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REDUCTION OF MILITARY BUDGETS

Measurement and international reporting of military expenditures



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REDUCTION OF MILITARY BUDGETS

Measurement and international reporting of military expenditures: report prepared by the Group of Experts on the Reduction of Military Budgets

Report of the Secretary-General



United Nations
New York, 1977

NOTE

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INTRODUCTORY NOTE

The General Assembly, at its 2437th plenary meeting on 11 December 1975, adopted resolution 3463 (XXX) entitled "Implementation of General Assembly resolution 3254 (XXIX)". In the resolution the Assembly, inter alia, requested "the Secretary-General, assisted by a group of qualified experts appointed by him after consultations with Member States, to prepare a report containing an in-depth analysis and examination in concrete terms of the various matters specified in paragraph 5 below, including conclusions and recommendations". By paragraph 5, the General Assembly decided that the report should give emphasis particularly to the following matters:

"(a) The definition and scope of the military sector and of military expenditures, as well as the classification and structuring of expenditures within the military budgets, with the over-all aim of achieving generally acceptable and universally applicable delimitations and definitions and a standardized accounting system, so as to permit effective comparisons of the military budgets;

(b) The valuation of resources in the military sector, considering different economic systems and different structures of production within the military sector, with the purpose of examining methods concerning the relationships between resources and military output;

(c) The deflation for price change in military production in different countries, with the aim of examining methods of measuring real expenditure trends over a period of time, taking into account differences between countries in the rate of price change;

(d) The international value comparison and exchange rates relevant to military production, with the purpose of examining methods for accurate currency comparison of military expenditures;"

In pursuance of resolution 3463 (XXX), after consultations with Member States, consultant experts were appointed. 1/ The Group of Experts on the Reduction of Military Budgets held three sessions at Geneva in the period between March and September 1976. On 7 September 1976, the Chairman transmitted the report of the Group entitled "Measurement and international reporting of military expenditures" to the Secretary-General. This report (A/31/222 and Corr.1), which the Secretary-General hereby submits for the consideration of the General Assembly, contains observations and recommendations of the experts. In this connexion, the Secretary-General wishes to refer to the comments concerning the preparation of such reports made in the introductory note to the previous report on the subject of the reduction of military budgets. 2/

1/ For the names of the experts, see the letter of transmittal below.

2/ A/9770/Rev.1 (United Nations publication, Sales No. E.75.I.10).

LETTER OF TRANSMITTAL

7 September 1976

Sir,

I have the honour to submit herewith the report of the Group of Experts on the Reduction of Military Budgets, appointed by you, which was requested by the General Assembly in paragraph 3 of its resolution 3463 (XXX) of 11 December 1975.

The experts appointed in accordance with the General Assembly resolution were the following:

Mr. Abraham S. BECKER
Senior Economist
The Rand Corporation
Santa Monica, California
United States of America

Mr. Karunakaran BRECKENRIDGE
First Secretary of the Permanent Mission
of Sri Lanka to the United Nations at Geneva

Mr. José A. ENCINAS DEL PANDO
Dean of School of Economics
University of Lima
Peru

Mr. Brian FIELD
Economic Adviser
Ministry of Defence, London
United Kingdom of Great Britain and Northern Ireland

Mr. Plácido GARCÍA REYNOSO
Former Professor of Economics
Universidad Nacional Autónoma
Mexico, D.F., Mexico

Mr. Zvoimir KACIC
Professor of the Higher Military Academy
Belgrade
Yugoslavia

His Excellency
Mr. Kurt Waldheim
Secretary-General of the United Nations
New York

Mr. Kiyohiko KOIKE
Chief of First Procurement
Management Division
Central Procurement Office
Japan Defense Agency, Tokyo
Japan

Mr. Lutz KÖLLNER
Assistant Professor at the Social Sciences Institute
of the Federal Armed Forces, Munich
Federal Republic of Germany

Mr. Karl-Erik STRAND
Director of Economic Analysis
Ministry of Defence, Stockholm
Sweden

Mr. Shuaib Uthman YOLAH
Ambassador of Nigeria
to the Federal Republic of Germany
Bonn

At its first meeting, on 22 March 1976, the Group elected Professor J. A. Encinas del Pando of Peru as its Chairman. Dr. P. K. Banerjee, Deputy to the Under-Secretary-General for Political and Security Council Affairs of the United Nations Secretariat, attended the sessions as representative of the Secretary-General. Mr. P. Csillag, Chief of the Information and Research Section of the Disarmament Affairs Division, served as Secretary of the Group of Experts.

The report was prepared between March and September 1976, during which period the Group held three sessions, from 22 to 26 March, from 28 June to 9 July and from 30 August to 7 September 1976, at Geneva.

Professor Z. Kacic of Yugoslavia participated only in the first session, while Mr. K. Breckenridge of Sri Lanka joined the Group during its second session. At the first session Mr. S. Tsukihara acted as expert from Japan.

The Group of Experts on the Reduction of Military Budgets wishes to acknowledge with appreciation the assistance it received from the Disarmament Affairs Division, Department of Political and Security Council Affairs, of the United Nations Secretariat and from Mr. P. W. Quigg, who served as Consultant to the Secretariat.

I have been requested by the Group of Experts, as its Chairman, to submit this report to you on its behalf.

Respectfully yours,

(Signed) J. A. Encinas del Pando
Chairman, Group of Experts

Measurement and international reporting of military
expenditures: Report of the Group of Experts on the
Reduction of Military Budgets

Executive summary

Section I

1. The origin of this Group of Experts may be traced back to General Assembly resolutions 3093 A and B (XXVIII) of 7 December 1973, concerning the reduction of the military budgets of major world military spenders and the utilization of part of the resources thereby saved for international development assistance. The exercise continued with the report 1/ of the Group of Consultant Experts on the Reduction of Military Budgets set up under resolution 3093 B (XXVIII), and with the discussion engendered by that report. Hereafter that report will be referred to as "the 1974 report". At its thirtieth session the Assembly, in resolution 3463 (XXX) of 11 December 1975, requested the Secretary-General to appoint, after consultations with Member States, another Group to study four specific technical issues of the measurement of military expenditures:

"(a) The definition and scope of the military sector and of military expenditures ... and a standardized accounting system ...;

(b) The valuation of resources in the military sector ...;

(c) The deflation for price change in military production ...;

(d) The international value comparison and exchange rates relevant to military production ...".

2. The present report is part of a continuous effort by the international community to achieve some degree of arms control and disarmament and to release resources for social and economic development, particularly for assistance to developing countries. The need for action under both headings is demonstrated by the very large volume of resources devoted to military activities and the very much smaller volume of concessional assistance to developing countries.

3. The central purpose of this study is to provide the major components of a system of military expenditure concepts, definitions and measurement procedures, along with a corresponding reporting structure. Because of the heterogeneity of national military budgets and budgetary practice, the structure recommended in this report is deduced from the logic of expenditure limitation rather than being based on actual national practice.

4. The satisfaction of the General Assembly's request, in resolution 3463 (XXX), for "generally acceptable" definitions and procedures is attempted by developing a reporting system characterized by consistency and comprehensiveness, which is

1/ A/9770/Rev.1 (United Nations publication, Sales No. E.75.I.10).

intended to add to the verifiability of compliance in an expenditure limitation. Only such a reporting system can assure the States concerned that their national interests can be adequately protected if and when military expenditures are limited.

5. For these purposes, the following criteria have been applied in this report:

(a) Reasonable comprehensiveness in defining the scope of the military sector and in determining what constitutes military expenditure, balanced by pragmatic selectiveness in excluding unessential elements;

(b) Identification of measurement objectives that are as close as practicable to the fundamental disarmament goal of the resolution;

(c) Consistency of valuations to ensure comparability over time and between States.

6. However comprehensive and detailed the system suggested in this study may be, not all elements of a complete solution could be provided. Steps to implement the recommendations of this report are contained in section VI.

7. Implementation of the international reporting system, which is one of the major recommendations of this report, constitutes only the first - although a very positive first - step towards realization of expenditure limitations. There remain other technical issues to be solved, especially that of verification.

8. It is hoped that implementation of the reporting system will, by virtue of the improved flow of information, contribute to creating mutual confidence among States, thereby stimulating détente and aiding the international effort for effective arms control and disarmament.

9. Given the complexities of the issues with which the Group of Experts has dealt, it has been necessary to adapt a pragmatic and gradualistic approach to the task of implementing the analytical discussion. It is the Group's firm belief that such an approach will permit more rapid progress towards the goals of the United Nations resolutions.

Section II

10. Comparisons of military expenditures may serve various purposes and require correspondingly different delimitations of the expenditure concept. Since arms control is fundamental in this study, an attempt is made to define military expenditures to correspond as closely as possible to military capability. However, it is recognized that not everything that affects military capability can be expressed in monetary terms, and that, in the achievement of national security, physical capabilities of military forces interact with other factors, such as the effectiveness of the political system.

11. The definition of the scope and content of military expenditure is approached via the corresponding delimitation of the military sector. The extent of the latter may be understood in broader or narrower terms depending on political-military conditions and the time interval considered. The present report follows that of 1974 in defining the military sector as that group of activities whose object is the research, development, provision, assembly, maintenance and deployment of current and future force potential intended for application mainly against external forces.

12. The activities of the military sector are also viewed in terms of employment of personnel, procurement of equipment, operations and maintenance, construction and acquisition of military facilities, and research and development. These activities embrace nuclear as well as conventional forces. Military space activities are included.

13. For more accurate delimitation of the sector, several important activities that can substitute for core military activities are included in the sector: paramilitary forces, civil defence and military assistance. In the future, other such activities might be considered appropriate for inclusion.

14. For reasons connected with valuation problems considered in section III, military expenditures are measured as the value of the flow of final military goods and services to the military sector. The scope and content of military expenditures are elaborated in terms of outlays on the activities listed in paragraph 12 above, including outlays on the appropriate set of substitutes noted in paragraph 13.

15. Elaboration of the scope and content of military expenditures provides the basic framework for standardized international accounting and reporting of military expenditures. The format of the instrument suggested for this purpose is intended to promote confidence-building through an increased flow of information on military expenditures, as well as to provide meaningful international comparisons as a step towards ultimate expenditure limitations.

16. The accounting and reporting instrument recommended in this report is a matrix of expenditures. In this matrix, the rows represent resource cost elements (outlays on personnel, operations and maintenance, procurement, construction and research and development) and the columns reflect a compromise mixture of programme-mission and service elements (strategic forces, general purpose forces, central support, administration and command, paramilitary forces, civil defence and military assistance). Most of the row and column headings are further subdivided. The more detailed the disaggregation, the more reliable will be the valuation of resources used in the military sector and the more cross-checks can be made, using other sources of information.

17. The structure of this matrix bears similarities to military expenditure accounting used by some countries but differs from any particular national system, since it is developed specifically for the purposes of the study. Also, military

expenditures are to be recorded independent of the type of financing, channel of expenditure and type of budget accounting used in any particular national system.

18. The expenditure matrix, while comprehensive in its coverage of expenditures as defined in this report, cannot take into account the value of the current services of military capital, nor does it allow for the recording of stocks of capital and their net and gross changes. Since military balances in the short run are dominated by inherited stocks, it would be desirable in the future to supplement expenditure values with data in physical terms for a number of resource categories.

19. Standardized reporting in the form recommended will require considerable effort. Since it is impossible to know in advance what kind of data States are able and willing to report, more information is requested in the matrix than can reasonably be expected from all States at the outset. A pragmatic approach and a step-by-step implementation will help overcome the difficulties encountered.

Section III

20. The accounting of military expenditures must determine not only what and how to count - for example, whether civil defence should be included or excluded; whether ammunition purchases should be recorded under procurement or operations and maintenance - but also how to value. What kinds of prices shall be used to weight physical quantities of goods and services so that the resulting aggregates correspond to the objectives of the measurement?

21. Given the fundamental arms control purpose of military expenditure limitations and reductions stipulated in this report, it would be desirable to establish valuation criteria that would generate expenditure measures corresponding to measures of military utility. In that case, changes in measured military expenditures could be expected to parallel the changes in real military capability which are to be constrained under the expenditure limitation. An attempt to establish the basis for such a measure of military expenditures uses a conceptual model which postulates that each State's political-military authorities maximize national military security derived from the combination of military goods and services, subject to a budget constraint. In this model, military expenditures may be interpreted in terms of the military utilities derived directly from the consumption of military goods and services, or indirectly through their combination in output-defined programme packages.

22. The assumptions of this concept are, however, stringent, with no discernible application to the real world, and it appears necessary to reject the military utility model as a basis for a valuation criterion. The alternative recommended focuses on the resources used in the military sector. A measure of costs is developed of such a nature that changes in military expenditures can be interpreted in terms of the potential to produce military goods and services, analogous to the interpretation of national income in terms of potential to produce civilian and military goods and services. Thus, while it does not appear feasible to develop a valuation basis for interpretation of military expenditure in terms of military utility, a second-best solution is attainable by shifting the focus to military resource costs.

23. The valuation criterion recommended for this purpose is adjusted factor cost. In pure form, factor cost measurements presuppose efficient production, that an economy fully exploits and fully employs the technological possibilities and resources available to it. To take account of pervasive real-world inefficiencies, factor cost is defined here in an adjusted concept which allows for valuation at average instead of marginal cost. The set of valuation standards associated with adjusted factor cost (a) provides a consistent and implementable set of rules for international valuation in domestic currencies, (b) is applicable to any type of national economic organization, and (c) provides a basis for adjustment of expenditure values for all major types of divergences of prices from real costs.

24. Historically, the theoretical framework for valuation discussed in section III has its roots in a system of thought describing a particular economic and production system, by elucidating its performance in terms of classical factors of production. It would therefore be readily understandable if theories based on alternative systems are proposed as different approaches to valuation problems. Specific proposals of such alternatives may also be operational and would need further examination.

Section IV

25. When prices are changing, nominal increases in military expenditure need not necessarily reflect changes in the real volume of military output. In order to distinguish between nominal and real changes in military expenditures, the distorting effects of price changes must be eliminated by a process of deflation. The task is to develop in factor cost terms intertemporal and international price indexes which permit reliable comparisons of military output in terms of potential to produce final military goods and services.

26. We envisage that those responsible for the construction of military price deflators will require information and data from different countries, at different levels of aggregation, and according to different definitions. The usual problems associated with index number construction may appear in a more extreme form for the military sector. For comparisons over a period of time, military outputs may be weighted in terms of base year or given year prices, corresponding to the familiar Laspeyres and Paasche index number formulae. There are, therefore, two possible indexes for price change of military output. The counterpart in international comparisons reflects the use of the price weights of one country or another. This is the so-called index number problem, made more severe by rapidly changing military structures. For this reason, the Group of Experts recommends a deflation procedure using both types of index referred to above.

27. For such cost categories as personnel, materials and standard equipment, the construction of price deflators is fairly routine. More difficult problems arise in the case of military hardware, especially advanced and technically sophisticated weapons systems, where quality change is rapid and difficult to measure, and the distinction between an improved product and a new product is often hard to make. With respect to quality change, experience gained in adjusting civilian price

indexes will be helpful for standard items with counterparts in the civilian sector; experimental work could be necessary for more complex items of military equipment.

28. In some cases the data needed to construct military price indexes will not be available; then surrogate indexes drawn from the civilian economy could possibly be used. Their appropriateness in each case will need to be carefully considered.

29. Specific proposals are made for the construction of military price deflators and appropriate surrogate indexes for six components of military expenditures: personnel, procurement of hardware, construction, research and development, imports and miscellaneous. At the point where price deflation becomes an operational task, it will be necessary to take careful account of the wide international variation in the availability and accuracy of price information.

Section V

30. In a situation where symmetry of military expenditure levels is essential to the conclusion of a military expenditure limitation, or is required by the type of limitation under consideration, it would be necessary to convert expenditure values expressed in national currencies into a common currency. The Group of Experts recommends the eventual use of purchasing power parities instead of prevailing or adjusted exchange rates for the purpose of comparing military expenditures.

31. The main argument against using exchange rates for converting military expenditures into a common currency is that official exchange rates for military products do not exist. But even if this were not so, there would be no reason to expect the relationship of internal prices of military output to reflect military exchange rates, since this would require an absence of restraints to trade, which are so much a feature of trade in general, including trade in military goods.

32. In recommending the use of purchasing power parities, the Group of Experts is mindful of the fact that the raw data for compiling these price ratios must await the construction of reliable military price deflators. Purchasing power parities would be based on the flows of final military goods and services valued on an adjusted factor cost basis.

Section VI

33. The Group of Experts believes that, while the recommendations in sections II to V are not necessarily exhaustive, they are viable and constitute an analytical step forward towards the goal of expenditure limitations and reductions. Nevertheless there is clearly a need to translate the concepts and procedures developed in this study into practical ways and means that can be utilized on a regular basis by the United Nations and its Member States.

34. To this end the international reporting instrument developed in section II (table A) must be operationalized, tested and refined. These are three distinct

phases of a development process which constitutes a prerequisite for more general application of the accounting matrix as a regular instrument for reporting the military expenditures of the States Members of the United Nations. Following reporting at established prices in national currencies, the development process should take up factor cost revaluation of outlays, the development of appropriate price deflators and the construction of purchasing power parities for military goods and services. Certain procedures for implementation of the development process and for testing the validity of the reporting system have been proposed.

35. At a further stage the international community should be ready for discussion of the other major issues of expenditure limitation, including the problem of verification. At the appropriate time, further consideration should be given to utilizing part of the resources released from the reduction of military expenditures for social and economic development, particularly that of the developing countries.

I. INTRODUCTION

A. Origin and background

1. On several occasions through the years, the General Assembly has called upon its members to take concrete steps to reduce the burden of military expenditures. There is a long history of proposals to limit armaments, but conceptual and practical difficulties have so far prevented serious consideration of the expenditure approach. As a result, arms control and disarmament negotiations have concentrated on measures to limit military forces and activities rather than on measures to limit expenditures.
2. On 7 December 1973, the General Assembly adopted resolution 3093 A (XXVIII) in which it, inter alia, recommended that all States permanent members of the Security Council should reduce their military budgets by 10 per cent from the 1973 level during the next financial year; appealed to those States to allot 10 per cent of the funds so released for assistance to developing countries; and expressed the desire that other States, particularly those with a major economic and military potential, should act similarly.
3. Under resolution 3093 B (XXVIII) of the same date, the General Assembly requested the Secretary-General to prepare, with the assistance of qualified consultant experts appointed by him, a report on the means to accomplish these objectives. Pursuant to this resolution, the Secretary-General, after consultation with Member States, appointed a Group of Consultant Experts which prepared the report entitled Reduction of the military budgets of States permanent members of the Security Council by 10 per cent and utilization of part of the funds thus saved to provide assistance to developing countries. 2/ Hereafter this will be referred to as the "1974 report".
4. At the twenty-ninth session, the Secretary-General submitted the 1974 report to the General Assembly for consideration. Noting that the Governments had not had enough time to study the report with the attention and care its importance and complexity deserved, the Assembly adopted resolution 3254 (XXIX) of 9 December 1974, in which all States were invited to communicate to the Secretary-General their views and suggestions on the matters covered in the report.
5. At its thirtieth session, the General Assembly was presented with a compilation of the views and suggestions of a number of States (A/10165 and Add.1 and 2) regarding some of the issues raised in the 1974 report. The need for further study was generally recognized. On this basis, the Assembly adopted resolution 3463 (XXX) on 11 December 1975 in which it, inter alia, requested the Secretary-General, assisted by a group of qualified experts appointed by him after consultations with Member States, to prepare a report containing an in-depth analysis and examination in concrete terms of four issues:

2/ Ibid.

"(a) The definition and scope of the military sector and of military expenditures, as well as the classification and structuring of expenditures within the military budgets, with the over-all aim of achieving generally acceptable and universally applicable delimitations and definitions and a standardized accounting system, so as to permit effective comparisons of the military budgets;

"(b) The valuation of resources in the military sector, considering different economic systems and different structures of production within the military sector, with the purpose of examining methods concerning the relationships between resources and military output;

"(c) The deflation for price change in military production in different countries, with the aim of examining methods of measuring real expenditure trends over a period of time, taking into account differences between countries in the rate of price change;

"(d) The international value comparison and exchange rates relevant to military production, with the purpose of examining methods for accurate currency comparison of military expenditures;"

B. Disarmament and development

6. Since the adoption of resolution 3093 B (XXVIII) in 1973, two objectives have been singled out by the General Assembly. One has been to secure some degree of arms control and disarmament, and the other to release resources for alternative purposes, i.e. social and economic development, particularly in the developing countries.

7. The continuing global expansion of arms and forces, both nuclear and conventional, attests to the need for effective arms control. As indicated in the introduction to the report of the Secretary-General on the work of the Organization in August 1975, it has been estimated that the size of military programmes throughout the world has more than trebled during the post-war period, to a current level on the order of \$US 300 billion. ^{3/} This represents an enormous capability for mass destruction. Moreover, a considerable fraction of the world's military effort is concentrated on nuclear weapons, which, if used, could mean global disaster.

8. From an arms control viewpoint, the rapid and accelerating advances observed in the field of military technology are particularly disquieting. The rapidity of military technological change is made possible by the very large volume of resources devoted the world over to military research and development. In this

^{3/} Official Records of the General Assembly, Thirtieth Session, Supplement No. 1 A (A/10001/Add.1), sect. VIII.

connexion, expenditure limitations may have the advantage not only of encompassing research and development outlays but, also, by virtue of the comprehensive scope of such limitations, of possibly constraining qualitative improvements in military forces.

9. The world would clearly benefit in many ways if national security could be achieved with a lower level of military expenditure, so that resources could be released to meet the many pressing economic and social needs throughout the world. Furthermore, a reallocation of resources from military to civil purposes would provide possibilities for an increase in the rate of world economic growth.

10. Some of the savings achieved by reduction of military expenditure could help augment the presently inadequate levels of assistance to developing countries. Compared to world military programmes with a magnitude of around \$300 billion, official development assistance flows to the developing countries in 1975 amounted only to about \$17 billion or roughly 6 per cent. This amount of official development assistance falls far short of the needs of the developing countries. As a proportion of gross national product, it is also well below the target of 0.7 per cent for international assistance by developed countries set by the Organization for the Second United Nations Development Decade.

11. In this context, the Group of Experts would like to underscore that the present report is not an isolated or unrelated document. It is part of a long effort with which the international community has been actively concerned. More specifically, it is part of the General Assembly's proposal to reduce military expenditures and channel part of the savings into international economic assistance. Hence the report is also linked with the United Nations endeavours to promote economic development.

C. Objectives of the report

12. The 1974 report demonstrated the diversity and incomparability of concepts, definitions and accounting practices of various Governments with respect to their military budgets. Therefore, the present study follows the 1974 report in identifying and defining the object to be reduced - or, more generally, limited - as a participant State's expenditure for military purposes (for brevity, military expenditures). By calling for a comprehensive examination of the issues enumerated above, in resolution 3463 (XXX) the General Assembly affirmed the need for a fresh effort to achieve "generally acceptable and universally applicable" definitions and measures as a prerequisite for international agreement to halt the growth of military expenditure. The central purpose of this study is to furnish the major components of a system of concepts, definitions and measurement procedures, along with a corresponding reporting structure, based on the requirements deduced from the logic of expenditure limitation.

13. In resolution 3463 (XXX), the General Assembly urged that an effort be made to develop definitions and procedures that would be "generally acceptable". If we are to make progress towards the goal of expenditure limitations, the condition of general acceptability must be satisfied by establishing definitions and a

reporting system which are seen both to constitute concrete progress toward the goals established in resolution 3463 (XXX) and also to protect the vital national interests of the States concerned. These interests, of course, are bound up with the maintenance of their national security. Only a reporting system characterized by consistency and comprehensiveness, which adds to the verifiability of compliance by participants, will assure the States concerned that their national interests can be adequately protected when military expenditures are limited.

14. Therefore, the following criteria were applied to the development of solutions for the main issues of our mandate:

(a) Reasonable comprehensiveness in the definition of the military sector and of military expenditure, balanced by pragmatic selectiveness in excluding extraneous elements;

(b) Identification of measurement objectives as close as practicable to the fundamental disarmament goal of the resolution;

(c) Consistency of valuations to ensure comparability over a period of time and between States.

15. As indicated, the present report seeks to provide the major components of a measurement and reporting system. Although the Group of Experts has attempted to deal with the major issues that arise under the heading of measurement, it could not provide all the elements for a complete solution. Even definitions and reporting systems explored in some detail must be made operational, general procedures must be elaborated, and the mechanism as a whole must be tested and developed. The last-named task is alone sufficient to require a specific means of implementation, and this question is explored in section VI below.

16. Implementation of the international reporting system, which is the major recommendation of this report, would not resolve all the arms control problems of expenditure limitations. The Group of Experts reaffirms the view expressed in the 1974 report that solution of the measurement problem, as broadly defined in paragraph 5 of resolution 3463 (XXX), is only the first - although a very positive first - step towards realization of expenditure limitations. Limitation of military expenditures can take various forms and can be carried out in different ways. ^{4/} The effect on the military security of participants in an expenditure limitation agreement can vary, depending on the political-military environment of the time. Particularly critical for successful negotiation of an expenditure limitation agreement is to solve the complex problems of verifying compliance with the agreed restraints. Consideration of these issues is outside our mandate and no discussion on these matters is to be found in this study.

^{4/} There are eight characteristics of military expenditure limitations discussed in annex II of the 1974 report, paragraphs 81-97: object, form, size of reduction, linkage to force limitations, duration, time-profile, mode and participants.

However, we are confident that successful implementation of an international reporting system of military expenditure will provide a strong impetus to resolve the remaining technical issues.

17. A viable reduction of military expenditures presupposes a substantial flow of information - first, as a reference for negotiations, and second, in order to verify the fulfilment of reductions. However, it should be noticed that the prerequisites for increased exchange of information have improved with more efficient methods of collecting, processing and evaluating information. The problems should be simplified by the provision of more and better data and by the implementation of such techniques as programme budgeting and the adoption of more sophisticated systems for long-term planning.

18. Creating mutual confidence among States, and thereby stimulating détente, depends to a great extent on improving the flow of military information. Where information is lacking, there is no clear answer to the question of how much military strength is enough. Uncertainty in military planning may lead to a preference for too much rather than too little. An improved flow of information in itself would contribute significantly to confidence-building. Effective international arms control and disarmament would be greatly aided by a broad and active body of informed opinion in all countries.

19. The analysis of the problem of measuring military expenditures as well as the recommended international reporting instrument contained in this report are intended primarily to facilitate more accurate international comparisons of military expenditures. Some of the methodological problems involved in comparing military expenditures are so complex that first-best solutions are either beyond the current state of the art or otherwise impracticable. The Group of Experts has tried to be responsive to the request of the General Assembly in paragraph 3 of resolution 3463 (XXX) for "examination in concrete terms ... including conclusions and recommendations". Accordingly the Group is, where possible, presenting proposals on methods and procedures regarding the various problems involved.

20. Given the nature of the task of the Group of Experts, its approach to the weighty issues set before it has been technical and analytic. Given also the ever-changing nature of this complex problem, and the variety of conceptual viewpoints from which it can be approached, no claim can be made that the Group's recommended analytical approach is either exhaustive or final. The Group is conscious of the real-world problems that must inevitably be encountered in putting any such analysis to practical effect. Implementation may have to proceed pragmatically with methods and procedures developed gradually and improved step by step as information exchange and experience increases. It is our firm belief that this will permit more rapid progress towards the goals of the United Nations resolutions in this regard.

D. Organization and content of the report

21. The organization of the present report closely follows the structuring of the assignment in paragraph 5 of General Assembly resolution 3463 (XXX). Accordingly, in section II definition and accounting of military expenditures are considered and a proposal is made for an international reporting system. Section III deals with the subject of valuation of resources in the military sector. That means, among other things, analysis of different approaches to the valuation problems and elaborations of valuation rules. Section IV takes up the subject of price and volume measures of military expenditures, analyses the general and technical problems in output and input price measurement and presents proposals on methods and procedures. Then the question of international value comparisons of military expenditures is examined in section V; this section contains a discussion of comparisons using exchange rates and purchasing power parities. Finally, in section VI ways and means of implementing the military expenditure measurement system are proposed.

II. DEFINITION AND ACCOUNTING OF MILITARY EXPENDITURES

A. Introduction

22. The ability to compare military expenditures may serve a number of different purposes: (a) to measure the domestic economic impact of changes in levels of national military outlays; (b) to trace the effects of changes in military expenditures, particularly international arms sales, on international trade flows and national payments balances; (c) to measure differences in the "burden of defence" on the national economy; or (d) to devise constraints on military expenditures in order to achieve a measure of arms control.
23. It is important to distinguish among these various purposes because delimitation of the military sector and the scope and content of military expenditures will vary significantly according to the objective sought. If one is concerned about the international arms trade, the important elements of military expenditures to be examined are those most closely related to international transfer of military goods and services; accordingly, domestic transactions would assume lesser importance. If the objective is to measure domestic economic effects of changes in military expenditures or the "burden of defence", the scope of outlays covered should be correspondingly broad. On the other hand, if the goal is arms control and eventual disarmament, attention will focus on current and future military capabilities; expenditures connected with the discharge of past military obligations will be regarded as irrelevant.
24. For reasons indicated in section I, progress towards the achievement of expenditure limitations requires that the arms control purpose be central to the definition of military expenditure - the concern of this section. In particular, the acceptability of such limitations will depend upon each State's perception that its military security will not be impaired by entering into the constraints envisaged. That means in turn that the measurement apparatus must provide the basis for comparisons of military capability to whatever extent is realizable in theory and in practice.
25. This does not mean that the objective of saving resources for whatever purposes may be agreed upon - including international assistance to developing countries - will thereby be ignored. A limitation of expenditures defined with a view to arms control can also generate substantial savings. In addition, this approach avoids the complications arising from the fact that there are sharp differences among States in the share of their military expenditures which reflect past obligations - such as pensions and allowances to retired servicemen or to families of deceased military personnel. Because such outlays are fixed, expenditure constraints would affect the variable outlays on current and future capabilities. States which, for reasons of social policy or history, have relatively large obligations of this kind would thereby be placed at a disadvantage if these charges were included in the military sector.
26. The purpose of this study is to measure military expenditures so as to obtain a reasonably clear reflection of military capability. However, it is recognized

that military expenditure is not all-encompassing. Not everything that affects military capability can be expressed in monetary terms. There are imponderables of the society and of military organization which are difficult or impossible to quantify. Thus, the military part of the general educational system or a general military attitude may be significant phenomena in a society. In extreme form such tangibles may result in the complete militarization of a society. In any event, no international comparison of military capability should be made on the basis of expenditure information alone, even implemented by other statistical data. It will always be necessary to take additional, albeit qualitative, account of the relationships existing between the military and the society in different countries. These factors, too, represent an important element in the evaluation of military capabilities.

B. Definition and scope of the military sector

27. Given these purposes, we must now proceed to define the scope and content of military expenditures. The first step is to delimit the set of activities to be encompassed. In effect, this requires identification of the boundaries of the military sector, the value of whose activities in the accounting period will represent the measure of military expenditures.

28. The extent of the military sector may be understood in broader or narrower terms, depending on the political-military conditions and the time interval considered. In wartime the military sector encompasses functionally the whole of society that must be mobilized for success in combat or, indeed, for national survival. The military sector may then legally embrace everything except those assets, organizations and people without specific combat functions of their own. Indeed, since effective maintenance of inflationary pressures may be vital to maintenance of social controls and thus to the prosecution of the war effort, even tax collectors, war-bond salesmen or price regulators may be viewed as belonging to the military sector. In peacetime, the military sector is of course functionally and legally more limited, with a scope possibly related to the degree of international tension. As for the time dimension, it is evident that, in the very short run, only mobilized forces with existing equipment and material stocks can be relied on for military capability. If a sufficiently long run is allowed, resources may be viewed as divisible into infinitely small packages. In the very long run, most of total national output and some portion of the national capital stock not initially earmarked for military use could be reallocated to the military sector. A concept of national "military potential" could therefore include such elements as (a) the industrial-technological base for development and manufacture of weapon systems, (b) infrastructure (transportation and communication) beyond the requirements suggested by economic and social considerations, and (c) self-sufficiency in "essential" food-stuffs and materials that would not be provided if purely economic criteria were applied.

29. It would be extremely difficult to quantify the costs involved in such broad concepts of the military sector. For example, those activities will frequently have economic and social as well as military benefits, and there is probably no way of apportioning the costs of a particular measure and the various

considerations that motivated it. Evidently, our definition must be based on some intermediate time-frame and a less than total mobilization of the social and political structure: hence, in a set of activities falling between the extremes described above.

30. Definitions of military expenditures sometimes include the current costs of past military activities, such as pensions to retired servicemen and families of deceased military personnel, or even payments on the national debt, accumulated largely in the prosecution of past conflicts. By this definition, the military sector is implicitly viewed as covering not only current but also past military activities, or, more correctly, activities in the current period that are connected with past force potential. As was indicated earlier, the definitions of military sector and military expenditures developed here are geared to arms control through military expenditure limitation. With this objective, our concern is restricted to current and future force potential. Hence, the definitions must exclude activities related only to past military involvement.

31. As the 1974 report suggests, the military activities of a State may be viewed as intended ultimately for the protection of "national security", of which "military security" is the element directly related to the national military activities. Of course, even military security is an extremely broad concept in which the physical capabilities of the forces at a nation's disposal must be viewed as interacting with a number of other factors, such as military morale, political will and national determination, the capabilities and intentions of adversaries, the solidity of alliances on both sides, and other such variables which are only remotely capable of being affected by the policies of the particular nation's military and political leaders. That aspect of national security which seems to correspond most directly to national military activities and the capability to affect events through military policy was called "force potential" in the 1974 report. It was defined as the ability to apply organized military force against an external armed enemy.

32. We may therefore use the definition of the military sector suggested by the 1974 report, with one addition indicated by brackets: "that group of activities whose object is the research, development, provision, assembly, maintenance and deployment of current and future force potential intended for application mainly against external forces".

33. The activities of the military sector may also be viewed in terms of:

- (a) Employment of personnel;
- (b) Procurement of equipment;
- (c) Operations and maintenance;
- (d) Construction of military facilities;
- (e) Research and development.

34. Employment covers both civilian and military personnel and includes reserves as well as active duty forces. As pointed out in paragraph 30 above, retired and deceased personnel are excluded from the purview of the military sector.

Procurement includes major modification of on-hand equipment (e.g., to ships and planes) as well as the acquisition and maintenance of reserve or "mothballed" arms production facilities (see para. 41 below). Operations and maintenance encompass a broad category of activities, including education, training and deployment of personnel and force units; operation and maintenance of equipment and facilities; military planning, command, administration and management. Construction embraces acquisition of land and facilities as well as the construction of buildings and structures. Research and development should include the testing and evaluation of military technology developed. In each category listed above, reference is not just to conventional arms but also to nuclear weapons; military applications of space technology are also included.

35. As the 1974 report points out, the delimitation of the military sector is complicated by the existence of more or less close substitutes for some of the activities mentioned above. Important substitutes which seem worth examining are:

- (a) Paramilitary forces;
- (b) Civil defence;
- (c) Stockpiling "strategic" commodities other than armaments;
- (d) "Mothballed" or reserve arms production facilities;
- (e) Military assistance.

These are taken up in turn.

Paramilitary forces

36. The concept of paramilitary forces is difficult to define. Several different types are identified under this general rubric in the annual entitled The Military Balance issued by the International Institute for Strategic Studies. Some of these forces are evidently intended to guard the national frontiers, mainly against such activities as illegal immigration, smuggling or even guerrilla infiltration, although the forces may also be used against organized external attack. A second category embraces forces whose chief mission is the maintenance of internal security, although these too may be used against an external armed enemy. Finally, there is a third group, often designated "militia", whose function may be a combination of internal security and regional or border defence against external attack.

37. Evidently, there is a wide spectrum of forces whose mission is protection of the public security, ranging from unarmed police to the highly sophisticated armies of the major Powers employing the most technologically advanced and lethal weapons. For present purposes, it is necessary to identify those elements that should not be included in the military sector at all. At a later point, it will also be useful to distinguish paramilitary from regular military forces.

38. Unfortunately, it is not possible to provide an airtight and clear-cut definition here. Two criteria for distinguishing military from civilian forces suggest themselves: extent of military training and level of armaments. Thus, it seems reasonable to include in the military sector those groups which, having received organized military training, could, if equipped with appropriate weapons, be used as substitutes for regular military forces. The practical implementation of this general definition may be left for a later stage.

Civil defence

39. It is apparent that passive or civil defence against air attack may be a substitute for active air defence of urban areas. The construction of bomb shelters or the organization of evacuation procedures can substitute for armed forces whose mission is to destroy incoming aircraft or missiles. Therefore, in principle civil defence should be included in the military sector. However, in view of (a) the difficulties of measurement and verification, arising from the involvement of local government and the private sector in civil defence; (b) doubts as to the effectiveness of civil defence as a substitute for active defence in some cases; and (c) the ambivalent arms control characteristics of civil defence (possible strategic importance versus humanitarian effect), the Group of Experts concludes that the application of the principle requires further study.

"Strategic" stockpiling

40. As the 1974 report points out, stockpiling of "strategic" goods other than arms may constitute a "substitution for future direct or indirect military purchases". In greater or lesser degree, many countries stockpile such commodities as food, petroleum products and industrial raw materials. However, the difficulty of "determining the defence-motivated portion of national inventories" makes it impractical to attempt to include this activity in the military sector.

"Mothballed" or reserve arms production facilities

41. Such facilities represent, in effect, a stockpiling of future production capacity. Their acquisition and maintenance should therefore be included in the military sector. The problem is primarily one of valuation, for the issue is to determine the incremental cost of maintaining standby capacity. However, the activity must be taken into account in mapping out a structure of military expenditure accounting, as is done in subsection D below.

42. While this activity has been introduced here in the category of substitutes for core activities, it should in fact be viewed as an element of the core itself, because such reserve facilities constitute future force potential.

Military assistance

43. Military assistance may be broken down into (a) aid provided for allied infrastructure or to allied forces stationed on one's own or an ally's territory; and (b) aid extended abroad. The latter category in turn could be subdivided into assistance to allies and that to non-allies. In an alliance relationship the military power of allied countries may be an important substitute for that of the donor country. When no alliance relationship exists, the problems are more complex, for then a grant of military aid may be motivated either by military or political considerations, or both. It seems unlikely that an objective basis for distinguishing between them can be found. Thus, the practical expedient is to include all military assistance to allies or non-allies in the general category of military assistance. The implicit and perhaps justifiable assumption is that military aid to some extent always strengthens the military position of the donor country.

44. The preceding list of substitutes probably accounts for the most significant activities in the category. However, there may be others of importance in particular contexts. Identification of such substitutes and determination of their proper classification may be left to the stage of implementation.

45. To sum up, the definition of the military sector and its scope and content are as follows:

Definition: that group of activities whose object is the research, development, provision, assembly, maintenance and deployment of current and future force potential intended for application mainly against external forces.

Core activities:

- (a) Employment of military and civilian personnel, including reserves;
- (b) Procurement of equipment; 5/
- (c) Operations and maintenance;
- (d) Construction of military facilities (including acquisition of land and facilities);
- (e) Research and development.

5/ Including acquisition and maintenance of reserve or "mothballed" arms production facilities.

Substitute activities included:

(a) Paramilitary forces; 6/

(b) Civil defence; 7/

(c) Military assistance;

(d) Such other activities as will be viewed as important substitutes for core activities of the military sector.

C. Definition and scope of military expenditures

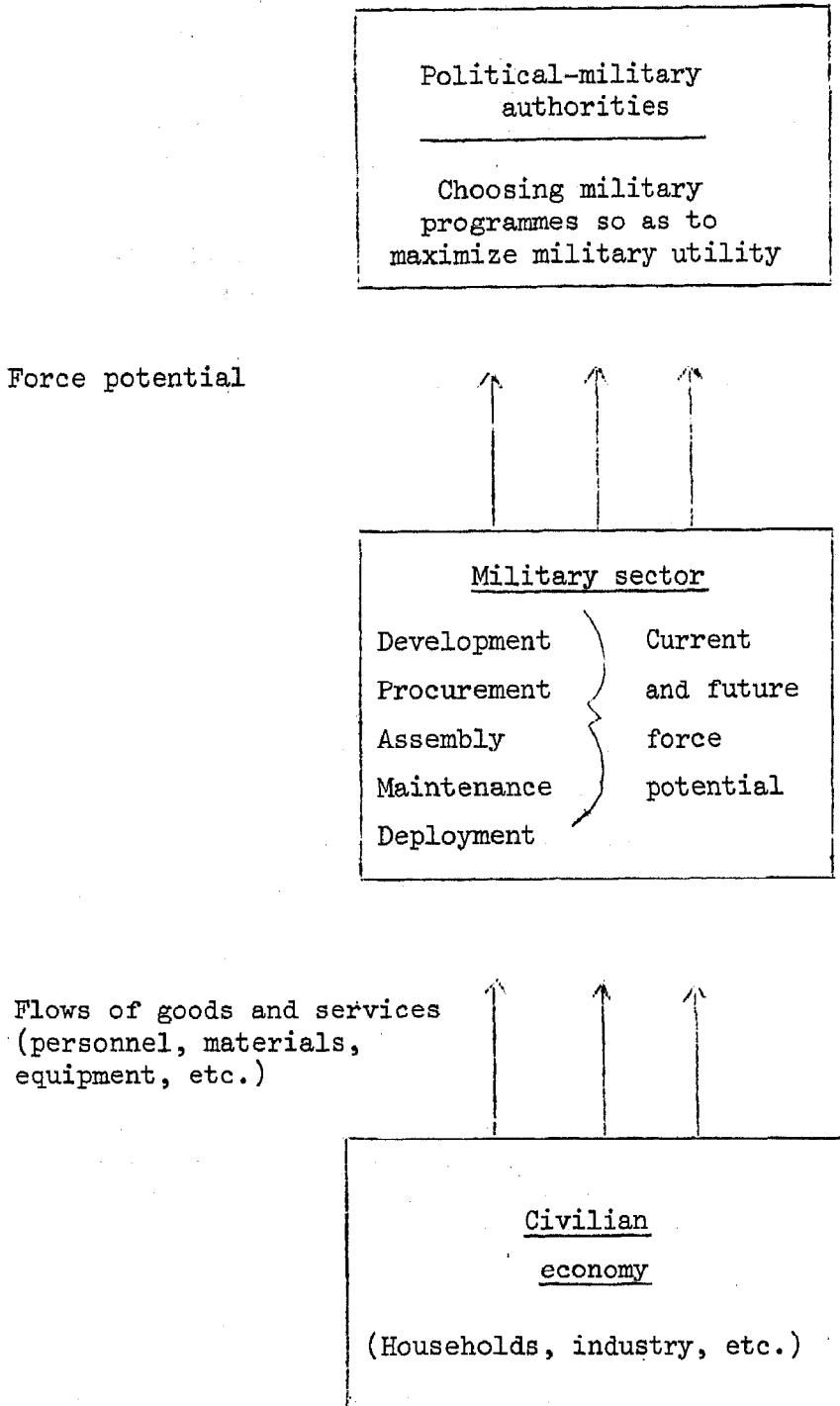
6. Such activities as training military units, equipping them with weaponry and facilities, and deploying the units for various missions depend on flows of goods and services in the form of personnel, materials, equipment, etc., which are obtained from outside the military sector. This general relationship between ultimate ends and the means to realize them may be viewed in schematic form in figure 1 below.

7. The concepts of military security and force potential are formalized in section III in connexion with the development of a criterion for valuing activities in the military sector. A valuation standard considered there interprets military expenditures in terms of utilities derived from force potential. It appears that the requirements of this formulation are so constraining as to make its application impossible. Thus, a valuation in the direction of the upper arrows in figure 1 is rejected because of the impossibility of implementation. The only alternative is to develop a valuation criterion for the set of lower arrows. This encompasses the set of activities which may be defined as the flow of military goods and services to the military sector, where they are converted into "force potential" by the activities described above. In terms of the schema of figure 1, the flows to be measured may be viewed as intermediate to the creation of force potential. From a national accounting point of view, where no attempt is made to distinguish ultimate ends of military activities, the flow of goods and services is "final" - i.e., they are not intended for further processing by branches of the national economy. Thus, the military sector itself is defined in terms of the activities of developing, creating, maintaining, etc., current and future force potential. Military expenditures are measured as the value of flows of goods and services into the military sector. Given the obvious convenience of adhering to the time span commonly used in national and international accounting, the time unit of definition to be used here is a full year.

6/ Defined as forces which, having received organized military training, could, if equipped with appropriate weapons, be used as substitutes for regular military forces.

7/ In principle civil defence is included in the military sector. However, the application of the principle requires further study.

Figure 1



48. Part of such flows of goods and services may sometimes be financed by the private sector. Should such financing be used as a subterfuge to conceal military activity, the distinction between public and private finance would obviously be spurious. However, we have previously noted the case of civil defence, where expenditure may take place partly or wholly through the private sector. We have also suggested that such outlays may be difficult to measure in a context where the trade-off with the core activity for which this is a substitute may also be difficult to determine. In such a situation, the private outlays might be excluded from consideration.

49. The scope and content of military expenditure may be clarified in terms of costs of the activities identified in section II, that is, in the following breakdown:

- (a) Compensation of military and civilian personnel, including reserves;
- (b) Procurement of equipment;
- (c) Operations and maintenance;
- (d) Construction of military facilities;
- (e) Research and development.

The costs recorded under these headings refer not only to the core activities but also to the substitutes included in the military sector.

Compensation of military and civilian personnel, including reserves

50. Compensation of personnel covers costs of both military and civilian personnel, and reserve as well as active duty forces. In accordance with previous discussion of sector limits, pensions and allowances to retired personnel, and to families of deceased personnel, are excluded.

Procurement of equipment

51. Procurement is defined to cover all equipment, not just major classes, and, as in the sectoral definition, includes major modifications of equipment on hand. For practical reasons, acquisition of all ammunition and ordnance is classified as procurement, even though logic would suggest inclusion of munitions earmarked for training under operations and maintenance.

52. In many countries various forms of government assistance may be extended to military industry. Examples are investment in tools for production of specific weapon systems or grants and loans for current operations or investment purposes. Such assistance is treated here as a subsidy which, under the principle of factor cost valuation (see sect. III below), must be added to product price.

In general, all support not amortized in product price must be viewed as a budget subsidy. 8/ By the same token, military expenditures exclude investment in arms production which is recovered via product price.

Operations and maintenance

53. Outlays on operations and maintenance include the following:

(a) Purchases of food, clothing, petroleum products, training materials, medical materials, office supplies and other materials for current use;

(b) Travelling expenses, postal charges, printing expenses and payment for other current services;

(c) Contract services for repair and maintenance of equipment and facilities;

(d) Purchases of parts, materials and tools for repair and maintenance of equipment and facilities;

(e) Real estate rents.

54. The distinction within the maintenance and repair category between services contracted for with the civilian sector and purchases of parts, materials and tools to be processed by military labour is needed to allow for international differences in military maintenance organization. In some countries maintenance and repair services are bought from outside the sector, in others much maintenance and repair is performed in local workshops within the military sector itself. In some other cases there will be mixes of both contracted services and those performed within the military sector.

55. A problem area with regard to operations and maintenance is the stockpiling of such goods as parts, petroleum products, food or other materials for current use, which are included under this general heading. This kind of stockpiling is treated in various ways in national accounting systems. In principle, one might consider using a separate inventory investment category under procurement. However, this may be viewed as presenting certain difficulties and, if so, the stockpiling should be included within operations and maintenance; that is, the category of operations and maintenance will include all acquisitions of materials including those for additions to stockpiles or inventories.

Construction of military facilities

56. As indicated in paragraph 34 above, construction embraces acquisition of land and facilities as well as construction per se.

8/ Methods for estimating the subsidy element of military expenditures will have to be determined at the stage of implementation.

Research and development

57. Research and development should be subdivided into (a) basic and applied research, outlays on which present a most difficult verification problem; and (b) development, testing and evaluation, for which verification seems more manageable. Finer breakdowns are of course possible, depending on the statistical information available.

58. A difficult problem of military expenditure classification is presented by civilian activities carried out by the armed forces or the Ministry of Defence. Military forces sometimes perform such exclusively civilian activities as construction, farming assistance, medical services, education, hydrographic services or the operation of such institutions as naval observatories. These activities may be extremely important in developing countries where armed forces may play a very significant role in educational and construction functions that are of direct and immediate value to the civilian economies. Such activities are also carried out in a number of countries with centrally planned economies.

59. Given the orientation of the expenditure definition of this study to military potential, civilian activities, such as those indicated above, should be excluded from military expenditures. However, the excluded outlays must be strictly limited to those with a purely civilian effect, such as the cost of construction materials for certain clearly civilian projects. Equipment allocated to such construction may still be used primarily on military projects and the costs of the military personnel engaged may reflect in considerable part contributions to the training and maintenance of military skills of members of the armed forces. Activities of this kind must not be used as a loop-hole to mitigate the constraint of an expenditure limitation, and outlay claims will have to be carefully verified.

60. To sum up, the definition and scope of military expenditures are as follows:

Definition: Flow of final military goods and services to the military sector, 9/ valued at factor cost.

Costs: 10/

(a) Compensation of military and civilian personnel, including reserves; 11/

9/ On the treatment of private sector outlays and outlays by the military for civilian purposes, see paras. 48, 58 and 59.

10/ Defined comprehensively, irrespective of channel of finance and type or form of subsidization.

11/ Excluding pensions and allowances to retired personnel and to families of deceased personnel.

(b) Procurement of equipment, including major modification of equipment on hand; 12/ 13/

(c) Operations and maintenance; 14/

(d) Construction of military facilities, including acquisition of land and facilities;

(e) Research and development.

D. Structuring and classification of military expenditures:
a proposed international reporting system

61. We now propose a framework for standardized international accounting and reporting of military expenditures. Agreement on a common accounting table and a common set of accounting principles would facilitate international comparison of military expenditures. The purpose here is to propose an aggregated accounting table that could be used as soon as practically possible by States in reporting their military expenditures. At the same time further efforts should be made to work out definitions and accounting principles in detail to improve the reliability of the data. We are confident that this involves no insurmountable technical problems, but it will take some time and effort by the participating States.

62. The format of the standard table should be evaluated primarily against the following criteria:

(a) Structure and scope of information needed for comparisons of military expenditures;

(b) Technical feasibility: what kind of data can States present for statistical purposes?

(c) Ease of verification.

The choice of a format for standardized military expenditures, although containing many arbitrary elements, should as far as possible be made to meet the need for confidence-building and for meaningful measurements and comparisons of military expenditures in various States. To some extent it is possible to determine the requirements for the expenditure format by analysing how information on military expenditure affects mutual confidence. Such reasoning

12/ Including procurement for stockpiling as well as for assignment to forces

13/ Including construction and maintenance of reserve or "mothballed" arms production facilities.

14/ Including stockpiling and additions to inventories of equipment parts, petroleum products, food and other materials for current use.

will be briefly outlined here and, together with the more obvious requirements generated from cost measurement and comparisons, this will provide a basis for discussion of a feasible expenditure format that will best serve these purposes.

63. The use of a standard accounting format for military expenditures will probably first fulfil its function as a confidence-building tool. The improved information available through published budgets reduces the fear of underestimating military forces of other States and the tendency to overcompensate.

64. The minimum possible presentation of military expenditures is to give the total amount, using specified accounting and pricing standards. Negotiations on limitations or reductions of military expenditures, defined so crudely, are likely to be in vain. Basically, the problem is that no party in the negotiations wants a military situation perceived as stable to develop into one that is to its disadvantage. It is evident that defining limitations or reductions in terms of a budget total is not sufficient to judge whether or not a stable situation has changed into an unstable one. More information is necessary on such major components as "ground combat forces", "air defence" and "strategic forces". Specifying the military forces on this level of disaggregation makes possible a rough assessment of what military balance would result from a proposed mutual change (see also paras. 79-81 below).

65. Having broadly defined the boundaries of the military sector and the scope of military expenditures, we may now proceed to present a detailed structuring of military expenditures. As in the 1974 report, this will be done both in terms of resource cost elements and in terms of military missions or programmes. A schema of the general accounting structure to be used for reporting by participant States is set out in the accompanying table A.

66. The accounting form of table A is designed to serve as the basic information instrument of an effort to limit military expenditures alone. In some cases there may be an interest in linking a limitation on expenditures to one on physical forces. ^{15/} For such a purpose it may be necessary to adjust the format and content of table A to fit the particular forces or weapon systems being considered.

67. The breakdown by rows of resource elements is intended to facilitate the establishment of consistent measurement and to ease the problem of verification. For example, States differ considerably in the degree to which they use conscript or voluntary armies and the extent to which they subsidize domestic production or foreign trade in military hardware. To render the expenditure measures between States reasonably comparable, it is necessary to subdivide the resource elements so that appropriate valuations can be attached in each case.

^{15/} See the 1974 report, annex II, paras. 115-118.

TABLE A

Recommended format for international reporting of military expenditures

Resource costs	Force groups	Strategic forces	General purpose forces	Central support, administration and command	Para-military forces	Civil defence	Military assistance
		(1)	(2) (3) (4) (5)	(6) (7)	(8)	(9)	(10) (11)
<u>I. Operating costs</u>							
1. Personnel							
(a) Civilian							
(b) Conscripts							
(c) Other military							
2. Operations and maintenance							
(a) Materials for current use (purchases of food, clothing, petroleum products, training materials, medical materials, office supplies and the like)							
(b) Maintenance and repair							
(i) Contract services for repair and maintenance of equipment and facilities							
(ii) Purchases of parts, materials and tools for repair and maintenance of equipment and facilities							
(c) Travel expenses, postal charges, printing expenses and payment for other current services							
(d) Real estate rents							
<u>II. Procurement and construction</u>							
1. Procurement*							
(a) Aircraft and engines							
(b) Missiles, including conventional warheads							
(c) Nuclear warheads and bombs							
(d) Ships and boats							

Subdivision of general purpose forces

- Cols. (2) Land forces
(3) Naval forces
(4) Air forces
(5) Other combat forces

Subdivision of central support, administration and command

- (6) Central support (supply, maintenance construction, training, medical, etc.)
(7) Central administration and command, including intelligence and communications

Subdivision of military assistance

- Cols. (10) Contributions to allied forces and infrastructure
(11) Military assistance to allies and non-allies

TABLE A (continued)

Resource costs	Force groups	Strategic forces	General purpose forces	Central support, administration and command	Para-military forces	Civil defence	Military assistance
		(1)	(2) (3) (4) (5)	(6) (7)	(8)	(9)	(10) (11)
II. (continued)							
(e) Tanks, armoured personnel carriers and other armoured equipment							
(f) Artillery							
(g) Other ground force weapons							
(h) Ordnance and ammunition**							
(i) Electronics and communications							
(j) Vehicles							
(k) Other							
2. Construction							
(a) Airbases, airfields							
(b) Missile sites							
(c) Naval bases and facilities							
(d) Electronics, communications and related structures and facilities							
(e) Personnel facilities							
(f) Medical facilities							
(g) Warehouses, depots, repair and maintenance facilities							
(h) Command and administration facilities							
(i) Fortifications							
(j) Shelters							
(k) Other							
III. Research and development							
1. Basic and applied research							
2. Development, testing and evaluation							

* Subdivide by

Domestically produced vs. imported.
Allocation to forces vs. stockpiled.

** Excluding elements in (b) and (c) above.

68. The three main headings of the resource sector - "operating costs", "procurement and construction" and "research and development" - are intended to reflect the time dimension of different kinds of input resources in terms of their contribution to current, near-future and distant-future forces. Expenditure categories which can be derived from the time-lag structure run almost parallel to a breakdown into kinds of input resources, but there are some obvious deviations. For instance, the cost of trained military personnel is partly an expenditure for maintaining a certain current force and partly one for the training of recruits, which adds to future military capability. Also, research and development has highly variable lead times in relation to force output. Other activities have rather indirect links with force output, e.g., development of training equipment, research in planning and management.

69. Current costs are those for personnel and operations and maintenance, with subdivisions as indicated. ^{16/} Procurement and construction are further divided by category of weapon systems and class of construction. Table A suggests a breakdown of procurement that has a certain military logic. However, the precise degree of disaggregation may be left to the stage of implementation. For each procurement entry, direct imports should be accounted for separately.

70. Two additional comments on the resource cost classification may be useful:

(a) The structure indicated in table A bears certain similarities to the accounting structure used by a number of countries but differs from any particular national accounting system. The current accounting structure has been developed specifically for the purposes described earlier;

(b) The costs of military programmes are indicated here independent of the type of financing, the channel of expenditure and the type of budget accounting used in any particular national system. The definition is based on activities and not on the particular form of budgetary organization.

71. We come now to the column structure of table A, which classifies military expenditures in terms of missions and programmes. Such a classification is most useful for comparisons of military capabilities. It will afford the best means of determining whether expenditure limitation or reduction preserves a stable military balance (however, see paras. 79-81 below). It would be desirable to classify expenditures by military function, with the costs of manning, commanding, managing, equipping, etc., allocated among more or less narrowly defined military missions, and with support functions and overhead costs identified separately. However, this structure would probably be too difficult to implement. In the compromise suggested in table A, support and overhead are only partially identified, and military programmes are somewhat more broadly defined. Since the planning systems of many countries cannot provide for consistent programme budgeting, the programme categories may have to be adapted to existing organizational structures, as indicated in table A, where general

^{16/} On the distribution within the maintenance and repair category, see para. 54 above.

purpose forces are subdivided by land, sea, air and other combat forces. It is suggested, however, that all strategic forces be accounted for separately.

72. Still within the military sector in a more limited sense, there are many agencies with functions common to all services. The relative size of this output category is highly dependent on the organizational structure - the extent to which each service has schools, procurement agencies, research establishments, etc., of its own. Organizational changes will also complicate the making of comparisons both between countries and over time. As far as possible, common support and command functions should be identified separately, as suggested in table A.

73. Intelligence and communications are functions performed at many levels in a military organization. The activities that are considered for evaluation along with central administration and command in column 7 of table A are intended to cover those elements which exist at a level of command covering several different types of forces and programme packages. As with other elements of the matrix, the feasibility of distinguishing elements with a particular military function may depend upon the particular conditions of national statistical systems.

74. Some additional comment seems worthwhile for military assistance. First, military assistance can be of different kinds: financial, material (equipment), training, etc. It may be given in various forms: for example, outright grants, different kinds of favourable credit arrangements, or subsidized prices on equipment. Second, in terms of substantive military relations, it seems appropriate to subdivide military assistance into two components - one related to the contributions that are made to allied forces or to common infrastructure, and the other representing aid of one kind or another, in different forms, to various countries. As noted earlier (para. 43), it might also be interesting to distinguish between aid to allies and to non-allies but this seems difficult to implement.

75. Accounting of military assistance should be given by both receiver and supplier. Military assistance as shown in columns 10 and 11 of table A refers to aid supplied by the donor. However, military assistance received will be recorded in the programme-mission or service column most appropriate. If assistance supplied by the donor may be viewed as a substitute for core military activities, from the recipient's viewpoint the goods and services are not substitutes but are part of the core itself.

76. Table A calls for subdivision of procurement by domestic or foreign source. For various purposes, but especially for later verification stages, it would also be useful to indicate for all resource-cost elements the distribution of received military aid by financial category, such as grants (whether in financial or material form), concessionary loans, discounted prices for equipment, etc.

77. The matrix structure of table A calls for information in three dimensions: kinds of military forces produced, kinds of resources used in production, and time, relating current input of resources to output of forces with different time-lags. Since it is not possible to devise an accounting table that most States could fill in simply by using official budget data, standardized reporting will require some

effort. The problems will be principally of two kinds. In some cases, the information needed may already exist in the accounting system used, but will have to be arranged in a different way to fit with the standardized aggregates. There are other States in which the internal planning and accounting systems may not be sufficiently developed to produce the kind of data required. To match even the modest ambitions of the standardized model, they will have to implement more advanced accounting procedures than they themselves may feel necessary.

78. To overcome these problems so that a start can be made, a pragmatic approach is suggested here. A prompt beginning of standardized reporting will yield useful experience. Since it is impossible to know in advance what kind of data States are able and willing to report, more information is requested in table A than can reasonably be expected from all States at the outset. The further disaggregation of the resources side of the standard table could be made along several lines, and be more or less detailed. The more detailed the disaggregation, the more reliable will be the valuation of resources used in the military sector and the more cross-checks can be made, using other sources of information. In the process of implementing the accounting structure proposed here, it may be expected that improvements and refinements will be introduced with a view to both feasibility and technical soundness. In this way the reliability of estimates and comparisons will gradually increase while giving all States time to accommodate their own accounting to the standardized form.

79. As noted at the beginning of this section, the arms control objective underlying the present study makes it desirable to develop measures of military expenditure that closely reflect military capability in the sense defined. However, an important drawback of the measures developed, as also of all national measures actually in use, is their failure to take into account stocks of military hardware. In this report, as in national practice generally, gross increments are to be recorded as procurement outlays, but the basic accounting instrument of table A does not include an explicit charge for the services of military capital. In addition, table A has no place to record stocks at the beginning or end of the reporting period and makes no other allowance for retirements.

80. It is clear, however, that military balances over the short run are dominated by stocks inherited from previous periods rather than by current procurement. States interested in concluding an agreement to limit military expenditure and concerned to establish the relative symmetry of the starting military positions of the participants will undoubtedly want more or less detailed information on stocks of military hardware of their future partners under the agreement. Similarly, data of this kind will probably be necessary to solve the other technical problems of expenditure limitation, particularly with respect to verification.

81. In view of these considerations and with the dual aim of building greater mutual confidence as well as of speeding the achievement of the goal of expenditure limitation, it would be desirable in the future to supplement expenditure values with data in physical terms for certain resource categories. This applies particularly to manpower and major classes of weapon systems. For military hardware, reports of stocks as well as their changes during the reporting period would, of course, be highly desirable.

82. In conclusion, we would like to underline our belief in the utility of expenditure limitations as an approach to effective arms control, for reasons suggested in paragraph 8 above. Reporting military expenditures on an international basis under the aegis of the United Nations is the keystone to that approach, and the Group of Experts believes that this study suggests a valuable instrument for that purpose.

III. VALUATION OF RESOURCES IN THE MILITARY SECTOR

A. Introduction

83. In calling for a discussion of valuation in this report, the General Assembly, in subparagraph 5 (b) of resolution 3463 (XXX), requested particular attention to "examining methods concerning the relationships between resources and military output". In this formulation, the Assembly recognized the desirability of having military expenditure defined and valued so that changes in expenditure can be viewed as reflecting parallel changes in real military capabilities. Since valuation implies pricing and there are evidently distinct differences among national price systems, the Group of Experts is asked to bear in mind the differences in valuation in "different economic systems".

84. Variations in resource valuation were also seen by the original sponsors of the resolution as being caused by different "structures of production within the military sector". This would seem to refer to such international structural differences as the degree of "capital" or research and development-intensity of military production, recognizing the great variations in the mix of men, materials and equipment, as well as in the levels of military technology, employed in different States and military systems. In effect, then, "different production structures" appear to be a reference to international differences in military production functions. As will be noted below, such differences effect divergences between opportunity-cost and military-utility interpretations of military expenditure.

85. This section will consider first the interpretation of military expenditure in terms of military utility. Because the conditions required for the interpretation of military expenditure in utility terms are so restrictive, it is necessary to turn to an alternative interpretation derived from the costing of military goods and services. An approach to providing a consistent and feasible valuation standard of the latter kind is suggested at the end.

B. Military expenditure and military utility

86. Section II sets out a diagrammatic representation of the flows from civilian origins to military ends in which the ultimate benefits are defined in terms of "military security". That concept may be formalized as follows. Each State's Ministry of Defence perceives the nation's current and future military security as being derived from the capabilities of the forces at its disposal in interaction with a number of other factors, termed environmental variables, such as military morale, national determination, the capabilities and intentions of adversaries, cohesiveness of alliances on either side, etc. Each Ministry of Defence may then be pictured as having a security (utility) function of the type

$$(1) \quad S = S(x_1 \dots x_n; \gamma)$$

where x 's are values of military goods and services obtained by the Ministry of Defence in the accounting interval, including the current services of past military

capital, and γ denotes the set of what may be called "environmental" variables. It is assumed provisionally that S is a consistent function. If the Ministry of Defence takes the prices of military goods and services as given and maximizes S within a fixed budget, 17/ then at the maximum point, the relative prices of any pair of military goods and services corresponds to the marginal rate of substitution, the rate at which those goods or services can be substituted for each other at the margin, in yielding military security. 18/

87. Of course, this is a highly desirable result, because it means that for relatively small changes in military expenditure (the sum of the products of the x variables and corresponding prices per unit) 19/ security varies directly with expenditure. However, this holds true only if there are no changes simultaneously in γ , the environmental variables. Changes in γ - for example, a change in the adversary's military expenditure - will cause changes in the marginal rates of substitution of the x 's. Thus, the symmetry between an index of military expenditure and one of military security will be broken.

88. It would be convenient if we could assume that the effects of the γ and x variables on S are separable, so that S could be rewritten as:

$$(2) \quad S = S/\bar{F}(x_1 \dots x_n); \bar{\gamma}$$

What meaning is to be attached to F ? Section II, following the 1974 report, uses the concept of "force potential", defined as "capacity to apply physical force in organized form mainly against external opponents". Thus force potential defines military capabilities in terms of ability to apply force, abstracting from the environmental variables. 20/ Let F be interpreted in this sense as current and future force potential. 21/ For the same conditions of maximization under a budget constraint with prices taken as parameters, the relative prices of any pair of military goods and services will equal their marginal rates of substitution in yielding force potential. 22/

17/ Or minimizes costs for a fixed level of security.

18/ Techniques of constrained maxima are a frequently used tool of economic optimization, regardless of economic system.

19/ We may ignore the fact that in most countries military expenditure does not include an explicit valuation for the services of capital procured in previous accounting periods (see para. 79 above).

20/ As was noted in the 1974 report, even in the abstract framework of definition it is not possible to dispense entirely with the context of warfare. It would be necessary to specify force potential in terms of certain standardized conditions and scenarios.

21/ As noted in section II, this definition implies a particular limitation of the scope of military expenditure, excluding, for example, war debts and support of war widows as charges on account of past activities. Some limitation, however, is implicit even in formula (1), since not all outlays contained in military budgets relate to military security.

22/ That is, at the maximum, $P_1/P_2 = F_1^*/F_2^*$ where P_1, P_2 are the prices of any two military goods and F^* 's are partial derivatives of S with respect to x_1 .

89. Obviously, these abstractions idealize the budgetary decision-making process in most defence establishments. But to the extent that military expenditure is planned and executed with a view only to military utilities (however, see para. 95 below), does the Ministry of Defence perceive the security function as formulated in (2)? Is security viewed as a function of procurement of tanks and guns and the training of a given number of soldiers? In many countries, defence ministries have been attempting to develop a more output-oriented budget and force planning structure. The Ministry of Defence may be unable (figuratively) to draw indifference curves between tanks and strategic bombers. However, it may more easily be able to rank artillery and tanks in terms of utility for general purpose forces or ICBMs and SLBMs for strategic missions. Assume, then, that the Ministry of Defence is able to specify the utility function $F = F(y_i)$, where y designates programmes. Consequently, the appropriate force potential arguments of the security function are not specific military goods and services but programmes, so that the security function should be rewritten as

$$(3) \quad \hat{s} = \hat{s}/\hat{F}(y_1 \dots y_k); \gamma$$

Again, separability is assumed. 23/

90. Thus, military expenditure may be interpreted in terms of the utilities derived from either the consumption of military goods and services directly, or indirectly, via their combination in output-defined programme packages. In either case, if relative prices are to be read as corresponding to rates of substitution in terms of such utilities, the formal requirements are: (a) consistent choice among the goods and services, (b) treatment of prices of individual goods and services as parameters, and (c) maximization of the utility function subject to a budget constraint. If, in addition, the force potential variables can be separated from the environmental variables, the marginal rates of substitution would not depend on the values of γ .

91. It does not require detailed familiarity with the processes of budgetary decision-making to recognize the wide gap that separates these abstractions from the real world. It would be difficult to find a single State whose military budgeting conformed to the stated requirements. Three of them pose major problems for decision-makers.

Consistent choice among goods and services

92. The fact that actual choices are often demonstrably inconsistent has much to do with the decision-making environment discussed briefly below under the heading of maximization of utility. However, consistency is the more difficult to achieve because of the great difficulty in specifying military utility functions.

23/ Formula (3) is the military analogue of hedonic consumer indexes where the consumer is viewed as having an indifference map for, say, travel and movies as inputs to recreation rather than a map for travel relative to meat. The latter case is the standard concept of consumer utility indexes, for which the analogue here is formula (1).

93. The 1974 report noted some of the difficulties that arise from the absence of a "market" for military output. It has been suggested here that the Ministry of Defence may be able to describe its indifference map for particular programmes rather than for all military goods and services. This is the area in which analysis has been most effective in improving military resource allocation. ^{24/} However, it does not appear possible to develop consistent, articulated maps for all force potential - that is, preference rankings between programmes.

Treatment of prices as parameters

94. The complexity of the military utility maximization model suggests that if it is practicable at all, it is only with respect to the developed countries possessing elaborate military budgeting and planning mechanisms. Paradoxically, this particular requirement of the model may be relevant particularly to the countries. Small developing countries whose hardware needs are met by procurement imports from the major Powers may properly be described as "price takers" in procurement. On the other hand, the military establishments of major Powers are too large relative to their domestic suppliers not to affect prices in greater or lesser degree.

Maximization of utility subject to a budget constraint

95. If Ministries of Defence were free and ready to maximize utility the task would be complicated in itself, if only because some goods and services yield utility over a period of time, so that maximization at a particular time must take into account future benefits and alternatives. However, effective maximization is not often achieved. Military planners, like other economic agents, may tend less to maximizing than to "satisficing" (a combination of satisfying and sufficing), a term that has come to be used to designate behaviour oriented to goals other than those of maximization. Considerations relating to conflicts among significant interest groups in the society are sometimes of far greater weight in determining resource allocation than concern for pure military utilities. ^{25/}

^{24/} This is the classical domain of the military systems analysis, on which there is a very substantial literature. The standard work is E. S. Quade and W. I. Boucher, Systems Analysis and Policy Planning. Applications in Defence (New York, American Elsevier, 1968) (7th printing, 1975). See also Gene H. Fisher, Cost Considerations in Systems Analysis (New York, American Elsevier, 1971) and Alain C. Enthoven and K. Wayne Smith, How Much is Enough: Shaping the Defence Program, 1961-1969 (New York, Harper and Row, 1971). A relatively undeveloped area in military analysis is the measurement of military manpower productivity.

^{25/} See, for example, Graham T. Allison and Frederick A. Morris, "Armaments and Arms Control: Exploring the Determinants of Military Weapons," Daedalus (Summer 1975), pp. 99-129. In Anthony Downs' An Economic Theory of Democracy (New York, Harper and Row, 1957) the objective of Governments is winning elections, so that project rankings and utilities depend on the expected perception by the electorate of the benefits and costs of such projects.

96. Many of the obstacles and difficulties listed above have analogues in other utility maximization models - most prominently, in the theory of consumer welfare. Yet economists continue to apply welfare interpretations to consumption data in the conviction that, despite the acknowledged gaps between the real world and the theoretical criteria, the theory is still useful in explanation or prediction. However, the gaps seem as wide or even wider with respect to military expenditure, and it appears more difficult to conclude that the theoretical apparatus is still a meaningful way of interpreting actual outlays in most known military budgeting systems. In addition, there are international differences in the divergence of actual military expenditure decision-making from the theoretical requirements. It would require major investigation to assess even crudely the relative degree of divergence. Failing such information, there seems no reasonable basis for cross national adjustment of actual outlays. There does seem to be such a basis for the resource cost measurements dealt with in the next section. On these grounds, it appears necessary to reject the military utility model as a basis for a valuation criterion. Thus, there are both positive and negative reasons for developing an alternative valuation criterion.

C. Military expenditure and production potential

97. The alternative approach to the valuation of military activities suggested in the 1974 report is that of opportunity costing. Resources used in the military sector would be priced at the value of the civilian opportunities forgone because of allocation to military use. Opportunity costing of military activities therefore is a measurement of the civilian production potential that is embodied in the resources in military use, as contrasted with the military utilities that are supposed to be measured by military expenditure in formulae (1) to (3). For that reason, opportunity cost valuation yields expenditure values that are a second-best measure for arms control purposes, 26/ and for reasons indicated in subsection B above, we have no choice but to use a second-best solution for the valuation of military expenditure.

98. The discussion below suggests a variant of opportunity costing as a basic valuation criterion for military expenditure. Such expenditure would then be interpreted in terms of potential to produce military goods and services, in an analogue to the production potential interpretation of national income flows and in distinction from the counterpart welfare-utility interpretations. 27/

26/ By the same token, however, such values are directly relevant for a measurement of the burden of defence.

27/ Opportunity cost is not only conceptually different from a valuation derived from military utilities; there is also an inescapable divergence between opportunity cost and value of production of military goods in international comparison. This problem can be illustrated in two hypothetical cases. Assume, first, that two States operate with the same production function but produce different mixes of civilian and military goods. Because they operate on the same frontier, a reduction of military output of the same size could be imposed on both

9. The 1974 report states the main principles of opportunity costing. It also states that opportunity costing requires a correspondence of relative prices and relative real costs, that the correspondence is "far from perfect" in the real world, and that the nature and degree of the shortfall will vary because of differences in international price systems. These difficulties are outlined below.

10. Let us assume, first, that a particular State's economy is operating efficiently - that is, at a point on the locus of real production possibilities (with given resources and technology), or the production frontier. At that point, the relative prices of any pair of goods or services produced corresponds to the rate at which one of those goods may be transformed into the other at the margin by reallocation of the existing factors of production. Factor relative prices, in turn, correspond to the ratios of the value of their marginal products. In this idealized context, valuation of resources at their marginal cost provides a true measure of the economy's ability to provide varying mixes of goods and services - its production potential - given its current resource endowment. Here, marginal costs are opportunity costs, for relative product prices are also measures of the rate of transformation into alternative uses. At the same time, military expenditures will also reflect the true "burden of defence", in the sense of civilian output forgone. 28/

11. However, suppose, as is more likely, that the economy is not able to exploit its production opportunities fully. Relative prices for the same factors (with equivalent quality characteristics) may vary across industries or even within the same industry. Therefore, opportunity costs will also vary depending on the particular use to which resources are (hypothetically) reallocated or from which they are (hypothetically) considered drawn. If there are not unique but multiple opportunity costs, there will also be no unique measure of the "burden of defence",

27/ (continued)

states unambiguously. However, at the different points on the frontier where the two States have located, the marginal rates of transformation of civilian to military goods (the opportunity cost of military goods) differ. Thus, the value of the output effect of a marginal change in military resource allocation would be subject to "index number" relativity. Now, suppose instead that two States use different production functions and with different efficiency. Then equal absolute changes in resources devoted to military use will mean different absolute changes in military output in the two States. Because of different relative factor prices in the two States there will be an index number problem of measurement, and the ultimate effect on output is difficult to assess. The effect of equiproportional changes in the volume of military resources applied would be even more difficult to determine. Of course, if the military utility functions of the two States differ, it seems highly probable, the complexities are further compounded.

28/ It will also reflect the potential for production of military goods and services with given resources in the armaments industry and in the military sector. Military expenditure values could then be interpreted, in addition, in terms of opportunities forgone within the military sector.

in terms of the civilian opportunity sacrificed through diversion of resources to military use. ^{29/} Thus, the aggregate value of all goods and services produced in the accounting period will not be clearly interpretable in terms of the society's production potential. Neither will there be a clear interpretation of military expenditures in terms of either their "burden" on the economy or the potential to produce military goods and services.

102. The 1974 report suggests conscription as an important example of divergences of expenditure from real costs. Other examples, of possibly equal importance, are indirect taxes and subsidies. Indirect taxes distort the structure of real cost because they do not represent a return to a factor of production, while subsidies are in effect elements of real cost that are financed separately and not reflected in product price. Distortions of cost price relations may occur with respect to capital charges and rental returns for the differential productivity of grades of land, or by virtue of impediments to the free movement of civilian labour between different employments, so that wages inadequately reflect supply-demand interactions.

103. Distortions of relative prices are found in all real economies, resulting largely from government action on behalf of one or another public policy interest. However, there also are salient international differences in relative prices that reflect the significant differences between different price systems.

104. If we are to succeed in defining a valuation framework of such a nature that military expenditure will be even crudely indicative of an economy's potential to produce military goods and services, it will be necessary to take these and other pricing problems, in both centrally planned economies and market economies, into account. One theoretical apparatus that succeeds in doing so is the Adjusted Factor Cost standard of pricing devised by Professor Abram Bergson, who eases the requirements of the traditional factor cost standard by recognizing that any economy may be operating short of its real production frontier, on a "feasibility locus". Valuation need not be at marginal cost but at average cost.

105. To summarize briefly the cost implications of these standards, it may be noted that commodity prices are viewed as composed of charges for factors of production. Wages are the same for any given occupation, with inter-occupational differences corresponding to the average difference for the economy as a whole in the disutility of employment and marginal productivity. A net charge for capital is accounted for either as a cost (interest) or as residual income (profits) but at a uniform rate for all production based on the average productivity of capital generally. In addition, cost includes depreciation. Land rent allows for differential return to superior land. Where actual costs diverge from the standards indicated, adjustment of expenditures would be required.

^{29/} It will be recognized, as the 1974 report notes, that whereas a marginal shift of resources may be expected to have only a negligible effect on prices, reallocation of total military expenditure will in most cases alter relative prices substantially.

106. This set of standards represents a considerable easing of the strict assumptions underlying the condition of efficient production. A modified factor cost standard of this type is a viable solution to the problem of developing a consistent and feasible set of rules for international valuation of military expenditure in domestic currencies. Moreover, it is of general applicability, since the presumption of less than fully efficient operation applies to all economies and encompasses all the major price distortions responsible for shortfalls from the theoretical norm.

107. It will be understood that such a theoretical framework requires judicious application and will necessarily have to bend to the realities of data availability. It cannot be expected that real world measurements can be precisely tailored to fit neatly defined theoretical categories. However, it seems worth the effort to develop measurements that are broadly meaningful in terms of a consistent set of theoretical criteria.

108. The criteria suggested here, of course, represent only one possible approach to the valuation problem, although we believe the approach is useful. Other approaches, based on different theoretical frameworks, may also be operational and would then require further examination.

IV. PRICE AND VOLUME MEASURES OF MILITARY EXPENDITURES

A. Introduction

109. It was pointed out in the 1974 report that an increase in military expenditure by a State which has concluded an agreement to limit or reduce military spending is not in itself evidence of a broken agreement. It is quite possible that an increase in expenditure is necessary to purchase the same basket of military goods and services because of an autonomous rise in their prices. Therefore it is essential to distinguish between nominal and real changes in military expenditures. The usual procedure is to revalue physical quantities at the prices of a single year, and so eliminate the distorting effects of pure price changes.

110. Unfortunately, there is no single source and no systematic collection and processing of information concerning changes in military expenditures at constant prices. ^{30/} A number of organizations, including the Organisation for Economic Co-operation and Development (OECD), the Stockholm International Peace Research Institute (SIPRI) and the United States Arms Control and Disarmament Agency (ACDA), provide constant-price figures for selected countries. But these are based on methods of deflation which are insufficiently described. The United Nations receives some details of the measurement of price changes of military expenditures from a limited number of countries. ^{31/} Most of them provide a breakdown of expenditures into broad categories and apply price indexes prepared for economies as a whole and not just for military sectors.

111. In addition, the United Nations Statistical Commission exercise is developing proposals for an integrated system of general price and quantity indexes for the economy as a whole. Guidelines exist to help countries prepare price and quantity information with a view to improving international comparisons. This system is intended to be applicable to the System of National Accounts for market economies and to the System of Balances of the National Economy for centrally planned economies. But these efforts must be seen in a much wider context; they have only indirect relevance to the military sector as such.

^{30/} Useful ideas and information with regard to the deflation of military expenditures were obtained from two reports: "Adjustment for Price Changes of Defence Expenditures" ("Prisreglering av försvarsutgifterna", available only in Swedish) by a Swedish Official Expert Group, April 1975; "Measuring Price Changes of Military Expenditures" by the United States Department of Commerce, June 1975.

^{31/} These are Belgium, Canada, Denmark, Finland, France, Greece, Norway, the Philippines, Sweden, Switzerland, the United Kingdom, the United States and Zambia.

B. Conceptual problems in intertemporal and international comparisons

112. In view of close correspondence between the theory of intertemporal and international price and volume comparisons, it seems useful to set forth at this point a number of the basic common ideas. There are complex conceptual problems involved in constructing measures of the change in volume of production or real expenditures over a period of time and between countries. This is particularly true in areas where it is difficult to develop a concept of output or quantity to which a constant price can be attached. It has already been pointed out that the concept of output of the military sector is somewhat elusive, and in sections II and III it has been acknowledged that the concept of military security or even force potential cannot be easily specified and measured. In terms of change over time, it would be possible theoretically to derive a measure of the change in military output as defined in section III by combining indexes of real change in the volume of inputs to the military sector with some measure of the changing effectiveness of utilizing these inputs. However, this would require a detailed knowledge of military productivity indexes, and this begs the basic question of the definition and measurement of military output, which underlies the rejection of that measure in section III.

113. In view of these difficulties, the alternative chosen in section III was to measure changes in the flows of final military goods and services into the military sector. These flows are valued at factor cost defined in average cost terms. Therefore, the task of deflating for price change within one country or for price differences between countries at a point in time is to construct intertemporal or international price indexes in factor cost terms.

114. In developing these indexes it is necessary to distinguish between valuation at purchasers' prices and at producers' prices. Within purchasers' prices, but excluded from producers' prices, are charges for transportation, for installation, special discounts and excise taxes, which may differ considerably over a period of time and between countries. Since the valuation criterion recommended is a factor cost standard, the difference between them will be largely attributable to transportation and installation charges. The final choice between these two concepts of price is largely one of convenience and may be left to the stage of implementation. What is essential, however, is that the valuation standard adopted and the price indexes applied to deflate military expenditures are consistently used across different expenditure categories.

115. Relative quantities of final military goods and services and their relative prices will probably differ considerably over a period of time and between countries. In the case of intertemporal comparisons, the measure of price change of military goods and services will have two answers depending upon whether the weights used reflect prices in the initial or terminal year. This is, of course, the well-known index number problem. It has its counterpart in international comparisons according to whether the price weights of one country or another are used. The index number problem may be very severe if large numbers of new military products are introduced each year, effecting distinct changes in military structures. This is particularly true when comparisons are made over long periods of time, but it also applies to comparisons between countries where differences in military structures clearly exist.

In many countries change in the military sector is especially rapid because of the high degree of innovation and technological development. Consequently, the difference between the two index number solutions is likely to be greater.

116. Since there is no single measure of comparison of relative price change over a period of time and between countries, what meaning should be attached to each solution? Production index numbers are interpreted as having a particular meaning within the framework of productive potential. ^{32/} What is not clear is whether these interpretations, which are applicable to the economy as a whole, are also applicable to a particular sector. But if they are, and if they can be applied to the military sector, these interpretations argue for the use of one or other of the Laspeyres-Paasche formula in particular situations. ^{33/} In this context, to obtain a time series of real final military goods and services at factor cost, deflation by a Laspeyres index would be illuminating. But where there are possibilities of substantial changes in military structures within a country over time, or where differences in military structures exist between countries at a moment in time, it is probably advisable to deflate by both a Laspeyres index and a Paasche index.

C. Technical problems in constructing military price indexes

117. Consistent with the valuation criterion recommended in section III, price indexes constructed for intertemporal or international deflation will be based on factor cost measurements. The technical problems of constructing such deflators are of a fairly routine nature with respect to personnel categories and, to a considerable extent, materials and off-the-shelf equipment as well. However, the deflation of procurement of military hardware, particularly of advanced and technologically sophisticated hardware, poses more difficult technical problems. This is because changes in product performance as well as in product mix are often rapid in military industry.

118. The deflation of current price series is always made more difficult by the need to adjust to changes in the quality and performance of products over a period of time. In relation to price measurement, quality change is closely associated with specification change. But while it may be possible to agree that quality has changed, it is more difficult to measure it. Generally speaking, measurement may be based either on the improved performance of a piece of military equipment or on the additional resources (cost) required to produce that extra performance.

^{32/} Richard H. Moorsteen, "On Measuring Productive Potential and Relative Efficiency", Quarterly Journal of Economics (August 1961).

^{33/} The Laspeyres index for intertemporal comparisons uses weights of the base year, while the Paasche index uses weights of a given year. For international comparisons the weights are drawn from the different countries involved, and the Paasche-Laspeyres designation is then somewhat conventional.

Different procedures lead to different adjustments, and just what constitutes the correct approach is an open question. In the military sector it is convenient to distinguish between standard military items with counterparts in the civilian sector, and complex items of military equipment whose performance may improve rapidly with changes in technology. In the former case, experience gained in adjusting civilian price indexes for quality change should prove invaluable; in the latter, experimental work will probably be necessary.

119. In attempting to develop a measure of price change, the answer to the question, "What is the price?" presupposes a clear-cut answer to the question, "What is the unit to be priced?" Therefore, in trying to measure the price change in the procurement of tanks or aircraft, it is necessary to specify in detail the product to which that measure should be applied. This measure of price change may be developed from two points of view. From a production-oriented view, only those specific changes that require the use of additional resources would be recognized as quality change. From a consumer-oriented view, all changes that contribute in some way to the altered utility of the product, regardless of resource use, would be recognized as quality change. Either criterion may be used, but it is necessary to be consistent in the application of the criterion for all categories of product price. Quality change may be so extensive that in effect a new product has resulted. One of the problems of measurement is to decide when a new product has appeared, and to distinguish between a new product and an improved product. In the case of a product that has not been previously produced, there can be no price change since there has been no output change. However, it is important to try to distinguish what are really new products from those which merely represent product innovation, since the degree of price inflation can be concealed by designating what is really product development as the creation of new products.

120. In principle it is necessary to develop indexes of price change in the categories of products purchased or procured by the military sector. In some cases, it will be difficult to obtain the data to do so. There may be some interest, therefore, in considering surrogate indexes to deflate the relevant military expenditure categories. ^{34/} In applying such surrogate indexes the implicit assumption is that price change in the branches of industry from which the proxy indexes are drawn corresponds closely to that in the actual products whose prices we desire to measure. To determine whether or not that assumption holds true, the specific organizational and productivity conditions of each case will have to be carefully considered. Some of the considerations that may affect the choice of surrogate indexes are indicated below.

121. One important factor affecting price trends for goods and services produced by the civilian sector is the market situation prevailing for these goods and services. In this respect, production by the civilian sector can be divided into two separate categories. One category covers goods and services sold on a

^{34/} Cf. 1974 report, annex II, para. 70.

competitive market where several producers are operating and where the military sector is one of several consumers. This is relevant to, for instance, off-the-shelf items and most of the maintenance and repair services bought from outside the sector. Here the appropriate price indexes are easily developed. The other category covers those products, mainly weapons systems, where the military sector is the only customer and where in many cases the producer has a national monopoly. In the latter case, prices are determined by negotiation, and there is no reason a priori to believe a similarity exists to general price trends in the civil economy.

122. Whether productivity and price change take place more rapidly in military than in civilian industry depends on a variety of organizational and technical conditions which will probably vary from country to country. The degree of distortion in real price change introduced by the use of proxy indexes will, therefore, also vary across national boundaries. Changes in cost due to changes in performance are a frequent phenomenon in military industry characterized by rapid advancement of the state of the art. Price changes based on such cost increases, representing real change in output volume, must be distinguished from those associated with a qualitatively unchanged product. Only the latter type of price change is subject to deflation. Thus, the deflation of military hardware is complicated by changes in performance as well as in product mix.

D. Specific proposals for the construction of price deflators for military expenditures

123. The task of constructing price indexes that closely mirror the actual changes in prices of military goods and services is both technical and political. Technically, the problem is to establish procedures that will yield accurate measures of price change. Politically, it is important to guard against self-serving statistics in the price deflating system. Hence, it would be of doubtful value to use indexes constructed and measured by military agencies without the opportunity of cross-checking against data developed from other sources. At the same time, it must be recognized that the state of the art of deflating military expenditures and the availability of statistical data are poorly developed in most countries, and far from uniform even in those countries where significant efforts have been made.

124. Deflation of military expenditure by programme categories does not seem possible because of the large number of price changes that may take place within programmes, comprising very varied elements or components. Therefore a necessary starting point for the deflation procedure is the allocation of military expenditure into resource cost categories, such as those shown in the accounting matrix of table A, each of which could be deflated by an appropriate price index. Given differences in the structures of such categories and differences in price behaviour, it is desirable to use separate deflators for as many categories of military expenditure as there appear to be distinguishable patterns of price change, consistent with the availability of data. The precise number and identity of such categories cannot be determined until accounting systems in the reporting States have been examined in greater detail. Nevertheless, it may be tentatively

suggested that it will be possible to distinguish between categories of personnel costs, procurement of hardware, materials purchases, construction, imports of materials and equipment from abroad and miscellaneous outlays.

Personnel costs

125. The further breakdown of personnel costs should accord with the levels of skill, educational attainment, etc. It may be desirable to distinguish between military and civilian personnel costs and deflate them separately. Assuming that personnel and services are measured in the base year at factor cost, one way of adjusting the price change would be simply to adjust personnel costs for changes in man-hours. However, this method would neglect changes in labour productivity. To treat all changes in cost as pure price change would be to assume implicitly that the rate of improvement in efficiency, skill and know-how is zero. The difficulty of measuring the rate of growth of productivity of personnel in military activities, as in services generally, makes it useful to adapt price indexes of comparable grades and categories of labour from the civilian economy; that is, there may be labour unit cost indexes prepared for the civil economy and adjusted for changes in labour productivity that can be used for the different manpower categories, skills, etc., in the military sector.

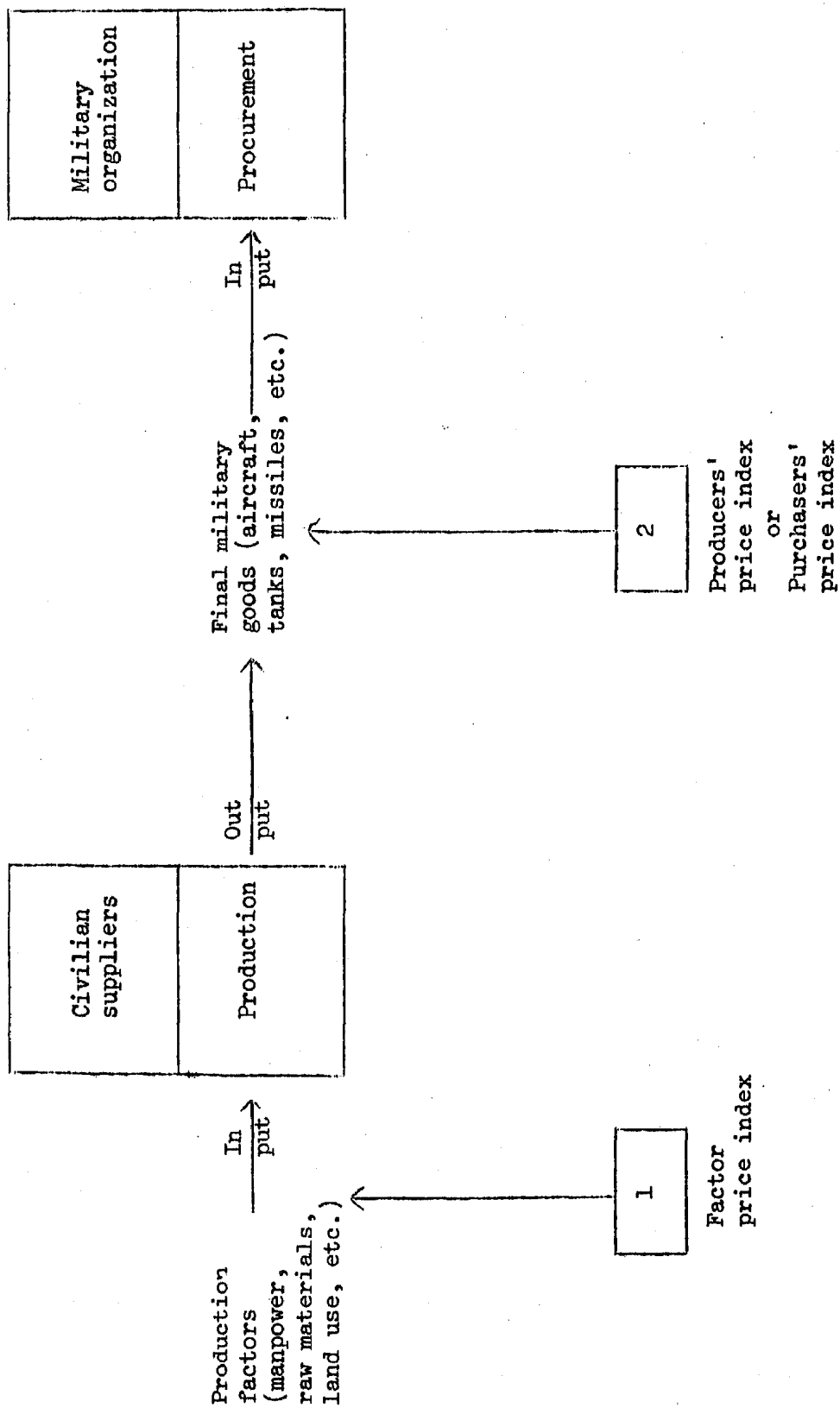
Procurement of equipment

126. Data for calculating a price index for military procurement may in principle be collected at two different points: (a) where the equipment is procured by the military from civilian suppliers; or (b) where inputs are fed into the production process for military hardware (see figure 2). In the latter case, the question is how to define changes in productivity of factors in the production of military hardware. The use of the input quantity index alone assumes that input-output relations are constant. The advantage of measuring price change at the stage of inputs into the production of military hardware is that the trends of prices of inputs are relatively accessible. However, the great disadvantages of this method are the assumptions that input and output relations correspond over time and that change in productivity is proportional.

127. To the extent that change in performance or specification of particular products can be measured at all, it is preferable to determine the level of price change at the point at which equipment enters the military sector. To acquire the necessary data, prices must be found for projects in different years which in various senses are equivalent. In comparison with a factor price index, an assessment based on producers' or purchasers' prices would take into account changes in productivity and adjustments to changed factor prices. An assessment of this kind would relate to the final goods and not the inputs of production factors. The major weakness of this method is the difficulty of making appropriate adjustments for changes in quality.

128. The data base for such a price index would consist of price calculations for equivalent projects from different years. Such calculations are available for

Figure 2



certain major hardware projects. But in the case of other types of equipment it is more difficult to acquire such price calculations for equivalent projects over several years. This method can be used in two ways: first, by trying to chart the trend in prices for a sample of military hardware; and second, by using surrogate price indexes prepared for the civil economy but arranged in such a way that they correspond to the procurement structure of the military sector.

129. In the first case the current practice is to build up an index based on a small sample of items whose technical performance is relatively static, to avoid the problem of quality change, and then simply apply this index to all goods. This method has certain serious short-comings. In the second case the quality problem will be solved in so far as the surrogate indexes are properly adjusted for quality change. It is important to notice, however, that use of surrogates always carries the implication that quality and productivity change, and thereby price change of goods for military use parallels that of the civilian goods in the surrogate index. This, of course, is also a serious short-coming.

130. The object of deflation is to achieve a measure of real change in prices of military goods and services so that military expenditure will, in fact, reflect real changes in volume over a period of time. Thus the type of deflator to be used and the extent to which surrogates may be applicable depend on an estimate of the distortion that would result, taking account of what is feasible and practicable and the information available.

131. Since States differ widely with regard to the availability and accuracy of price information and with respect to the methods of constructing price indexes at various levels, it will be necessary to adopt a pragmatic approach to the improvement of the method of deflation in all areas of military expenditure, particularly that of hardware procurement.

Construction

132. Construction (buildings, fortifications, airfields, etc.) is a category of goods and services where price indexes are rarely based on prices of the finished product itself. In many countries there is a variety of cost indexes for construction, but almost all are based on weighted input price indexes, often without an adjustment for change in productivity. The index thus measures only the price changes for specified units of production resources, e.g. labour, concrete, bricks and so on, without consideration of effects on the price of the finished product from changes in productivity. In some countries, however, efforts are being made to develop indexes which move the technique of price measurement for construction towards the pricing of the end-products.

133. The difficulties of developing end-product price indexes for construction make it necessary, at least in the short run, to rely on the closest substitute for a comprehensive construction price index: the construction cost indexes (weighted factor price indexes) prepared primarily for the civil economy which are now available in most States. For some of them, an explicit adjustment is

made for productivity change. Where that is not the case, an adjustment must be made based on available statistics on productivity change in the construction industry. In using these indexes, account should be taken of the different types of construction - e.g. buildings, shelters, airfields - and it may also be necessary to consider regional differences in construction prices within States.

Imports

134. For an appropriate treatment of this cost category, import items must be identified and valued at the same level of aggregation as in the procurement of military hardware. It seems likely that most States importing military equipment will have records of financial flows and price changes. The quantity indicators for imports, particularly with regard to product specifications, should be relatively easy to obtain, given the high degree of standardization of major categories and equipment in the international arms trade.

Research and development

135. Here the breakdown can be by categories of personnel, materials and equipment which can be treated in the ways designated above for these categories.

Miscellaneous

136. With respect to goods consisting largely of standard items and commodities which bear strong physical resemblance to civilian counterparts, it would seem appropriate to use wholesale price indexes, assuming that they are appropriately constructed.

137. The following table sums up the previous discussion:

TABLE B

Cost category	Statistical method for deflating
<u>Personnel costs</u>	Labour-unit cost index for the civil economy (adjusted for change in labour-productivity) weighted according to personnel categories, skills, etc. in the military sector
<u>Procurement of equipment</u>	Producers' price or purchasers' price index, either specially constructed by sampling for the military sector or based on a civil economy index weighted according to the military procurement structure
<u>Construction</u>	Construction cost index for the civil economy (adjusted for change in productivity) weighted according to the types of construction in the military sector
<u>Imports</u>	Import price index, either specially constructed by sampling for the military sector or based on a civil economy index weighted according to the import structure in the military sector
<u>Research and development</u>	Breakdown by categories of personnel, equipment, etc. and treated as designated above
<u>Miscellaneous</u>	E.g., wholesale price index for the civil economy weighted according to the consumption pattern in the military sector

V. INTERNATIONAL VALUE COMPARISONS OF MILITARY EXPENDITURES

A. Introduction

138. Any proposal for reduction or limitation of military expenditures may require a generally acceptable means of comparison in absolute value terms. Very little empirical work has been done in the field of international comparisons of military spending. But since the very beginnings of modern economics, considerable interest has been shown in simple comparisons of real income and expenditure, productivity and relative prices between countries. Much of the work has been formal and theoretical, and in the last 25 years, with marked improvements in data collection of many countries, some important empirical studies of real incomes and relative prices have been carried out. ^{35/} As a result, a number of the more important issues in the field of international comparisons, relevant for national aggregates and for more detailed expenditure categories, have at least been discussed.

B. International comparisons using exchange rates

139. An increasing number of leading economists consider that international comparisons which convert national products or some component of national products, estimated in terms of the national currency, into a common currency unit by means of prevailing or adjusted exchange rates are of doubtful value. It is useful to explain in general terms why this is so for national products, and then extend the argument to the special case of military products.

140. The existence of different rates for different trade transactions in many countries makes it very difficult to determine the official exchange rate; and although it may be possible to derive a weighted average exchange rate, this requires detailed information on foreign transactions which is often hard to obtain. But even if average official rates of exchange could be computed, their use for the conversion of values to a common currency is open to question. To produce the right results the relationship of internal prices in two or more countries, i.e. the relative purchasing power of currencies, must be the same as the exchange rates used to make value comparisons. This equivalence is extremely unlikely. With respect to internationally traded goods it would require that exchange rates reflect the long-run equilibrium rate of exchange, ^{36/} and this would only be

^{35/} Milton Gilbert and Irving B. Kravis, "An International Comparison of National Products and the Purchasing Power of Currencies" (OEEC, 1954); Milton Gilbert and Associates, "Comparative National Products and Price Levels" (OEEC, 1958); Irving B. Kravis, Zoltan Kenessey, Alan Heston and Robert Summers, "A System of International Comparisons of Gross Product and Purchasing Power" (United Nations International Comparison Project: Phase 1, 1975).

^{36/} For a discussion of international comparisons and exchange rates, see J. Grunwald and J. Salazar-Carrillo, "Economic Integration, Rates of Exchange, and Value Comparisons in Latin America", International Comparison of Prices and Output, edited by D. J. Daly (National Bureau of Economic Research, vol. 37, 1972).

possible in the absence of restraints to trade such as tariffs, export subsidies, quotas and licences, and exchange controls. That this should be so is, to say the least, remote.

141. The use of under- or over-valued exchange rates to convert national products and their components to a common unit of currency quite clearly distorts international value comparisons, and attempts have been made to overcome the problem. It is possible to estimate an adjusted exchange rate based on par values during a period which approaches free market equilibrium and adjust that rate in line with the movement of national price indexes. Such adjustments, however, are crude, and the likelihood of error is high. Even if the selection of the initial period manages to avoid par values which are under- or over-valued, the movement of national price indexes may not reflect the change in equilibrium rates of exchange. While such refinements may adjust exchange rates in the direction of the expected equilibrium position, they do little to establish the appropriate purchasing power parity relationship of currencies.

142. For even if long-run equilibrium exchange rates could be properly estimated and used in international comparisons, these comparisons would still be unreliable. The equilibrium rate would reflect not only the free-trade price relatives of internationally traded goods and traded services, but all international flows including capital transactions. Hence a country with substantial capital inflows would have a higher valued currency than if its currency were determined just on the basis of traded goods and services. In effect this breaks any link there might be between the internal purchasing power of currencies and the equilibrium exchange rate. Moreover, the equilibrium rate is determined, as already stated, by all the flows which make up international trade, whereas the bulk of final goods and services are not traded internationally. If all goods and services are considered, and not just those that enter international trade, then countries with relatively cheaper service sectors would have relatively higher purchasing power. In this sense the use of equilibrium rates for international comparisons is limited, since they apply only to foreign transactions.

143. All these general objections to the use of exchange rates in international comparisons of national products apply with even greater force to military products. There simply are no official exchange rates for military products, but even if there were, there is no reason to expect the relationship of internal military output prices to reflect military exchange rates, since this would require the absence of restraints to trade, which are so much a feature of the present trade in military goods.

C. Purchasing power parities for the military sector

144. The reliability of estimates of purchasing power parities for final military goods and services will depend upon the availability and quality of the data provided by individual States. The studies by the Organization for European Economic Co-operation (OEEC) referred to the lack of data for the military sector and emphasized the limitations of the purchasing power parities derived for

defence. 37/ Defence spending, defined to include certain types of research and related activities but to exclude civil defence, was divided into two broad groups, personnel and other goods and services. Using numbers of military and civilian personnel employed in the defence sector, purchasing power parities were derived from quantity and expenditure ratios. In these studies expenditure on other goods and services was broken down into the following categories, related to fairly homogeneous types of product: major equipment, construction, spare parts, gas and oil, other operating and maintenance, and other. Since price data relating specifically to government military purchases were not available, purchasing power ratios were taken from estimates made in the consumption and investment areas of the studies. For goods sold in both military and civilian sectors, it was convenient in practice to use price ratios which emerged in the civilian sector. But where no counterpart existed in the civilian sector, purchasing power parities of civilian goods were chosen on the assumption that products embodying similar kinds of material, labour and capital would have similar price ratios in both the military and civilian sectors. For example, price ratios for producers' durable equipment were used for major defence equipment; and price ratios from civilian construction for military construction. Apart from personnel, therefore, purchasing power parities depended upon price relatives for comparable civilian goods.

145. The international comparisons made by OEEC were concerned with whole economies rather than a sector within an economy. Hence the lack of data for the military sector and the very limited value of purchasing power parities obtained for defence spending did not destroy the utility of these studies. But serious consideration of military sectors, and the derivation of reliable internal purchasing power parities for military output, will require detailed price and quantity information. Some conceptual problems involved in international comparisons have already been discussed in section IV above together with such difficulties as changes in quality, the introduction of new products, etc. For the purpose of reductions and limitations of military expenditures, it has been suggested in previous sections that flows of final military goods and services used should be measured. Expenditures on resources on an adjusted factor cost basis would be deflated, where possible, by both a Laspeyres index and a Paasche index. These are the price indexes necessary for the compilation of purchasing power parities.

146. The reliability of this information will depend in part upon the careful matching of a sample of representative final military goods and services. Consequently, estimates of purchasing power parities for the military sector must be based on standard definitions and on an expenditure classification common to all countries. The broad category breakdown of military expenditures will be the same between countries, although there may be differences in detail. If there are such differences, it may be convenient to modify the basic classification, if by so doing homogeneity within categories is improved. But where particularly difficult pricing problems arise because of the non-homogeneous nature of certain military products, it is probably better to collect more price information and increase the sample size.

37/ Gilbert and Kravis (1954); Gilbert and Associates (1958), *op. cit.* The United Nations International Comparison Project (1975) did not provide a breakdown of defence expenditures.

D. Binary and multilateral comparisons

147. In judging the reliability of international comparisons, problems associated with inadequate price data tend to overshadow other important questions concerned with weighting 38/ and with what has been termed "aggregation" of relative price ratios or purchasing power parities for different expenditure categories. There are two basic methods of aggregation known as binary comparisons and multilateral comparisons. In simple binary comparisons of two countries, standard index number formulae would be used to compute purchasing power parities for categories of final military goods and services. 39/ It has already been pointed out in section IV that there is no unique result because price ratios can be aggregated on the basis of weights in either of the two countries. But this is not just a statistical awkwardness. It reflects existing basic differences in military structures between States. One solution is to calculate a Fisher Ideal index - the geometric mean of two indexes derived using each country's weights. 40/ But this is only one among a number of symmetric weighting schemes, which can also take the form of arithmetic or harmonic 41/ averaging of two indexes. The choice between these methods of aggregation for binary comparisons is usually judged according to what extent the system fulfils certain consistency requirements.

148. For pairs of countries taken separately, the set of binary comparisons provide maximum characteristicity, i.e. the weights are based on the spending patterns of each country in turn. The difficulties of comparison do become apparent, however, when attempts are made to extend binary comparisons to more than two countries. The main problem arises over the lack of consistency between such comparisons, because they do not yield a transitive system. Hence in a situation where the military expenditures of countries A and C exceed B by 10 per cent and 5 per cent respectively, little can be deduced with any certainty about C's position relative

38/ In selecting the weight base (i.e., year chosen to provide value data), one should choose a year when military burdens are normal, when prices are not abnormally high or low, and when basic data revisions are unlikely.

39/ At the more detailed level, price data must be averaged to obtain price indexes for each category of military spending. If expenditure information is unavailable, a simple unweighted mean of the price relatives is unavoidable. This can only be justified if the dispersion of the price ratios within the category is small. If dispersion is large, some distortion occurs.

40/ Some justification for the Fisher Ideal index relies upon the empirical findings of Kloeck and Theil; see "International Comparisons of Prices and Quantities Consumed", Econometrica (July 1965). (The results obtained from the Fisher index approximated those derived from an ideal index, which used a formula suggested by Theil's information approach to demand analysis. Nevertheless the implications of the assumptions required for the Fisher index are somewhat difficult to accept.)

41/ D. M. Iklé, "A New Approach to the Index Number Problem", Quarterly Journal of Economics (May 1972). The resulting price index is constructed on the basis of harmonic averaging of quantity weights of the two countries compared.

to A. A superficial kind of transitivity can be achieved by the use of a bridge country, through which all comparisons are made. An important objection to this approach is that it ignores the results of any direct comparison between two countries and depends upon the bridge country's sample of goods and weights, which need not be characteristic of the two countries being compared.

149. An important feature of the recent United Nations study 42/ is the methodology developed for making multilateral comparisons. The basic requirement is to obtain transitivity (or circularity as it is often called in comparisons between several countries) without giving up too much of the characteristicity of binary comparisons. Without circularity it is not possible to get a consistent picture of the group of countries compared, and even a ranking of countries cannot be determined. There are two main types of solution in multilateral comparisons: those based on an averaging of indexes, using the Fisher Ideal formula; and those based on some kind of averaging of price, which envisages the simultaneous solution of a system of equations. 43/ Of course no method satisfies all requirements, and there is no best method in absolute terms.

150. In practice value comparisons depend not only upon the availability and quality of data, but also upon the willingness of States to supply data. But where symmetry of military expenditure levels is essential to the conclusion of an agreement or is required by the type of limitation under consideration, then absolute value comparisons may be needed. On the one hand, it would be desirable to have a full-scale comparison in which every country is directly compared with every other country. On the other hand, it is more likely that only a limited number of direct comparisons will be possible for certain key military powers, with other countries covered by some kind of indirect comparison. Limited scale comparisons of this kind, however, will raise further questions concerning the principles on which the key direct comparisons are selected.

42/ Kravis, Kenessey et al, op. cit.

43/ Useful summaries of the methods used and proposed for compiling indexes in multilateral comparisons can be found in L. Drechsler, "Weighting of Index Numbers in Multilateral International Comparisons", Review of Income and Wealth (March 1973); and in Kravis, Kenessey et al, op. cit., part II, chap. 5.

VI. SUGGESTIONS FOR IMPLEMENTATION

A. Introduction

151. The Group of Experts believes that, while the recommendations in sections II to V concerning the complex problems posed in our mandate are not necessarily exhaustive, they are viable and constitute an analytical step forward towards the goal of expenditure limitations and reductions. It is now necessary to take practical steps to make the analysis applicable to the real world. Moreover, there are several technical issues which have been left unresolved, largely because the possible choices required a level of technical detail and specialization which could be supplied only by professionals in the narrow subfields involved. For this reason, there is clearly a need to translate the concepts and procedures developed in this study into practical ways and means that can be utilized on a regular basis by the United Nations and its Member States. In recommending steps that might be followed to this end, the Group believes it highly desirable to proceed cautiously, learning by doing as the process moves from stage to stage.

152. The Group has previously expressed the view that the international reporting instrument developed in section II (table A) must be operationalized, tested and refined. These are three distinct phases of what might be called "operational development", which constitutes a prerequisite for more general application of the accounting matrix as a regular instrument for reporting the military expenditure of the States Members of the United Nations. Paragraphs 153 to 157 below briefly explain the meaning and content of operational development, its suggested time-ordering, and the means by which it can be executed. Assuming successful completion of operational development of the reporting instrument, suggestions for further action are outlined in paragraphs 158 to 160.

B. Operational development of the reporting instrument

153. The three phases of operational development may be briefly described as follows. By operationalization is meant the precise definition and specification of expenditure categories and their content in such detail as to constitute concrete guidance to States that will be supplying the required data. In the next phase, testing, the instrument and its accompanying instructions are transmitted to the participant States for completion with the required data. In this phase, the adequacy of the operationalization is examined and assessed. The correction and improvement of the matrix, as well as the accompanying instructions, based on the experience obtained in the testing phase, may be called refinement.

154. The foregoing outline of the operational development of the international reporting instrument refers to national reporting at established prices of the reporting State in a given reporting period, and in national currencies. Subsequent stages of the development process should take up revaluation of outlays originally expressed in established prices of the particular country, according to the valuation criteria indicated in section III, and reporting for

a series of years by developing appropriate price deflators. A final development task, according to criteria discussed in section V, might be the construction of purchasing power parities for military goods and services, so as to convert values of different countries into common currency units.

155. Apart from filling in the standardized reporting instrument, States may be invited to comment generally on the instrument and the process of operational development. It would also be useful to have any information they would wish to convey on their military expenditure accounting practices. Description of methods currently in use or suggestions for future procedures with respect to deflation of military expenditure would be especially welcome.

156. In the implementation of operational development, the General Assembly may wish to keep the process under its general supervision. However, the Group of Experts recommends that the technical responsibility for the concrete tasks of operationalizing, testing and refining should be delegated to an ad hoc panel of experienced practitioners in the field of military budgeting, under the aegis of the United Nations system.

157. In testing the validity of the reporting system proposed in the present report, the General Assembly may opt for a universalistic approach, on the grounds that all Member States should be given an opportunity to participate on a voluntary basis from the outset. In the interest of economy and time, however, the General Assembly may wish to consider, if feasible, that at the initial stage a selected group of States would suffice, providing it is representative.

C. Suggestions for further action

158. If the operational development of the standardized reporting instrument is successfully completed, the instrument should be ready for adoption and institutionalization by the United Nations for regular reporting. The institutions that should administer such regularized reporting, the means by which the information is to be collected, processed and publicized, the pace at which reporting may be expected to become global in scope - these are all matters on which the General Assembly may wish to take action at the appropriate time.

159. At this further stage the international community should be ready for discussion of the other major technical issues of expenditure limitation, and especially of the problems of verification. At the appropriate time, further consideration should be given to utilizing part of the resources released from the reduction of military expenditures for social and economic development, particularly that of the developing countries.

160. In conclusion, it must be emphasized that limitation and reduction of military expenditures is a universally desired objective, and progress towards it should not be further delayed. The orderly reporting of such expenditures is the first major step towards reaching the objective. The Group of Experts is confident that, given the political will, the analytical and operational problems involved in the establishment of a reporting system can be resolved by the exercise of due judgement and care throughout all phases of its implementation.

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