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New global and national military expenditure series developed by SIPRI

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Summary : SIPRI has become the main provider of quantitative information on military expenditure, especially for econometricians. However, during the Cold War, SIPRI was not always accurate in its estimates, as the US Arms Control and Disarmament Agency (USACDA) was more accurate on the question of the magnitude of Soviet and Warsaw Pact military spending. SIPRI has taken this experience into account and has modified its series several times, providing a new comparative list of military expenditures for all countries over the last decade each year. Numerous reassessments (positive or negative) have been undertaken. The SIPRI effort is interesting. However, the data remains questionable and the results of the econometric analyses obtained are interesting but inconclusive, as they are difficult to verify.

Le SIPRI est devenu le principal fournisseur d'informations quantitatives sur les dépenses militaires, notamment pour les économètres. Cependant, pendant la guerre froide, le SIPRI n'a pas toujours été pertinent dans ses estimations, l'Agence américaine de contrôle des armements et du désarmement (USACDA) étant plus précise sur la question de l'ampleur des dépenses militaires soviétiques et du Pacte de Varsovie. Le SIPRI a tenu compte de cette expérience, il a modifié ses séries à plusieurs reprises et a fourni chaque année une nouvelle liste comparative sur la dernière décennie des dépenses militaires de tous les pays. De nombreuses réévaluations (positives ou négatives) ont été entreprises. L'effort du SIPRI est intéressant. Cependant, les données restent contestables et les résultats des analyses économétriques obtenues sont intéressants mais non concluants, car difficilement vérifiables.

Dépenses militaires, comparaisons internationales,
Military expenditures, international comparisons

Created in May 1966 to celebrate 150 years of uninterrupted peace in Sweden, SIPRI (Stockholm International Peace Research Institute) has been engaged in general reflection on peace, but it is best known for estimating and comparing the military expenditure of states around the world in a period characterised by antagonistic economic and political systems and the secrecy of strategic defence information. SIPRI developed statistical series on military expenditure and exports, based on available or published information (particularly from NATO), with a rigorously followed procedure for analysis, collection and homogenisation, detached from the announcement effects of states seeking recognition of power or propaganda.

The statistics provided by the states were subject to restrictions, secrecy and political concealment. Indeed, definitions of military expenditure differed greatly from one source to another. In addition, the floating exchange rate of market economy countries tended to alter comparisons of military expenditure between two countries, depending on speculative monetary and financial factors. For the Warsaw Pact countries, prices were decided by the Plan according to political objectives that did not fit well with the criteria used in market economies. Finally, chronological comparisons of military expenditure 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 USSR military expenditure varied by a factor of 59 between the information provided by the USSR and the calculations made by the USACDA statistical services. For Egypt, Romania or China, the differences were respectively 1 to 106, 153 and 138.

Economists have often trusted the statistics provided by SIPRI, probably because of Sweden's military neutrality and the independence of the Institute, even if they have sometimes noted the questionable reliability of this database

The statistical basis of SIPRI's military expenditure series

In the early 1980s, SIPRI became the main provider of quantitative information on military expenditure, particularly for econometricians. However, in hindsight, during the Cold War, SIPRI was not always relevant in its estimates, as the United States Arms Control and Disarmament Agency (USACDA) was more accurate on the question of the size and scope of Soviet and Warsaw Pact military expenditures.

SIPRI has taken this experience into account, has modified its series several times, and has provided a new comparative ten-year list of military expenditures for all countries each year. Many revaluations (positive or negative) have been undertaken. It must be said that the concept of price was different in the Soviet system compared to that of market economies and that the homogenisation assumptions influenced the results themselves. In principle, when a scarce product was needed for the manufacture of weapons for the national security of the USSR, it was given priority, based on the forecasts of the plan with a planned price that remained constant. If civilian companies wanted to buy it, they did not have priority and could not bid on the basis of a purchase at a higher price than that decided by the Gosplan. In a market economy, if the product is scarce, the price goes up and the army and the arms industry will only be able to dispose of it if the price is that of the highest bidder.

Before 1988, international studies involved new assumptions each year to combine more than 10 years of information. Overlapping data series made it difficult to use scientifically. Changes in the national military expenditure figures provided for a country in the same year by two successive SIPRI Yearbooks obviously pose the problem of constructing data series broader than a single decade. These changes in figures depended mainly on new and more accurate information collected later, a change in the constant dollar base or the erratic evolution of exchange rates. As a result, coherent series, usable without further approximation, were often limited to 10 years, sometimes a little more, making rational but imprecise conversion assumptions about the transition from one series to another.

SIPRI has proposed empirical solutions regarding information and data sources. It has made methodological choices to control and resolve the issue of overlapping data series, which are often considered insufficiently compatible, in particular with the

introduction of series on price trends, with a view to better understanding, behind the raw figures, national trends in military expenditure. SIPRI cross-references all the statistical information that has been available for years (official government statistics when they exist, the United States National Statistical Yearbook, NATO data, the IMF Government Finance Statistics, estimates provided by journals or recognised experts for certain countries.

Despite the existence of a statistical instrument drawn up by the United Nations (which may or may not be filled in by states, without any verification procedure) or homogenised statistics provided by NATO, the World Bank, the IMF or the IISS, most economists use the statistical data on national military expenditure published by the SIPRI. Some states provide data annually, in more or less detailed forms, which makes it possible to observe long-term changes in national military effort in national currencies, in constant dollars or as a percentage of GDP. However, elements of international comparisons are particularly difficult to calculate in view of developments (notably technological) in armaments, the volatility of exchange rates and the difficulties in setting up an instrument dedicated to the military sector of purchasing power parities. The data series presented by SIPRI are supposed to be less directly concerned by a biased or partisan use of the figures and they provide interesting quantitative information on defence efforts country by country throughout the world. The chosen definition is clearly established, even if the content may sometimes seem questionable or incomplete, depending on the subject matter of the particular studies. The Swedish institution includes in its concept of military expenditure the public expenditure devoted to it, personnel costs, operating costs, the purchase of military equipment and weapons, military infrastructure, dedicated research and development and expenditure on central administration, command and support.

However, several questions need to be answered more clearly.

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

- What is the real content of the budget line? Some headings are sufficiently vague to make it difficult to analyse their exact content.

- What are the procedures used to estimate funding for national security? Is the financing of public expenditure, especially military expenditure, by resources from oil exports for Russia an interesting indicator, as is the relationship between copper production and export and the resources available to the military sector in Chile? Does this explanatory relationship take hold over time or not?

- Should demining efforts, demobilisation costs, pensions or ex-combatants' pensions be included in the estimation of military expenditure? In terms of costs to the state, these figures should be retained. In specifically military terms, the question is debatable, especially for international comparisons.

- Some funds remain secret, in particular those that feed private militia companies? How should paramilitary forces be accounted for? For some countries, what is the specifically military role of the police or border controls?

- Which public services are intended for military expenditure that is not included in the budget of the Ministry of Defence and the armed forces?

- Finally, countries often change the titles of their ministries and internal expenditure categories. They provide information on an initial military budget, which is not equivalent to what will ultimately be spent over the period.

Other conceptions of military expenditure could be calculated; for example, the IMF does not include military pensions for retirees, education and health care specific to the military sector in its estimates. The World Bank often refers to SIPRI analyses, but the results are not always consistent with other information collected by the Bank. Differences may also depend on the estimation of GDP in dollars; the conversion index for national currencies is necessarily random, depending on the period chosen and the methods used.

According to SIPRI, military spending was nearly \$1,820 billion in 2018, or 2.1% of global GDP, and has been increasing slightly over the past two years, particularly in Asia, the Eastern European Union and Oceania. In 2018, in billions of dollars, the United States' military expenditure reached \$650 billion, which is as much as the eight other largest global military budgets compared to \$223 billion for China. For Russia and Saudi Arabia, military spending must be significantly reduced, depending on the

evolution of the oil price and related or specific economic problems.

In 2017, SIPRI set about the difficult task of reconstructing the statistical series since 1949. The reasons for such an operation are multiple. The aim is to 'revisit' the history of international tensions in the light of military expenditure, to provide econometricians with new information that can be processed to provide new knowledge, and to have long-period data to observe the existence of cycles linked to demography, national product, diplomatic negotiations, changes in governance, or to define the conditions for preparing for war or relative peace. There are several difficulties in reconstructing these long data, such as the break-up of the USSR, the change of course of the popular democracies, the transformations of borders, the evolutions of military alliances, the national transformations of budgetary documents, etc.

Despite SIPRI's efforts, the methodologies used are not without question, even if the overall result seems satisfactory. Information from the 1960s to the 1990s often poses acute problems to process, as the figures from the various sources are so contradictory, particularly for the USSR, but also for many developing countries. This means that the information has to be based on second-hand sources, which are often difficult to verify, even by crosschecking.

The usefulness of information on military expenditure

SIPRI has undertaken a major effort to provide data on military expenditure, in current and constant dollars and as a percentage of GDP, in order to improve the statistical and econometric analyses of researchers, since 1949, despite all the problems posed by political changes, border variations, currency developments or fragmentary and biased information from non-democratic countries. Armament and disarmament efforts also reflect real inter- or intra-state conflicts, threats to peace, alliances (and their rules), the will to power or defence, the strength of the military-industrial complex, or the economic policies of governments.

The SIPRI series, interesting as they are, raise difficulties that one should be aware of before using their content. What is the

purpose of information on military expenditure? In the context of an internal civil war, the dangerousness of the situation is usually not explained by the publication of total military expenditure, which is 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 between Middle Eastern countries are a concern for international security, their defence spending seems paradoxically to remain constant. While the reduction in military spending is sometimes "noticeable", it is generally due to the significant decline in the price of oil and fossil fuels. However, in the short term, "weapons stocks" are used up, until they are exhausted, without any perceptible increase in military expenditure. In countries with weak democracies where statistical information is never really controllable, crosschecking of information allows estimates to be made 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 expenditure (in all forms available from SIPRI) is of interest for all econometric analyses. They are widely used by econometricians, even if the interpretation of the results deserves great caution. Obviously, the content of military expenditure needs to be clearly established, in particular whether or not pensions or health care for war-wounded soldiers are introduced. It all depends on the objective of the study. Analysis in terms of a country's power through military expenditure is not always precise enough. In particular, it is always useful to remember whether or not the countries under study are nuclear powers, as this changes the cost-effectiveness ratio. It is also important to know whether the state has allies and which ones, whether it is independent or not in terms of arms production, or whether it is threatened by neighbours or enemy systems. In terms of opportunity costs, it is clear that all the present and future costs of choosing military expenditure over alternative civilian expenditure must be analysed. For example, if one is looking at the impact of military spending on a country's economic development, the burden of military pensions, pensions for veterans wounded on the battlefield, or productive arms options in lieu of production must be included as a time-lagged cost to the national community for its own defence.

Military spending can also contribute to the implementation of economic or industrial policy. For example, the US government is the biggest spender with \$650 billion, with a substantial increase in research and development and procurement in the coming years. This analysis leads us 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 the large firms with new innovations of general application, particularly in the digital economy.

Issues of national sovereignty, security and defence are beyond the control of the World Trade Organisation. It is therefore relatively difficult to measure the real costs of the operations undertaken in these capacities, which are often secret at least as regards their real or expected economic values. Transparency in the field of 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 in conventional arms and seeks to prevent and eradicate the illicit market by establishing standard rules for arms transfers. The results in terms of transparency have fallen far short of the hopes expressed when the ATT was signed. Sales of arms and military-related services by the 100 largest companies in the sector amounted to USD 420 billion in 2018. It should be noted that many weapons components are not always produced by the CMI and that some weapons do not belong to the military and defence sector itself. It is often difficult to know the use of a dual-use product that may have both military and civilian applications. 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 area of influence.

Nuclear forces are both a special case and an indisputable power factor and, at the same time, their use in a theatre of operations is rendered almost impossible as an acceptable strategy by the international community. For half a century, the use of this weapon has never been recognised by the major powers, within the framework of the "strategy of terror" and even of a debatable "no first use". Today, after the five traditional powers, i.e. the USA, Russia, the United Kingdom, France and

China, other countries have acquired nuclear weapons, such as India, Pakistan and 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. However, this information is merely an estimate, the United States provides some data on its forces, and if Russia refuses to give detailed results of its New Start advances, the United States accompanies this secrecy by not providing any more information on Russian and Chinese nuclear forces.

III Conclusion

Military expenditure is only a rough reflection of a country's military strength. Their content is subject to many assumptions, which vary over time. Many factors can make these national defence costs more or less effective, in particular the size of the military forces still effective from previous budgets, the bang for a buck, the effectiveness of the strategic choices made 'across the board' with regard to perceived or unlikely threats, common defence alliances, the military strength of civilian equipment (in particular cyber information or control of production tools), but also the real cost of the equipment and men in charge of the security of a country. Can we say that an American general is ten times more effective than a Russian general if his income is ten times higher, all other things being equal?

The SIPRI effort is interesting. However, the information should not be used by economists as an indisputable and verified database to justify and validate the results of the econometric analyses obtained, which will rather be a source of inspiration for continuing to improve our knowledge of world peace and conflicts in terms of the military commitments of states.

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