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Is the SIPRI estimate of military expenditure a reliable indicator of the power of states?

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The analysis of military expenditure has always been a matter of debate, as to its content, its significance for national defence, the value of international and intertemporal comparisons, the quality of the figures provided and their suitability for econometric studies. SIPRI has undertaken new work to refine its conception of military expenditure, not taking over the work done by the United Nations for the construction of an information matrix on the national defence effort. In fact, precise knowledge of military expenditure is probably only of real interest for analysing its influence on economic variables. Military expenditure is first and foremost a cost for the public sector, which provides a security service whose effectiveness is difficult to measure in view of the sums involved. The content of armaments (nuclear or cyber warfare) is not really indicative of the quality of a country's defence. Thus, despite the crisis suffered by the Soviet military-industrial complex, Russia remains a great military power because of the threat of its nuclear missiles, which make it little subject to external attack. Similarly, despite the fact that its nuclear weapons are virtually useless in local theaters of conflict, the United States' military engagements in Afghanistan and Iraq have been failures.

L'analyse des dépenses militaires a toujours fait débat sur leur contenu, leur signification au regard de la défense nationale, l'intérêt des comparaisons internationales et intertemporelles, la qualité des chiffres fournis et la capacité de ceux-ci à servir dans le cadre d'études économétriques. Le SIPRI a engagé de nouveaux travaux, en vue d'affiner sa conception des dépenses militaires, en ne reprenant pas les travaux effectués par l'ONU pour la construction d'une matrice d'information sur l'effort national de défense. De fait, la connaissance précise des dépenses militaires n'est sans doute vraiment intéressante que pour analyser leur influence sur les variables économiques. Les dépenses militaires constituent d'abord un coût pour le secteur public, qui assure un service de sécurité dont il est difficile de mesurer l'efficacité eu égard aux sommes engagées. Le contenu des armements (nucléaires ou de cyberguerre) n'est pas vraiment significatif de la qualité de la défense d'un pays. Ainsi, malgré la crise subie par le complexe militaro-industriel soviétique, la Russie reste une grande puissance militaire par la menace de ses missiles nucléaires qui la rendent peu sujette à une attaque extérieure. De même, malgré l'arme nucléaire quasi inutilisable dans les théâtres de conflits locaux, les engagements militaires des Etats-Unis en Afghanistan et en Irak ont été autant d'échecs.

SIPRI, Military expenditure, national defence, econometrics, nuclear weapons, cyber attacks

The SIPRI (Stockholm International Peace Research Institute) is best known for estimating and comparing the military expenditures of states around the world. It has developed statistical series of military expenditures and exports, based on available or published information (notably by NATO), with a rigorous procedure for homogenizing the available information. Despite the existence of a statistical instrument developed by the United Nations (Cars & Fontanel, 1987; Fontanel, 2016) that is too little used or homogenized statistics provided by NATO, the World Bank, the IMF or the IISS, most econometricians use the statistical data on national military expenditures published by SIPRI. In democratic countries, it is always possible to make satisfactory estimates, given the parliamentary reports that allow the people's representatives to check the power of the government's executive. Even in this situation, it is difficult to define and measure military spending beyond the presentation of a military or defense budget, which may or may not include civilian security efforts, and which does not measure specific actions such as economic sanctions.

Statistics provided by states are often subject to both military secrecy and political concealment. From one country to another, from one period to another, definitions of military expenditure differ and so do the estimates. Similarly, in terms of comparisons, the use of the floating exchange rate of market economy countries tends to alter comparisons of military spending between two countries, depending on speculative monetary and financial factors that constantly change the values being compared. For the countries of the former Warsaw Pact, prices were decided by the Plan according to political objectives that did not fit well with the criteria used in market economies. Finally, intertemporal comparisons of military expenditures in a country were calculated on the basis of the general price index, whereas the calculation in real terms should have used the military price index.

In 1980, the estimate of military expenditure in the USSR varied by a factor of 60 and 140 between the information provided officially by the USSR and China and the calculations made by the USACDA statistical service (Fontanel, 1984). In this context, economists often trusted the statistics provided by SIPRI, no doubt because of Sweden's military neutrality and the Institute's independence, even if they sometimes noted the questionable reliability of this database. Yet, in retrospect, during the Cold War, SIPRI often provided less relevant information than the United

States Arms Control and Disarmament Agency (USACDA) on the size and scope of Soviet and Warsaw Pact military expenditures (USACDA, 1982-1989).

Given the openness of information after 1990, SIPRI has taken this experience into account, modifying its series of information a posteriori if necessary and providing, each year, a new comparative ten-year list of military expenditure for all countries, with some positive or negative revaluations depending on the case. The difficulties of SIPRI during the "cold war" could be explained by the concept of price in the Soviet system, which was very different from that of market economies, and which reduced the cost of Soviet military equipment in view of a constant planned price that gave priority access to military production, without competition with civilian demand. On the contrary, in a market economy, competition is imposed, without reference to the military or civilian nature of intermediate consumption.

Prior to 1988, intertemporal and international studies required new assumptions each year to combine more than 10 years of information. Overlapping data series made it difficult to use them scientifically, which posed the problem for econometricians of constructing data series that were broader than a single decade. These changes in figures depended on new information, a change in the constant dollar base, or the erratic changes in exchange rates. SIPRI has made methodological choices to control and address the issue of overlapping data series that are often deemed insufficiently compatible (Perlo-Freeman, 2017). It cross-checks all statistical information that has been available for years, including official government statistics, the United States National Statistical Yearbook, NATO data, or The IMF Government Finance Statistics.

Some governments provide data annually, in more or less detailed forms, which makes it possible to observe long-term changes in the national military effort in national currencies or as a percentage of GDP. However, elements of international or intertemporal comparisons are particularly difficult to determine in view of developments (notably technological) in armaments, the volatility of exchange rates, and the difficulties of setting up a dedicated purchasing power parity instrument for the military sector (Donsimoni & Fontanel (2019)). The data series presented by SIPRI seeks to avoid partisan government information and to make its choices explicit. The notion of military spending is then clearly conceptualized, even if the content may sometimes seem questionable. For SIPRI, military expenditures are public

expenditures classified according to personnel costs, operating costs, the purchase of military equipment and weapons, military infrastructure, dedicated research and development, and expenditures related to central administration, command and support.

Several questions can then be debated.

- Is the state the only economic agent to engage in military operations leading to ad hoc expenditures? In the case of civil war, what is measured?

- What are the real contents corresponding to the title of the budget line? What is the civilian content that is included and is everything military included in the figures provided?

- What are the procedures used to estimate the funding devoted to national security? An interesting indicator is the financing of public expenditure, including military expenditure, by resources from oil exports for Russia.

- Should demining efforts, demobilization costs, and pensions for veterans be included in the estimate of military expenditures? In terms of costs to the state, these figures should be retained. In specifically military terms, the question is debatable, particularly in the context of international comparisons.

- Some funds remain secret, in particular those that feed private militia companies or reserve armies. How should paramilitary forces be accounted for? What is the specifically military role of the police or border controls, in relation to trafficking in illegal substances, for example?

- What are the public services for the defense effort that are not reported in the budget of the dedicated Ministry? - Finally, countries often change the titles of their ministries and internal expenditure categories, making it difficult to estimate military spending from one period to the next.

The World Bank (2019) often refers to analyses by SIPRI, but this statistical information does not always agree. In its assessments, the IMF does not include military pensions for retirees, education, and health care specific to the military sector. Differences may also depend on the relatively random conversion index, depending on the period chosen and the methods used.

According to SIPRI, military spending was nearly \$1,820 billion in 2018, or 2.1 percent of global GDP, increasing slightly over the past two years, particularly in Asia, the Eastern European Union, and Oceania. In 2018, the United States' military spending reached \$650 billion or as much as the other eight largest global

military budgets, compared to \$223 million for China. For Russia, the defense effort also depends on the evolution of oil prices.

In 2017, SIPRI took on the difficult task of reconstructing the statistical series since 1949. The aim was to "revisit" the history of international tensions in the light of military spending, to provide econometricians with new, more rigorous statistical information for the long term, with once again debatable but interesting and rational hypotheses concerning the effects of the break-up of the USSR, the change of course of the popular democracies, border movements, the often erratic evolution of currencies, changes in military alliances or the evolution of the content of national budget documents. SIPRI has undertaken significant work to provide data on military spending, in dollars (current and constant) and as a percentage of GDP (SIPRI, 2017)

However, the information for the 1960s to 1990s is based on questionable assumptions, particularly for the USSR, but also for many developing countries. Armament and disarmament efforts also reflect real inter- or intra-state conflicts, threats to peace, alliances (and their rules), the desire for power or defense, the strength of military-industrial complexes, and the economic policies of governments (Fontanel, Samson, 2008). Military expenditures are incurred to maintain and develop the defense forces. It is a flow and not a stock. After the collapse of the USSR, Russia, despite relatively low military expenditure, had a stock of military equipment and personnel sufficient to remain the world's second military power (Shkaratan & Fontanel, 1998). Finally, it should be noted that cyber security, which will undoubtedly be essential for national security in the years to come, can be carried out just as well by the military as by the civilian sector, no doubt with some preferential attributions with overlapping competences. This perception is probably not sufficiently taken into account in SIPRI's analyses, as it is for all other sources of information on military and defence spending.

The SIPRI series, interesting as they are, raise difficulties that one should be aware of before using their contents (Smith, 2017). What is the purpose of information on military spending? In the context of an internal civil war, the dangerousness of the situation is usually not explained by the publication of total military expenditures, which are often not known because of arms trafficking, secret support of foreign forces, and civilian materials used in the conflict for military purposes. While tensions and armed conflicts among Middle Eastern countries are a concern for international security, their defense spending seems paradoxically

to remain constant. While the reduction in military spending is sometimes "noticeable", it is generally due to the significant drop in the price of oil and fossil fuels. However, in the short term, "arms stocks" are being used up, until they are exhausted, without any perceptible increase in military spending.

In countries with weak democracies, where statistical information is never really controllable, cross-checking of information makes it possible to make estimates with very wide "standard deviations", which are often not available. In addition, many conflicts involve national and foreign civilians whose real cost is difficult to measure, as is the existence of official or unofficial paramilitary forces whose specifically military role is not negligible.

The use of time series of military expenditures (in all forms available from SIPRI) is interesting for all econometric analyses. However, analysis in terms of a country's power through military expenditure is not always sufficiently precise, especially without taking into account the nuclear or non-nuclear nature of national defense, in terms of its cost-effectiveness (Aben, Fontanel, 2019). It is also crucial to know whether the state has allies, whether it is threatened by neighbors or enemy systems, whether it is independent or not in terms of arms production, or whether it has sufficient reserves of essential goods and services in case of conflict. In terms of opportunity costs, it is clear that all present and future costs of choosing military spending over alternative civilian spending must be analyzed. Military strategies as well as the geographical location of countries play also an important role in a country's ability to defend itself against a potential enemy.

Military expenditure can also contribute to the implementation of an economic or industrial policy (Fontanel & Smith, 1985 a,b). Thus, it is possible to question the role of the military sector in the development of the American economy, as these operations make it possible to conduct a Keynesian and supply-side policy, while at the same time providing significant funding for R&D in the military sector, which will progressively permeate large firms with new innovations of general application, particularly in the digital economy.

Issues of national sovereignty, security and defense are beyond the control of the World Trade Organization (Fontanel, Touatam, 2015). Transparency in arms transfers is not clearly established by the United Nations Register of Conventional Arms (UNROCA). The Arms Trade Treaty (ATT), which entered into force at the end of 2014, aims to regulate the international market

for conventional arms and seeks to prevent and eradicate the illicit market by establishing standard rules for arms transfers. The results in terms of transparency remain far below the hopes formulated at the time of the signing of the ATT. It should be noted that many arms components are not always produced by the military-industrial complex itself. It is therefore difficult to know the use of a dual-use product that can be applied in both the military and civilian fields. Similarly, some arms transfers are offered officially as development aid, but also as support for a political team, or as a factor in expanding the seller's zone of influence.

Nuclear forces are both a special case and an indisputable power factor, and at the same time their use in a theater of operations is made almost impossible as an acceptable strategy by the international community. For half a century, the use of this weapon has never been recognized by the great powers, within the framework of the "strategy of terror" and even of a debatable "no first use", which Russia denies today (Brunat & Fontanel, 2018). Today, after the five traditional powers, the USA, Russia, the United Kingdom, France and China, other countries have acquired nuclear weapons - India, Pakistan or Israel (and continue to increase and improve the quality of their arsenal) or are in a position to produce them (North Korea, Iran), despite the Nuclear Non-Proliferation Treaty (NPT). 15,000 nuclear weapons are still available, more than 4,000 are deployed in operational forces and 1,800 are on operational alert (Kiles & Kristensen, 2017).

Military spending is only a rough reflection of a country's military strength (Fontanel, J. & Corvaisier-Drouart, 2014). Many factors can make these national defense costs more or less effective, including the existence of large weapons stockpiles, the bang for a buck, the effectiveness of strategic choices made "across the board" with respect to perceived or unlikely threats, common defense alliances, the military strength of civilian materials (including cyber information), and the actual cost of the materials and men responsible for a country's security.

The SIPRI effort is interesting, but the information provided is mainly in the realm of macroeconomics and geopolitics. It provides fragmentary information on the power of a state and possibly on its capacity to defend itself or its potential for harm. Thus, Russia is no longer the power of the USSR, but with its nuclear weapons its potential degree of nuisance is considerable for its adversaries and they provide its citizens with a considerable defense capacity that NATO as a whole is not in a position to

neglect and reduce. Similarly, Washington, despite its military power, has not been able to achieve its objectives in Vietnam, Iraq or Afghanistan. Finally, China frightens its neighbors with its economic and military power, but it is still not in a position to make the return of Taiwan to the national unity that it has always demanded for three quarters of a century, militarily and politically. The power of arms has its limits. The questions of ethics (Fontanel, 2007) and survival of humanity are raised as soon as nuclear weapons are likely to be used.

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