and provide an even greater stimulus (eg infrastructure and civil construction projects, etc.).

2. Defense provides direct benefits from new technologies through spillover effects to the civilian sector.

3. Especially in less developed countries, defense spending could promote economic growth if some spending is used to provide social infrastructure (e.g. airports, communications networks, roads and bridges, military hospitals, all of which contribute to national economies).

4. Developing and supporting human capital, especially in less developed countries. A nation's armed forces are equipped, fed, educated, trained and disciplined.

5. In principle, defense provides security, which in itself is a multiple product comprising: protection, safety, assurance, peace, stability and avoiding or reducing the risks of conflict. Other dimensions include prosperity, individual and national liberties, and a society's way of life. All of these products are difficult to measure and may be influenced by factors other than defense. Also, these aspects of security are public goods that cannot be traded.

6. Investments: Military organizations often make significant investments in research and development, as well as infrastructure and equipment. These investments can stimulate economic growth by providing financing for new technologies and innovations and by creating jobs in construction and manufacturing, contracting for the production or supply of goods or equipment.

7. Trade: Military organizations are often engaged in international trade, buying goods and services from other countries and exporting their own goods and services. This can contribute to economic growth by increasing exports and promoting trade.

8. Insurance: Last but not least, defense can be considered as insurance and as a form of response to various known and unknown threats and contingencies, current or future. The insurance approach has private market comparators. Individuals and businesses pay for a variety of insurance policies and other forms of protection. Examples include home insurance, car insurance, healthcare, international travel and pensions, etc. Of course, these are private rather than public goods, but nevertheless the demand for such services provides clues as to the willingness of private individuals and firms to pay for protection;

such a willingness to pay for protection (viewed as an insurance policy), could then be applied to determining the desired level of defense and to estimating the level of a nation's defense expenditure.

9. Deterrence: Ideally, a nation's military power helps prevent and avoid conflict; however, even where conflict occurs, its duration and effects on citizens are minimized when there is a strong military, which also contributes to faster post-conflict recovery. In this context, defense provides a deterrent that aims to convince potential adversaries that it is not worth starting a conflict. However, it is difficult to measure cost savings for events that do not occur. Indeed, such issues raise a general methodological question: What would have happened in the absence of defense spending?

However, these economic benefits must be critically evaluated: there are numerous studies that cast some doubt on many of the economic benefits brought by the defense field. It should be observed and investigated whether resources used in the military would bring higher welfare (even if they contribute to the production of new jobs, technology and exports) if these resources were used elsewhere in the economy.

Defense spending also brings major non-economic benefits to states. Non-economic benefits may be even more valuable than many economic benefits. Non-economic benefits are those that do not explicitly contribute to the national economy. These benefits include the pursuit of national interests and foreign policy objectives; contributes to a country's reputation and international status in the world; and contributes to positioning in the world power hierarchy.

Non-economic benefits could be reflected in a nation's membership of various international organizations such as the United Nations (e.g. member of the Security Council), in its membership of world economic organizations (e.g. OECD; IMF; trade groups G-8 and G-20 nations), the leadership positions in international military alliances (NATO).

There are other ways in which a nation can enjoy non-economic benefits like this:

- Defense efforts help protect a country's borders, citizens, and interests from external threats such as terrorism, aggression from other countries, and cyber attacks;
- International relations: A strong defense can be a useful tool in international relations because it can deter other countries from aggressive behavior and help maintain peace and stability;
- Strategic Advantage: A country with a strong defense can have a strategic advantage in international negotiations and political decision making;
- International prestige and reputation: A nation can provide military forces for international peacekeeping and peacemaking, thereby contributing to world peace;
- Other non-economic benefits arise when a nation's armed forces contribute to international humanitarian and disaster relief efforts. These contributions provide an image factor that contributes to "safety".

There are many more non-economic benefits of defense that are often discussed and emphasized by states than those outlined above. But even if these benefits from a strong defense cannot be quantified economically, the political, military-strategic and international business advantages are invaluable for a state.

Quantifying defense outcomes involves a complex set of variables related to security, protection and risk management, security, peace and stability. Resource inputs into the defense system are more easily identified, measured and evaluated than outputs. Inputs can be reflected primarily through annual defense budgets that are input-oriented. But how do the input costs match the desired defense outcomes (outputs)? Do defense budgets provide policymakers with the type of data needed to conduct military cost-benefit analysis?

Budgets provide some limited information, mainly only on defense spending, such as the pay of military and civilian personnel, the cost of military equipment, investment and infrastructure costs, or other costs. However, these budgets have major limitations in assessing effectiveness because they alone fail to show the existing correlation with the final defense output, other than the overall "defense" product achieved. A budget-only effectiveness assessment does not address specific intermediate inputs and

outputs (eg air defence, land defence, etc) and budgets considered as resource inputs focus only on the current year and do not reflect cost implications over the life cycle of current purchases.

3. Conclusions

This article has identified a set of important questions that arise in efforts to measure defense system outcomes. The approach contributes to the understanding needed to address central research questions: What is the outcome of defense? How can this result be evaluated? By themselves, input indicators provide little detail about the value of defense capabilities such as peace, protection, conflict deterrence, and insurance against future threats. A starting point is to note the importance of measuring defense performance in order to guide future military budget allocation decisions in the most efficient way.

Thus, an attempt was made to identify the economic theory of the public good of defense. Practically, it was desired, by studying the specialized literature, to observe and conclude the way in which the public good of defense can be analyzed from an economic perspective. For this, it was first necessary to treat the notions of public goods and private goods, to observe their characteristics, the differences between them and especially the existing correlations between them.

Next, the notion of a defense public good was debated, a good that, unlike many other public goods and services, is a classic example of a pure public good. An essential difference between other public services, and national defense, is the fact that the production of the defense good does not have obvious (direct) recipients, such as e.g. students or pupils, patients, social workers, or pensioners, etc., as in the case of the former. This means that for the armed forces there are few, if any, objective tools or beneficiaries that can provide feedback on measuring the output achieved, the quantity and quality of services provided and implicitly the effectiveness of the defense system. Studies have been identified that claim that if "the results obtained by state agencies are pure public goods, it is possible that the public does not request the level (coefficients) of production (or output) of the goods/services offered, being only interested in the end result itself". These aspects and more were considered relevant in the attempt to observe the field of defense through an economic prism. Also here it is necessary to take into account the fact that the field of defense is a government service, and in government fields decisions are made at the political level, which is why the process departs from the optimization solution of economic theory, the choice model was explored public and the principal-agent model.

In the identification and definition of defense benefits, both non-economic benefits and economic benefits brought by defense spending were taken into account. The economic benefits of defense usually take the form of the purchase of goods and services that contribute to national output. The non-economic benefits of defense include foreign policy benefits, peacekeeping and its contribution to a nation's stability factor.

The exposure of important questions and the search for scientifically based answers constitute the first stage of any scientific endeavor. In a democracy, elected politicians are ultimately responsible for determining the size of military spending and the allocation of funds to each public sector, but every citizen can contribute to the efficiency of the public system and a more economical approach to the use of public funds, through knowledge and involvement.

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