ST/ESA/STAT/SER.F/22

DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS
STATISTICAL OFFICE

STUDIES IN METHODS Series F No. 22

THE FEASIBILITY OF WELFARE-ORIENTED MEASURES TO SUPPLEMENT THE NATIONAL ACCOUNTS AND BALANCES: A TECHNICAL REPORT

UNITED NATIONS
New York, 1977

NOTE

Symbols of United Nations documents are composed of capital letters combined with figures. Mention of such a symbol indicates a reference to a United Nations document.

ST/ESA/STAT/SER.F/22

UNITED NATIONS PUBLICATION

Sales No. E.77.XVII.12

Price: $U.S. 4.50
(or equivalent in other currencies)

PREFACE

This publication had its origins in the growing interest in measuring the levels of living or well-being of populations and in the widespread consensus that monetary measures of output and income fail to capture important dimensions of welfare. The Committee for Development Planning of the United Nations expressed concern at the concentration of attention on monetary measures of output and requested the Statistical Commission of the United Nations to consider supplementary measures. Accordingly the Statistical Commission, at its eighteenth session in 1974, requested that an expert group should be convened to consider the various aspects of welfare and its distribution. However, the Commission emphasized that the national accounts and balances serve many other uses and that these should not be disturbed in developing measures of welfare. The expert group met in March 1976 and considered an earlier version of the present publication. The paper, prepared by Christopher T. Saunders acting as consultant to the United Nations, was then discussed by the Statistical Commission together with the conclusions of the expert group, and the Commission requested that the paper be published with a preface summarizing its own views.

The Statistical Commission considered the paper an excellent survey of the problems arising and the work done to date in devising welfare measures to supplement the national accounts and balances. It was agreed that it would be inappropriate to attempt to develop international standards for an aggregate designed to measure welfare. It was felt that currently the area was more suitable for research than for statistical compilation and that what was considered important would vary from country to country. A variety of statistics, particularly social and demographic statistics, are needed in order to assess welfare. Individual items drawn from the national accounts are also of value, especially the elements entering into the concept of total consumption of the population. A view was expressed that the well-being of a society could not adequately be assessed by monetary measures alone and that it is appropriate to use non-monetary indicators also for that purpose.

The priorities for future work set out in the paper were broadly endorsed by the Commission. These priorities are: (a) the development of a system of environment statistics; (b) the promotion of a more functional analysis of expenditures by general government, providing a separation particularly of expenditures that supplement private consumption, so as to allow the calculation by function of total consumption of the population; and (c) further study of the techniques, definitions, interpretation and use of time-budget data. The Commission also considered that several additional topics should be added to the priority list, including the distribution of income by age, social group and income size class, the effect on real income of changes in the terms of trade and the special needs of developing countries. The Commission noted that further work on these topics could be expected to take place under the specific headings shown in the list of priorities, all of which were part of the regular programme of the Statistical Office of the United Nations.

CONTENTS

Explanatory notes

The following symbols have been used in the tables throughout the report:

Three dots (...) indicate that data are not available or are not separately reported.

A dash (-) indicates that the amount is nil or negligible.

A blank in a table indicates that the item is not applicable.

A minus sign (-) indicates a deficit or decrease, except as indicated.

A full stop (.) is used to indicate decimals.

A slash (/) indicates a crop year or financial year, e.g., 1970/71.

Use of a hyphen (-) between dates representing years, e.g., 1971-1973, signifies the full period involved, including the beginning and end years.

Reference to "tons" indicates metric tons, and to "dollars" ($) United States dollars of 1977 purchasing power.

Annual rates of growth or change, unless otherwise stated, refer to annual compound rates.

Details and percentages in tables do not necessarily add to totals, because of rounding.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

The term "country" as used in the text of this report also refers, as appropriate, to territories or areas.

Chapter I

OVERVIEW

1. The purpose of this publication is to make a critical review of the concepts, methodologies and empirical applications of monetary measures of welfare that may be used to supplement national accounts and balances, with special references to the use of such measures for international comparison and to their feasibility for government statistical work.

2. The immediate origins of the paper lie in:

(a) The decision of the Statistical Commission of the United Nations at its eighteenth session to invite an expert group "to consider the various aspects of welfare and its distribution. It should concern itself with level of living indicators ... as well as with possible welfare measures supplementing the conventional national accounts". The Commission emphasized that "the national accounts and balances, as at present conceived, were of the highest importance nationally and internationally and should not be modified in order to yield measures of welfare". 1/

(b) The concern of the Committee for Development Planning of the United Nations at the concentration of attention, for international comparison, on measures of gross domestic product and its request to the Statistical Commission to consider supplementary measures "that more accurately reflect genuine differences in economic welfare". 2/

3. A general review of many issues arising from measures of welfare was made in a paper, prepared for the most part by Richard Stone, for the Statistical Commission of the United Nations at its eighteenth session (E/CN.3/459). That paper dealt not only with suggestions for modifying the national accounting aggregates but also with statistics of distribution, with social and demographic statistics and with international comparisons of levels of living. The present paper is an attempt to carry forward that discussion of principles in the areas relevant to national accounts to make a more detailed assessment of statistical methods and practicalities. It is only rather incidentally concerned with the problems that may arise from adjusting the accounting procedures in the System of National Accounts (SNA), 3/ with which the earlier paper dealt.

4. The discussion of measures supplementing national accounts is clearly and closely related to current discussions of social and demographic statistics. The present publication does not attempt to cover the whole range of social and demographic statistics but is concerned with attempts to express some of the relevant indicators in monetary terms.

1/ Official Records of the Economic and Social Council, Fifty-eighth Session, Supplement No. 2, para. 137 (e) and (a).

2/ Ibid., Fifty-fifth Session, Supplement No. 5, para. 17.

3/ Studies in Methods, series F, No. 2 (United Nations publication, Sales No. E.69.XVII.3).

5. The point of view from which this paper is written embodies the following considerations:

(a) The present structure of national accounts, as codified in the revised SNA, is acceptable for its purpose and within its limitations (apart from minor revisions) in the countries that use the system;

(b) The purpose of the national accounts as codified in SNA is, essentially, the measurement of activities in the market with a view, in particular, to guiding the authorities in the establishment of equilibrium between resources and market demand;

(c) For this purpose, it is legitimate that the national accounts should concentrate upon market transactions and that imputations for non-market activities should be kept to the minimum;

(d) SNA and the national accounts of most countries in fact include a certain number of imputations. These are, for the most part, restricted to those non-market activities that are very directly competitive with market activities (such as production of food for own use) and whose omission would significantly influence analysis. These imputations certainly embody an element of compromise with a stricter interpretation of the boundaries of "the market". (Some critics suggest that it would be preferable to exclude even these imputations so as to maintain the logic of the system as a record of actual market transactions only.);

(e) There are strong practical reasons for maintaining the general structure of the system as now understood. The first is that it is generally used as an instrument for policy guidance: any serious adjustments would create confusion and discontinuity. The second reason is that a valuable and elaborate superstructure of research, analysis and forecasting methods has been built upon the existing series.

6. It is, of course, true that the structure of the national accounts referred to above was developed in the industrialized market economies, notably in the Netherlands, the United Kingdom of Great Britain and Northern Ireland and the United States of America during the 1930s and 1940s; their main purpose was the monitoring and control of short-period, cyclical fluctuations. The system of material product balances (MPS) was developed rather earlier in the Union of Soviet Socialist Republics; the purposes of the MPS system include the analysis of balance between resources and demand but with more emphasis on planning the medium- and long-term development of production and of structural changes. Again, the broad structure of the system is embodied in statistical practice and analysis and in the guidance of policy.

7. In the developing market economies the position is rather different from that in the industrial market economies. There is, again, more emphasis on medium- and long-term growth of production and on structural changes. Yet the SNA-type of national accounting - even though countries with limited statistical resources and data have difficulty in applying it in full - is not ill-adapted to the monitoring and analysis of long-term changes and its main lines have been generally adopted in the developing market economies. The statistical priorities within the system may well, however, be different from those in countries with a greater preoccupation with short-term cyclical policy and, in particular, with more elaborate financial structures and institutions.

8. Nevertheless, though criticism of the limitations of existing systems was never absent, it has developed strongly in recent years. The thrust of the most commonly expressed criticism is that national accounts and, in particular, the concept of gross national product (GNP) or gross domestic product (GDP) provide an incomplete and often misleading record of economic performance, especially of "welfare", between countries and over time. This criticism originates chiefly but not wholly from those concerned with development policy. Undoubtedly, there has been a tendency to treat GNP as the sole indicator of successful performance in the achievement of economic and social aims. The problems of interpreting international comparisons of GNP, even among developed countries, are compounded if official exchange rates have to be used as indicators of relative purchasing power.

9. For these reasons, critics have rightly emphasized the urgent need to give much greater weight, in the statistical inventory as in economic policy and analysis, to other measures of performance of a society - to employment, to the distribution of income and wealth, to indicators of social conditions, of education, of health, of housing. More recently, especially in developed countries, the costs of high rates of material progress have been publicized in terms of pollution, environmental damage and the disamenities of a modern urbanized - and particularly a motorized - society. Statisticians and economists have to meet these criticisms.

10. The United Nations Statistical Commission and national official statistical offices have been active in promoting the development of statistics that give a more comprehensive view of the state and progress of society than is afforded by the usual macro-economic aggregates. Particularly relevant examples of United Nations work are:

(a) Provisional Guidelines on Statistics of the Distribution of Income, Consumption and Accumulation of Households; 4/

(b) The series of papers related to social and demographic statistics; 5/

(c) The elaboration of environmental statistics (see chap. IV below).

11. Another response is found in experimental efforts to construct, in theory and in actual numbers, an alternative set of accounts leading up to an aggregated measure of "welfare" expressed in monetary terms. Two of these comprehensive exercises, for Japan and for the United States, are discussed at several points in this paper. 6/ Both start from the official national accounts but they subtract a

---

4/ Statistical Papers, Series M, No. 61 (United Nations publication, Sales No. E.77.XVII.11).

5/ Towards a System of Social and Demographic Statistics (United Nations publication, Sales No. E.74.XVII.8); "System of social and demographic statistics (SSDS): potential uses and usefulness" (ST/ESA/STAT.75); "System of social and demographic statistics (SSDS): draft guidelines on social indicators" (ST/ESA/STAT.76); "Social and demographic statistics: framework for the integration of social and demographic statistics in developing countries" (E/CN.3/490).

6/ From the replies to the Statistical Office questionnaire on statistics of levels of living, it does not appear that other countries have embarked upon comprehensive alternative aggregates in monetary terms. Probably the first of these exercises was a set of bold and impressionistic estimates of "Welfare GNP" made for the United States and covering the period 1869-1966, by A. W. Sametz in E. B. Sheldon and W. E. Moore, Indicators of Social Change (New York, Russell Sage Foundation, 1968).

number of items of output or expenditure that they regard as intermediate rather than as final output - and so not adding to welfare; and they add, by imputation of money values, a variety of activities that they feel should be taken into account to measure welfare.

12. The first of these is the "measure of economic welfare", constructed for the United States, for selected years between 1929 and 1965, by Nordhaus and Tobin. 7/ The authors describe their estimates, for which three variants are given, as a "primitive and experimental measure of economic welfare (MEW), in which we attempt to allow for the more obvious discrepancies between GNP and economic welfare"; they add that "in proposing a welfare measure, we in no way deny the importance of the conventional national income accounts or of the output measures based upon them". To indicate the scale of the adjustments, it may be noted that MEW, in dollar terms, was in 1965 about twice the magnitude of GNP; and that while GNP at constant prices tripled between 1929 and 1965, MEW (in the variant preferred by the authors) increased 2.3 times.

13. The second comprehensive estimate, following in many respects but not in all the principles proposed by Nordhaus and Tobin, was made by the Net National Welfare (NNW) Measurement Committee (Chairman, M. Shinohara) set up by the Economic Council of Japan. The estimates for Japan cover selected years from 1955 to 1970. Again the procedure is to set up an alternative series of welfare measurements, a measure of "net national welfare" not to take the place of GNP but to "supplement its function in the welfare aspect". 8/ The policy-maker and analyst can use the two alternative measures like "a fencer with two swords". Unlike the estimates for the United States, the estimate of net national welfare for Japan comes out at about the same figure (for 1970) as the official estimate of net domestic product 9/ - largely because of relatively modest additions for imputed non-market services and relatively very large deductions for pollution, the increse from 1955 to 1970 in net domestic product at constant prices, by 3.6 times, compares with an increase by 2.8 times in the measure of net national welfare. It will be shown later, when the main items are discussed, that statistical and other non-comparabilities render very doubtful any direct comparison between the United States and Japanese estimates.

14. Special reference should be made to the large-scale project now in progress in the National Bureau of Economic Research (NBER) in New York, under the general title of "The measurement of economic and social performance in the United

---

7/ William Nordhaus and James Tobin, "Is growth obsolete?"; published in full in Economic Growth, Fiftieth Anniversary Coloquium V (New York, National Bureau of Economic Research, 1972). Quotations from pp. 4 and 5. The paper, without appendices describing sources and methods in detail, is reprinted in Milton Moss, ed., The Measurement of Economic and Social Performance, Studies in Income and Wealth, vol. 38 (New York, National Bureau of Economic Research, 1973).

8/ NNW Measurement Committee, Measuring Net National Welfare of Japan (Tokyo, Ministry of Finance, Printing Bureau, 1974), p. 4.

9/ There is no estimate of national product for Japan corresponding directly to GNP.

States. 10/ The project is concerned with solid empirical research into the theory and statistical estimation of a number of welfare-oriented variables (as well as with other more strictly economic variables calling for further research). Special attention is being given to the use of micro-data sets - files for individual households, enterprises and small units of government - so as to integrate social, demographic and regional information with the macro-economic data about transactions in the national accounts. While not aiming at an aggregate described as a measure of welfare, the project does permit the measurement of a concept of "extended gross national product", incorporating a number of welfare-related imputed additions to and subtractions from the official measure.

15. The present publication deals individually with a number of activities that have a special bearing on the welfare of a society, whether these activities are conceived as flows or as stocks. Some are already embodied in national accounts but are not all identified separately (e.g., expenditure on pollution control); in these cases, it may be felt that efforts should be made to record and display them. Others, mainly non-market activities with no counterpart in actual transactions, are excluded from national accounts and their monetary values must be estimated by some form of imputation. The main categories discussed are:

(a) Aspects of the household economy: the treatment of various unpaid activities by housewives and others within the household; of leisure activities; of instrumental expenditures such as commuting; of enterprise subsidies to households; and of alternative treatments of the services of consumer durables (chap. II).

(b) Intermediate and final expenditure of general government; including (paras. 118 ff) the use of the concept of total consumption of the population (chap. III).

(c) Measures of environmental conditions and pollution (chap. IV).

(d) The measurement of assets: the extent to which the various welfare-related measures of activities may be associated with measures of the corresponding assets of a society (chap. V).

(e) International comparisons of the supply of goods and services, particularly in relation to the request of the Committee for Development Planning that was mentioned in paragraph 2 (b) above (chap. VI).

16. In each of the categories outlined above, an effort is made to assess the relevance of measurements in money terms both to the formation of economic and

---

10/ Much of the background thinking for the project is contained in Milton Moss, op. cit. A progress report on the project, with some preliminary results, is given in Richard and Nancy Ruggles, "The measurement of economic and social performance", a paper for the fourteenth general conference of the International Association for Research in Income and Wealth, Aulanko, Finland, 19-23 August 1975. A number of papers for that and earlier conferences dealt with the problems of more comprehensive measurements; references to some of them are made below. Other estimates contributing to the NBER project have been published by John Kendrick; see especially "The treatment of intangible resources as capital" and "The accounting treatment of human investment and capital", Review of Income and Wealth, March 1972 and December 1974 respectively.

social policy and to the more comprehensive analysis of the process of economic and social change, as well as to the improvement of international comparisons. Examples are given (no doubt, far from complete) of methods used by various researchers to make quantitative estimates of the items concerned.

17. From the point of view of policy, the purpose of these measurements is to give proper prominence and a quantitative perspective to features of social change that are excluded from or hidden in the national accounts. From the point of view of analysis, the purpose is to bring clearly into relation with the national accounts some of the social and environmental forces that bear upon economic and social development. While the system of national accounts is self-balancing in an accounting sense, the dynamics of change - even of a narrowly defined economic growth - come largely from outside the system. To some extent, perhaps only to a limited extent, these outside factors can be quantified in the same common monetary denominator as are the transactions that feature in the accounts, thus adding something to their explanatory power in analysis. 11/

18. There are two ways by which some or all of the measurements described (and others not treated here) may be presented.

19. The first approach is to use the estimates (imputed or actual additions and subtractions) to compile an alternative aggregate that may be described as a measure of net national welfare (the Japanese measure), the "measure of economic welfare" (Nordhaus/Tobin) or, more modestly, "extended GNP" (Ruggles) or "adjusted GNP" (Kendrick).

20. The second approach is to present the additions and subtractions as supplementary measures to GNP "below the line", or in supplementary tables, but not necessarily aggregating them (the user can make his own aggregation at his own discretion). The presentation would in fact be open-ended.

21. The problem is not just a problem of editorial presentation. The display of an alternative aggregate, at least in an official document, implies a recognition that the new aggregate represents a specific concept (even if it is a concept, like that of GNP or material product, embodying certain accepted conventions).

22. The attractiveness of forming some alternative aggregate measure is obvious. In particular, it could deflect attention from the use of GNP as the exclusive index of over-all economic performance. This purpose could be partially achieved even if the alternative aggregate were less than a complete account of what it purported to measure.

23. Is the alternative aggregate to be described as a measure of "welfare" (or of "economic welfare")? It is recognized by all that it is not practicable to make a direct measure of the welfare of a community in monetary or in any other terms. 12/ The best that can be done is to measure a number of factors that are

---

11/ See, for example, the "Concluding remarks" of Simon Kuznets in Moss, op. cit.

12/ Perhaps the nearest approach is found by sample surveys that test people's sentiments of satisfaction or dissatisfaction with their circumstances.

generally supposed to contribute to or detract from welfare, not forgetting that the distribution of the aggregate among individuals may be as important from the welfare point of view as the aggregate itself.

24. An alternative approach is to ignore the concept of welfare as such, aiming instead at a wider concept of "net production" or of "activity" than that embodied in GNP. This would allow the inclusion of non-marketed activities (e.g., household activities); and the concept of net production could allow for the subtraction of a wide range of instrumental or intermediate activities (such as expenditure on abating the pollution associated with production). But the problem arises, again, of defining a production boundary that could be generally agreed on.

25. From the point of view of international comparability, having in mind the innumerable problems that have had to be resolved in getting agreement on existing accounting systems, the question must be asked whether an effort to reach international agreement on what should go into any new aggregate and on the ways of measuring it could be reached without a large and possibly unwelcome diversion of statistical resources.

26. Subsequent chapters describing some of the conceptual and practical problems arising in each of the categories may contribute to the consideration of these issues.

Chapter II

ASPECTS OF THE HOUSEHOLD ECONOMY

27. This chapter covers a variety of questions about possible extensions of the accounting for activities carried on within the household. Some authorities would, indeed, be prepared to treat the household as a kind of enterprise, making decisions on current and capital outlays, on choices between paid work and work at home and between work and leisure etc., on the basis of a mixture of market prices and shadow prices for the various alternatives. Indeed, for most households important decisions are in fact influenced to some extent, explicitly or implicitly, by this kind of economic rationalization. However, it can also be said that the social and institutional as well as the economic constraints on economically rational planning of a family economy, together with the non-economic variables that may quite rightly dominate decision-making, render this type of approach inappropriate and unrealistic. Although aspects of household behaviour may be subjected to tests of economic rationality by the social scientist, the formal incorporation of the household as an enterprise in national accounting does not seem at all necessary.

28. Nevertheless, many kinds of household activities that fall outside the market are measurable and have been measured in various more or less arbitrary or conventional ways. The results add interest to social and economic analysis without being incorporated into any formal system. Five such kinds of household activities are discussed in the sections below.

The estimation of productive non-market activities

29. "Productive" (or "economic") non-market activities are those that may be regarded as being, at least in principle, substitutable for the purchase of goods and services in the market. There are in practice two major categories. First comes the production of food and certain other goods for consumption in the producer's household. This production, together with an imputed net rental value for owner-occupied dwellings, has long been included in most national income estimates for both developed and developing countries and is recommended for inclusion by SNA. In the national accounts for developing countries these activities appear to represent on average - with very large variations - about one sixth of the total national output. In the most industrialized countries, the proportions are naturally much smaller for own-account food production but larger for owner-occupied rentals.

30. The second major category of productive non-market activities has always been much more controversial. This takes account of the value of unpaid services performed within the household. The coverage is, again, uncertain. The main element (and the classical example in controversy) is of course the unpaid services of full-time housewives; but the boundary should logically be extended to housework (and garden work) of men and women in paid employment and include house maintenance and improvement. It may also include a variety of other self-service operations that are alternatives to market activities. The work of students may be

covered to the extent that studying is an alternative to paid employment; so may volunteer activities for public and other organizations or social work. Private car driving, so far as it is an alternative to using public transport, may be included. Even with fairly restrictive definitions, these household productive activities can add something like one third to GNP in developed countries - a substantially greater proportion of the whole than that added to monetary measures of output by own-account production of food etc. in most developing countries.

31. The borderline between these productive household activities and activities in leisure time is also very shadowy. It may well be asked to what extent vegetable gardening or carpentry or voluntary public service, in spare time, is a productive activity and to what extent a hobby? There are certainly arguments, from the point of view of measuring welfare, for including some imputation for leisure time but any such measurements stand on rather a different footing from the measurement of what have been described as productive activities with fairly clear market analogies. Some attempts at imputing values for leisure are described in paragraphs 72-81.

Imputations in developing countries

32. It is well recognized that the growth of production for the market in developing countries is explained in part by the shift away from own-account production (sometimes, perhaps misleadingly, described as the "subsistence" economy). The inclusion of an imputed value, at least for own-account food production, has been standard practice for a long time. SNA recommends the inclusion in measured product of an important but not all-inclusive range of such own-account production as: (a) "the characteristic products of agriculture, forestry, fishing, hunting and mining and quarrying" and (b) own-account construction (in addition to rentals for owner-occupied dwellings). But it is also suggested that other activities for own account, including processing, that are also performed for the market should be included if sufficiently important. 13/ Valuations should be imputed at producers' values for similar products sold in the relevant market and inputs from the market should be estimated to obtain value added.

33. A survey of actual imputations practised in the national accounts of developing countries has been made for the Development Centre of the Organisation for Economic Co-operation and Development. Seventy countries replied to a questionnaire about the non-market activities included in national accounts, their relative importance in GDP and the methods of estimation and imputation of values. 14/ The main findings of the survey are set out below.

(a) Coverage of activities. Practically all countries include crop and livestock production. Most include forestry and fishing and also dwelling construction and imputed rentals. About one in three includes hunting. In addition to these activities, which are recommended for general inclusion by SNA, half the countries include handicrafts, about one in three includes buildings other than dwellings and a few include other construction work such as land-clearance, bore-holes, roads and bridges. A handful carry the imputations to water-carrying and crop storage and two (Angola and Mozambique) include housewives' services.

13/ A System of National Accounts, paras. 5.13 and 6.19-6.24.

14/ Derek W. Blades, Non-monetary (Subsistence) Activities in the National Accounts of Developing Countries (Paris, Development Centre of the Organisation for Economic Co-operation and Development, 1975).

(b) Relative importance of productive non-market activities. Forty-eight countries or areas provided estimates of the percentage of gross domestic product accounted for by the estimates of non-monetary value added - these estimates being admittedly guesses in many cases. The variations are naturally substantial. In seven African countries very heavily dependent on agriculture, 30 per cent or more of GDP is imputed. The median proportion is about 15 per cent (e.g., Iran, Philippines). For a dozen semi-industrial (or mining) countries, the proportion is well below 10 per cent (e.g., Argentina, Hong Kong, Iraq, Mexico, Zambia). As may be expected, there is some negative correlation between the non-monetary share and the recorded level of GDP per head. 15/

(c) Methods of estimation. A variety of methods is used; however, the most common feature is that the basic data are generally quantities rather than values, so that estimates of changes in real terms have a better foundation than those in current prices. For agriculture, both estimates of consumption (generally based on sample household budgets) and estimates of production are used; if total production is measured (e.g., by crop surveys) the proportion consumed by the producer is either asked for or estimated so that the total production may be more firmly based than its division between cash sales and own-use production.

Methods of valuation

34. The long argument over whether the most appropriate method of valuation is to use producers' prices or retail market prices seems to have been resolved in practice by the general adoption of producers' prices as well as in principle in the SNA recommendations. This appears to represent a shift to an emphasis on the measurement of production away from an emphasis on "welfare" as the concept to be measured, assuming that production for own consumption yields the same satisfaction as purchases in the market. However, the methods actually used for estimating producers' prices vary considerably and are very uneven in quality. Thus the production concept should probably imply the estimation of "farm-gate" prices, involving the deduction from wholesale market prices of an allowance for transport from the producer to the market; only a few countries make such a deduction.

35. It must, of course, be recognized that the problem of making reasonably accurate estimates of non-market activities is only one of the many difficulties in compiling national accounts for developing countries. How much importance should be attached to it depends upon the general statistical priorities of individual countries. It can be pointed out, however, that the basic data required - especially the physical volume of agricultural output for own consumption - are essential data for many purposes other than those of national accounting. They are essential, for example, for assessing food supplies and requirements and the impact of increasing monetization. Data on labour utilization are needed for assessing the manpower situation; this assessment requires a rather detailed account of the differing degrees of participation in both paid and unpaid work. Moreover, because of wide regional disparities, especially in countries undergoing the process of transition, the question of distribution is of great importance. For such basic data, the general view seems to be that, especially for rural areas, sample household surveys are the most effective instrument.

15/ Ibid., pp. 82-85. A regression run on 22 African countries that are reasonably homogeneous in economic structure suggests that about two thirds of the variation in non-monetary share is accounted for by the level of GDP per head.

Together with other statistics - such as those proposed as social indicators for developing countries - they can be assembled at the local level and provide information needed for local social programmes. 16/

36. A firm data base in non-monetary units (physical quantities of production or consumption, number of people in various forms of employment or unemployment, by geographical area, socio-economic and ethnic categories etc.) is, then, the first necessity. On this base, if it is sufficiently comprehensive, can be built estimates that can serve national accounting purposes. The imputation of monetary values presents a separate set of problems. These problems may perhaps be regarded as secondary; however, substantial improvements of data about market prices are needed if the contributions of non-market activities to aggregates of output are to be taken as more than orders of magnitude.

37. It is highly desirable that where imputed values of non-market activities are at all important, the list of activities covered and the methods of imputation used should be made explicit. The variations between countries are so considerable that both changes over time and international comparisons of aggregates can hardly be interpreted with confidence, for many developing countries, unless the non-monetary elements in national output are clearly displayed. The separation of own-account from marketed production is included in the "supplementary accounts" for rural areas suggested in the revised SNA. 17/

Imputations in developed countries: unpaid household activities

38. For developed countries, the conceptual and statistical problems surrounding imputations for non-market activities take on quite a different emphasis. Own-account food production and rental values for owner-occupied houses are normally imputed; analogous prices in the market are more generally available. The more relevant issues in the present context are those surrounding the calculation of unpaid household activities.

39. One of the oldest conundrums in the theory of national income statistics is the question: if a man marries his housekeeper, is it correct to show a decline in national income? The answer given is, in a sense, a test of the respondent's concept of what national income statistics are intended to exhibit. The answer "Yes" implies that, because the marriage signifies the disappearance of a marketed activity from the sphere of measured production, national income, or GNP, being regarded as essentially the sum of market activities, correctly falls. The answer "No" implies a recognition that the woman's activities as housekeeper may be expected more or less to continue as before: there is no change (necessarily) in the total flow of goods and services.

16/ These points are among those emphasized in the "Report of the expert group on social statistics and a system of social and demographic statistics for developing countries" (ESA/STAT/AC.3/2).

17/ A System of National Accounts, para. 9.33. It is understood, however, that so few countries are at present in a position to give this separation that it has so far been impracticable to provide for it in the tables contained in the United Nations Yearbook of National Accounts Statistics, Statistical Papers, series O.

40. While the proportion of household production tends fairly universally to fall in the early stages of development, in developed countries recent experience has revealed two conflicting tendencies of a rather different character from those influencing own-account food production.

41. The labour force participation rates for women, especially married women, have tended to rise, as a result partly of full employment and growth policies and partly of changing social trends. In itself, this might well tend to diminish the "volume" of household production (if that elusive concept could be measured). By contrast, the increasing relative prices of labour-intensive services have led in industrial societies to a great increase in self-service activities within the home - a trend towards what has been described as the "self-service economy". 18/ This trend has interacted with the development of domestic appliances, convenience foods and aids to do-it-yourself operations, which - granted the necessary skills - should increase the productivity of domestic activities. 19/

42. Such tendencies, it would generally be recognized, are essential for understanding long-term movements in the composition as well as in the aggregate of gross national product. They underlie analysis of consumer demand trends as well as of structural trends in production. They cannot be ignored in any long-term projections of economic growth. Trends in household activity are only one of many factors (such as demographic change and technological progress) that contribute to explaining long-term economic growth as measured by GNP. Unlike some of the other factors, however, unpaid household activities are to some extent interchangeable with market activities so that the theoretical possibility of pricing by analogy exists.

43. In previous years, in the generation of national income estimates it was not uncommon to include at least the unpaid services of housewives. Paul Studenski quotes some (unofficial) estimates for Hungary, Italy and Sweden in the 1930s, showing imputed income of housewives representing some 10-30 per cent of the rest of national income. 20/ The problem was discussed on several occasions by Simon Kuznets. While doubting whether "the productive activities of housewives and other members of the family ... can be characterized as economic processes whose net product should be evaluated and included in national income", he says that "it cannot be denied that they are an important complement to the market-eventuating process ... and should be considered in any attempt to evaluate the net product of the social system in terms of satisfying wants with scarce means". While omitting

---

18/ See, for example, J. Skolka, "The substitution of self-service activities for marketed services", Review of Income and Wealth, December 1976, pp. 297-304.

19/ The increase in productivity is not to be taken for granted: "Lord Finchley tried to mend the electric light/It burst, and blew him up, and serve him right/It is the duty of the nobleman/To give employment to the artisan." Hilaire Belloc.

20/ P. Studenski, The Income of Nations (New York, New York University Press, 1961), vol. 2, p. 17.

these activities from his estimates of the national income of the United States (in 1919-1938), he noted that if housewives' services were imputed at the average wage of paid domestic service (for non-farm housewives) or of paid farm workers (for farm housewives) - a basis of imputation which he agreed did "violence to many of the social and emotional factors involved" - such services would have amounted to about one fourth of United States national income in 1929. 21/

44. Some recent and more elaborate estimates, for the United States and for Japan, will be summarized to illustrate both orders of magnitude and differences in the methods employed.

(a) United States of America

45. Nordhaus and Tobin, 22/ in their "measure of economic welfare" (MEW), include estimates for non-market activities both for productive household activities and for leisure time (see para. 77 (a)). They make estimates both at current prices and at constant 1958 prices; these may be summarized as follows:

Productive non-market activities as percentage of GNP

	1929	1947	1958	1965
At current prices	46	54	54	47
At constant 1958 prices				
Alternative (i)	88	70	54	42
Alternative (ii)	42	52	54	48

46. These estimates, which are intended as illustrative rather than final, cover all persons of 14 and over; the time devoted to household activity (15 hours a week for men, 47 hours for women) is based on a single set of time-budgets compiled in 1954, roughly extrapolated backwards and forwards; the imputed wage for adults is simply the average market earnings of women, and for school hours the average market earnings of juveniles.

47. The authors also discuss alternative procedures for deflation, since their main objective is a measurement of growth in real terms. The question is whether to allow for an increase in labour productivity in the home. For alternative (i), no change in productivity is assumed over the period; the imputed money income is deflated by the average wage-rates. For alternative (ii), which is preferred by the authors and is certainly more plausible, the income data are deflated by the consumer price index (i.e., the assumption is that productivity has increased with the average real wage in paid employment). Comparison of these alternatives clearly shows the importance of the assumption adopted for measuring the productivity of non-market activities over long periods, if estimates in constant prices as well as in current values are required. The decline in each series from 1958 to 1965 presumably reflects the increase in women's rates of participation in the paid labour force, implying a relative reduction of the input of time into household activities.

21/ S. Kuznets, National Income and its Composition, 1919-1938 (New York, National Bureau of Economic Research, 1941), vol. II, pp. 431-433.

22/ W. D. Nordhaus and J. Tobin, "Is growth obsolete?" loc. cit.

(b) United States of America

48. The Social Security Administration has made a study of the "Economic value of housewife" 23/ which was undertaken especially with a view to estimating the "economic costs" of disease. This study bases its imputations on sample time-budgets, for 1974, for 45,000 married couples stratified by number and age of children. The time-budgets provided a breakdown into 10 categories of the various tasks performed in the home and the hourly market wage was ascertained for each activity (those of dishwashers, cooks, child-care women, cleaning women etc.); the wage rates for the different tasks varied from $1.65 to $2.50 an hour. The weighted average imputed annual value, for 1972, was $4,700, (but as high as $6,400 for women of 25-34, maximum number of children). 24/ It is noted that these figures compare with $3,900 for the average wage of a domestic worker, but with rather more than $7,000 for the average earnings of all women in full-time employment. The number of hours worked by the housewives is not made clear in the source; however, judging from other time-budgets, it can be assumed to be close to the average for employed persons.

49. The wide range shown by these figures is a good illustration of the difference between alternative bases of imputation: market rates for the component jobs actually done ($4,700); the market rate for a job that seems superficially analogous ($3,900); and the average pay of women in the labour force ($7,000) if housewives are assumed to have the same abilities and the same opportunities for earning as has the average woman.

(c) United States of America

50. Reporting on the large-scale project of the National Bureau of Economic Research (NBER) on the "Measurement of economic and social performance" (MESP), now in progress, Richard and Nancy Ruggles have given some values for unpaid household activities derived from the preliminary results of John Kendrick. These show:

Unpaid household work as percentage of GNP

(Current prices)

	1948	1969
Unpaid housework	34.3	29.5
Volunteer labour	1.1	2.1
School work	6.1	9.9
	41.5	41.5

Source: Richard and Nancy Ruggles, op. cit.

23/ Wendyce H. Brody, Research and Statistics Note, No. 9, Department of Health, Education and Welfare publication (SSA) 75-11701 (Washington, D.C., Government Printing Office, 1975).

24/ An estimate on similar lines was made by A. H. Shamseddine, "GNP imputations of the value of housewives' services", Economic and Business Bulletin, Summer 1968. His estimates show the imputed value of housewives' services in the United States falling from 29.5 per cent in 1950 to 27.3 per cent in 1960 and 24.1 per cent in 1964 - a result of the rising labour force participation rate.

51. These estimates distinguish between urban and rural residents and between households with and without children and they are also stratified by age of youngest child (which is an indicator of time necessary for child care). The imputed wages for housework are based on hourly market rates for the different components of a housewife's working day and for school work on average earnings in the appropriate age groups; the make-up of the day is derived from a collection of time-budgets.

52. The smaller addition to GNP than that given by Nordhaus and Tobin (see (a) above) may be due in part to the use of market rates for the component jobs which, as the Social Security Administration study (see (b) above) showed, appear to be much less than the average earnings of women used by Nordhaus and Tobin. However, both estimates concur in showing a significant decline during the post-war years in women's household work, due presumably to the rise in women's labour force participation rates; the NBER estimates compensate for this decline by showing a rise in "school work" that is not apparent in Nordhaus and Tobin.

53. The estimates given by Kendrick, it should be understood, are provisional results that are now being refined by the National Bureau of Economic Research. The data at current prices are also being deflated by factor incomes (without allowance for productivity changes).

(d) Japan

54. The NNW Measurement Committee derives its estimates for Japan 25/ from:

(a) The number of female houseworkers of 15 and over as shown by the Labour Force Survey (which classifies houseworkers separately from other non-active women);

(b) The average hours per week spent on housework by housewives (48.7 hours in 1960 falling to 45.6 in 1970); this is derived from a regular Survey of People's Living Hours (which appears to have begun about 1960);

(c) Average hourly wage earnings of females (in establishments employing 30 or more).

Houseworkers' services as percentage of official GNP

(Current market prices)

1955	1960	1965	1970
11.2	8.9	9.1	8.7

Note the small proportionate addition to GNP compared with the estimates for the United States quoted above. This is due partly to the restriction of the estimates to full-time housewives. But other differences are also important: the high labour force participation rate of women in Japan (52 per cent in 1970 for women of 15 plus, compared with 40 per cent in the United States; 26/ lower relative

25/ Measuring Net National Welfare of Japan, for data, see p. 170.

26/ This difference in female labour force participation rates may be partly explained by differences in age composition. For women of 15-64, the labour force participation rates are: Japan, 55 per cent; United States, 46 per cent. See Yearbook of Labour Statistics, 1974 (Geneva, International Labour Organisation, 1974), table 1.

earnings in Japan of full-time women as compared with men (average earnings of women in Japan about 51 per cent of men's, 27/ in the United States, about 55 per cent); 28/ in addition, the proportion of wages and salaries to total national income is much lower in Japan than in the United States. 29/

Comparative estimates

55. A paper by Oli Hawrylshyn 30/ compares eight calculations of the value of household activities for the United States, extending back to an estimate for 1919 by Wesley Mitchell. He attempts rough adjustments to get comparable coverage (bringing in all household members). He also emphasizes that earnings in the market should be imputed after deduction of income tax - a point that is ignored in most previous estimates.

56. The author's results, after these adjustments for coverage and for deduction of tax from imputed earnings where this is not done in the source, show a range, in spite of differences in the imputation methods, of between 30 and 40 per cent additions to GNP. The considerably higher estimates by Nordhaus and Tobin, quoted above, and the somewhat higher National Bureau of Economic Research estimates are both brought well within this range by the adjustment for taxes. The remaining gaps between the eight estimates are due principally to differences in the basis for imputation; on the whole the opportunity cost method (average earnings of women in the economy) gives rather higher figures, as might be expected, but the excess is much smaller than before tax adjustment; the other two methods (wages of domestic servants/housekeepers and the weighted pay rates for specific jobs) come fairly close to each other. The differences in the years for which the estimates were made (one for 1919, two for 1929 and the rest for 1964 to 1970) hint at some long-term decline in the proportion of household work to GNP; but if account is taken of the other divergences in estimation, this downward trend can hardly be taken as significant.

57. Estimates are also quoted for the United Kingdom of Great Britain and Northern

---

27/ Japan Statistical Yearbook, 1972 (Tokyo, Bureau of Statistics of the Office of the Prime Minister, 1972), p. 394. Data based on Monthly Labour Survey, for all establishments of 30 or over.

28/ Current Population Reports: Consumer Incomes, Series P.60, No. 97 (Washington, D.C., United States Department of Commerce, 1975). Data for 1973 relating to median incomes of year-round full-time workers.

29/ Compensation of employees as percentage of national income at market prices in 1970: Japan, 44 per cent; United States, 68 per cent. Yearbook of National Accounts Statistics, 1973 (United Nations publication, Sales No. E.75.XVII.2). The difference is partly due to the higher proportion of agriculture and self-employment in Japan; and it is uncertain how these have been dealt with in the Japanese imputation.

30/ "The value of household services: a survey of empirical estimates", Review of Income and Wealth (June 1976), pp. 101-132.

Ireland for 1956 31/ and Sweden for 1929; 32/ these fall at the upper end of the 30-40 per cent range.

58. Estimates for other countries have not come to hand. But there is reason to believe that they would show quite substantial differences, even among developed countries. As a very crude starting-point, we may note the widely differing rates of participation of women in paid employment, shown by the following selected figures from the 1970-1971 round of population censuses:

Percentages of women 15-64 recorded as occupied, 1970 or 1971

Czechoslovakia	64
Japan	55
United Kingdom	53
United States of America	46
Sweden	45
Netherlands	30

Source: Yearbook of Labour Statistics, 1974, (Geneva, International Labour Organisation, 1974), table 1.

59. These figures, incidentally, suggest that national differences in social tradition may play at least as important a role in women's choices between paid employment and home work as does economic calculation based on theories of comparative advantage or opportunity cost.

Conclusions

60. It is obvious enough that the valuation of productive household activities presents conceptual and statistical difficulties of a different order from those encountered in most elements of the national accounts. There are, it is true, other individual elements within the regular accounts, quite apart from the imputed elements, that are subject to large margins of uncertainty in practice, either because of incompleteness of the data (in the case of some items of consumers' expenditure and fixed capital formation, and stockbuilding) or because conventional or arbitrary methods of estimation are used (inventory valuation and stock appreciation, capital consumption). But the effect of these uncertainties on the measure of total GNP is hardly comparable in magnitude with that involved in the estimation of household activities. This is one reason for keeping any estimates of household activities in quite a separate compartment from the market and quasi-market activities recorded in the accounts. If a serious attempt is made to value productive household activities, the following three categories of data are needed.

31/ Colin Clark, "The economics of housework", Bulletin of the Oxford Institute of Statistics, May 1958. Clark uses a quite different base for imputation: the cost of maintaining an adult or a child in institutions (less goods purchased by the institution).

32/ E. Lindahl and others, The National Income of Sweden 1861-1930, University of Stockholm Institute for Social Studies (London, 1937).

Demographic data

61. The basic requirement is demographic data, generally from censuses of population, from which participation rates in paid employment can be derived. Such data can generally be carried back into past history. They may not, however, yield more than a rough approximation of the number of people engaged in household activities. Labour statistics, especially labour force surveys, may add information - or at least a starting point for assumptions - about part-time workers, the employment status of retired people, number of students etc. The collection of such information is illustrated in Towards a System of Social and Demographic Statistics; 33/ these illustrations also stress the importance of a distributional analysis of the "inactive" or the partly inactive, both by geographical areas and by sex and age, length of working hours, socio-economic class, ethnic origin, level of education etc.

Time-budgets

62. As is shown by the empirical examples quoted above, data on the allocation of time by various groups of the population are needed for any attempt to value household activity that is more than a rough approximation. Time-budgets are sample surveys generally based on diaries recording the amount of time spent by members of the household on various categories of activity (or inactivity). They serve, of course, a number of purposes besides the recording of productive household activities (e.g., the uses of leisure); their use for a variety of purposes in social and economic analysis is, again, illustrated in Towards a System of Social and Demographic Statistics. 34/

63. Time-budgets of differing quality have been collected for various purposes, but rather sporadically, since the 1920s; in the post-war period, the collection of time-budgets - both special-purpose and comprehensive - greatly expanded in many countries, particularly in the United States and in Eastern Europe. The development of a theory of the use of time as a form of allocation of resources owes much to the work of Becker. 35/ On the empirical side, the results of a remarkable international project were published in 1972 by Alexander Szalai; 36/ time-budgets in a standard form were collected with the assistance of statistical offices and research institutes in 12 countries (in Eastern and Western Europe, Peru, the Soviet Union and the United States).

64. Time-budgets are, no doubt, subject to various kinds of bias on the part of the respondents. Household expenditure budgets, which are used extensively in the compilation of national accounts, are also subject to bias. It is true that household estimates of expenditure or of income can often be checked in the aggregate from other sources of information and that this cannot easily be done for

---

33/ Towards a System of Social and Demographic Statistics, para. 18.57 and table 18.1, sects. A, B and D.

34/ Ibid., paras. 15.39-15.53 and table 15.1, sect. A.

35/ "A theory of the allocation of time", Economic Journal, vol. 75 (September 1965).

36/ A. Szalai, ed., The Use of Time, (The Hague, Mouton, 1972). Some results of this study for the European Co-ordination Centre for Research and Documentation in the Social Sciences are summarized in Towards a System of Social and Demographic Statistics, chap. XXVII.

time-budgets. 37/ If the rather uniform results shown by the 12-country collection of time-budgets - for instance, the quite general finding that full-time housewives report about the same time on household duties as employed men spend at work (including travel to and from work) - should be looked at with a sceptical eye, it could also be remarked that the stated hours of many paid employees conceal a good deal of variation in work performed. This does not render unacceptable the statistical records of labour productivity, although it may indicate margins for increasing productivity.

65. Thus the quality of the demographic and time-use data for calculating the volume of unpaid household activity need not be much inferior to that of many other sources of information used in national accounting.

Value imputations

66. Value imputations, as is shown by the examples cited above, raise questions not so much of data (at least for countries with comprehensive statistics of occupational earnings) as of determining what kind of earnings to impute. It does not seem wholly impossible to arrive at some agreement among those concerned on a convention, in view of the increasing interest in the problem. To reach a consensus need not be more difficult than in the cases of other international agreements which caused difficulties in their time (e.g., the definition of fixed capital formation or the classification of consumer expenditures).

67. The possible bases are, in principle, three: the average earnings in the economy as a whole (or in the geographical area if there are significant differences); the market earnings for the specific jobs that make up household work; or the market earnings for people who are believed to cover the whole range of household activity (housekeepers or domestic servants).

68. If the purpose is to measure the value of production of goods and services by market analogy, the first basis - opportunity cost - seems inappropriate. It may measure the alternative opportunity for the full-time housewife (or student); but the fact is that the housewife has not in fact chosen that alternative. The third basis - the pay of a domestic servant or housekeeper - is inappropriate in that people in such occupations do not in fact cover the whole range of household activities; the market for professional full-time mothers is in most countries a very limited one. The second basis, the weighted average of market pay for the mix of household activities, despite its defects, is the method adopted in the deeper studies undertaken recently and fits well into the framework of time-budgets. It seems to come nearest to the concept of valuing the actual production of goods and services in the home. And from the point of view of international comparisons and consistency with existing national accounts it is closest to the methods generally adopted for valuing food production for own account or the rental values of owner-occupied dwellings.

69. A general conclusion for developed countries may be that estimates of the imputed value of productive household activities can serve a useful purpose in

---

37/ It should, however, be possible to test their consistency with the normal statistics of working hours if the latter are sufficiently comprehensive (often they are not).

helping to explain long-term changes and international differences in GNP. But the aggregate of such activities in terms of money contains so many elements that by itself it can explain little. It is essential that if such an aggregate is displayed it should be accompanied not only by a clear explanation of the methods used but also by an account of the main non-monetary data (the social and demographic statistics) from which the aggregate is derived.

70. For an international comparison of the monetary values, the solution most comparable to that used in the United Nations International Comparison Project 38/ would presumably be to use as "prices" the wages in the occupations selected for imputation. This would mean in effect comparing the inputs of man/woman hours, (weighted, if worth while, by the different occupational wages used). Comparisons between the quality of the activities are clearly impossible. The same difficulties, of course, arise for many other service activities for which output measures are not available in comparing international purchasing powers. The results could not be regarded as accurate and would in themselves add little - except the convenience of using money as a common unit - to the simple comparison of man/woman hours.

71. It is not suggested that refined methods of estimating productive non-market activities within the household, other than food production etc., are particularly important at this stage for developing countries. The collection of the basic demographic data about participation in economic activity is already difficult enough to organize, especially in rural societies; and it clearly carries a much higher priority than does the collection of comprehensive time-budgets. Much more important is the collection of data more directly related to labour utilization. 39/

Leisure activities

72. The measurement of productive household activities is extended by some to the measurement of activities in leisure time. Conceptually, leisure activities share with housework the characteristic of being use of time alternative to production for the market. The methods of estimating leisure time can be the same as for housework (mainly time-budgets); and the ways of imputing a value can be very similar. Moreover, the overlap of activities is considerable; anyone completing a time-budget questionnaire must have difficulty in making an honest allocation at the margins (does one walk to work to enjoy the fresh air or to save the bus fare?). The classification must thus be arbitrary (but in this resembling some classifications in ordinary commercial or national accounting for which acceptable conventions have been devised). The qualitative importance of increased leisure (or reduced working hours) as a factor to be taken into account in assessing differences in income per head - between periods of time or between countries - is obvious enough. Normally, comparisons are made simply by using the usual data of hours of work. Such data often have a restricted coverage: they may relate only to manual workers or only to factory work; and it is rare, even in statistically advanced countries, to find comprehensive data about holidays (paid and unpaid)

38/ Irving B. Kravis and others, A System of International Comparisons of Gross Product and Purchasing Power (Baltimore, Md., Johns Hopkins University Press, 1975).

39/ As illustrated in "Social and demographic statistics: framework for the integration and analysis of social and demographic statistics in developing countries" (E/CN.3/490).

and time lost through sickness etc. from which a good figure (as distinct from a rather impressionistic estimate) can be built up for the length of the average working year.

73. In Towards a System of Social and Demographic Statistics, 40/ series are suggested for (a) average hours worked per week and (b) proportion of workers receiving paid holidays of different lengths. From such data, estimates of the average length of the working year could be compiled.

74. Time-budgets, also illustrated in Towards a System of Social and Demographic Statistics 41/ could considerably refine estimates of leisure time based simply on working time since (a) time-budgets can make distinctions between different socio-economic groups that are not so easily available from ordinary labour statistics and (b) the element of leisure time can be distinguished from household activities or travelling to and from work as well as from time spent on sleep, personal care etc. even if, as suggested above, the distinctions are necessarily somewhat arbitrary or even subjective. Thus, time-budgets that show the time spent on household work by women who are also in paid employment or that show differences in time spent going to and from work can be useful correctives to any easy assumption that a reduction in working hours is an adequate measure of the increase in leisure - much less of the welfare derivable from leisure. Furthermore, data on the amount of leisure time of and on the activities on which leisure-time is spent by various groupings of people can help in forecasting expenditure patterns, travel patterns etc. and are so used in planning and market research. 42/

75. The imputation of a value to leisure (apart from the expenditure on leisure-time activities that are - in a rather limited way - derivable from national accounts) raises more difficult questions. In particular, the choice between leisure and work, for paid employees at least, is not quite so free as the consumers' choice between butter and margarine. For most people, the hours of work are institutionally determined. In a very broad sense, however, it can be said that a declining trend in working hours represents a kind of collective choice of more leisure in preference to more pay. It can be suggested, for example, that in a rapidly developing country where long hours are worked but where GNP per head is now reaching high levels, social pressures are very likely to reduce working hours so that a slowing down of the growth rate of annual output may be forecast. 43/ Another problem is the treatment of enforced leisure (i.e., unemployment). No one would offset, hour for hour, a decline in output accompanied by loss of wages and unemployment against the corresponding increase in leisure of

---

40/ Towards a System of Social and Demographic Statistics, table 18.1.

41/ Ibid., chaps. VIII, XV and XXVII.

42/ The early development of time-budgets in Eastern Europe owes much to their intended value as information for social and economic planning. In the market economies, they have been developed partly for urban and transport planning and in the form of listener research by radio and television organizations.

43/ Measuring Net National Welfare of Japan, p. 89, refers to "the typically low Japanese evaluation of leisure" and adds "it is expected that a tremendous change in value judgement on leisure will take place in Japan hereafter".

the unemployed. This can be surmounted by attributing a zero value to normal working hours for the unemployed. 44/ (All the same, the value of the remaining leisure to an unemployed man is hardly the same as to a normally employed man.)

76. It is recognized that increased leisure, due to shorter working hours, carries extra costs. It means, normally, reduced use of capital capacity not likely to be fully offset by any increase in hourly factor productivity. However, this effect is in principle reflected in the normal national accounts, other things being equal, by a rise in prices or a reduction in factor rewards.

77. Two estimates of the imputed value of leisure may be cited:

(1) United States. Nordhaus and Tobin base their bench-mark estimate of leisure time on the same set of time-budgets for 1954 as that which they use for valuing household work (see para. 45 above). The amount of leisure time (48 hours a week for men, 50 hours for women, taking people of 14 and over only) is extrapolated to other years using statistics of average working hours. The value imputed to leisure time is average earnings (allowing unemployed people the same amount and value of leisure as the employed). For estimates at constant prices, the same alternative deflations as for housework are given.

Valuation of leisure time as percentage of GNP

(Current prices)

1929	1947	1958	1965
87	116	124	113

The resulting imputation for leisure, as well as being about as large as the GNP itself, is twice as large as the imputation for household work (the average number of hours of leisure being put at slightly more than the average hours of housework for women and at three times more for men).

(2) Japan. The measure of "net national welfare" compiled by the NNW Measurement Committee 45/ includes an imputation for the value of leisure time. Hours of leisure are based on the regular survey of people's living hours, classified by age and sex and distinguishing employed from non-employed. However, an interesting refinement is introduced. The starting-point for imputation is the average wage for each age-group and sex. 46/ But the value of a leisure hour in relation to the appropriate wage is differentiated between age-groups, between males and females and between employed and non-employed. The differentiation is derived from a single sample survey (conducted by a newspaper in 1971) which asked, among other things, how much pay the respondent would ask to do an extra hour's work. The significant feature of the results is that the marginal value of

---

44/ The same applies to changes in the amount of overtime worked. A reduction in overtime may mean a preference for leisure; it can also indicate an improved organization of production or a decline in demand.

45/ Measuring Net National Welfare of Japan, pp. 83 ff. for general discussion and 160 ff. for description of data.

46/ Ibid., p. 163. Note that in seniority-conscious Japan, wages rise very steeply (for men more than for women) with age. Men's average earnings reach a maximum at age 40-49, nearly two thirds greater than at 20-29.

leisure, even as a proportion of average wage for the age-group (a kind of supply curve of labour against pay), falls quite steeply and regularly with age. This differentiation is embodied in the imputation. 47/ Perhaps because of probable bias in the responses about the actual level of extra pay asked, the Committee assumes that in the youngest age-group, where people are thought to have the greatest freedom of choice, the price of an hour's leisure can be put equal to the average hourly wage; for older ages, the price of leisure therefore falls below the wage. The Committee also assumes that the valuation of leisure relative to wage has increased over time. 48/ The results of these processes are as follows: 49/

Leisure hours as percentage of official GNP

(Current market prices)

1955	1960	1965	1970
7.0	6.1	6.8	8.6

78. The very much smaller figures, in relation to GNP, than those given by Tobin and Nordhaus for the United States seem to be mainly due to the much smaller amount of time classified as "leisure" in Japan (apparently only about 600-700 hours a year for men of working age and 200-300 hours for women, against the figures of about 2,500 for both men and women used by Nordhaus and Tobin, for the United States). 50/

79. Conclusion. Estimates of the changing amounts of leisure and of the ways in which it is used, classified by sex, age and socio-economic group, are of considerable interest and can be useful both for various kinds of policy and for analysis. These requirements call for rather specific data of the kind best derivable from time-budgets.

47/ The minimum for men, at age 55-59, is less than half that at ages 15-24.

48/ The assumption is based on age-cohorts: the relative valuation of leisure in 1970 by five-year age-groups is applied to the group five years younger in 1965 etc.

49/ Towards a System of Social and Demographic Statistics, p.162.

50/ "Leisure hours" in the Japanese study are the hours not spent in "sleeping, eating, private matters, work, studying, housework, rest, social intercourse, movement, reading newspapers, doing something while watching TV or listening to radio". This is much more restricted than the United States time-budgets as used by Nordhaus and Tobin, who simply take as "leisure" the hours between 6 a.m. and 11 p.m. not spent in gainful work, "cost of work" (presumably travelling) or "personal care". But the available descriptions of the data do not make it clear how rest days etc. are dealt with in the basic data. Unfortunately, Szalai's The Use of Time does not include any figures for Japan; however, for none of the 12 countries for which he gives comparable figures are the amounts of "free time" so small as are the figures quoted here for Japan.

80. if more extensive use is to be made of time-budgets for international comparison, some uniformity of the classifications and definitions is badly needed, particularly for the definition of leisure. The examples just summarized show how misleading comparisons can be when differing definitions are used. However, it may be felt that a need that is even more urgent but that is related and that is probably simpler to meet is the improvement of statistics of working hours over the year. Knowledge of changes over time or of differences between countries in the length of the working year have the more direct bearing on the interpretation of differences in productivity.

81. The monetary valuation of leisure hours has its interest. Granted certain philosophical assumptions and allowing for a large element of arbitrariness in their application, imputation need not present great difficulties of calculation. But its usefulness seems to be limited. And because most leisure-time activities (although there are marginal exceptions) are less clearly analogous to market activities, the meaning of the imputations for leisure must be a great deal more ambiguous than is the meaning of imputed values for what we have called productive household activities.

Instrumental expenditures by households

82. The complexities of an advanced society impose on households a large number of costs that may be regarded as "regrettable necessities"; the expenditure undertaken, which figures in GNP as consumers' expenditure and adds to final product, is really a necessary cost of the particular pattern of society and would never be undertaken for its own sake. As is often pointed out, it is impossible to draw a philosophically tenable and statistically applicable dividing line between expenditures that are means to some other end and expenditures that are ends in themselves. Eating (some of it) can be regarded either as a final satisfaction or as a means of self-preservation (do we eat in order to work or work in order to eat?). Clothing may be a means of keeping warm or of satisfying social conventions or of satisfying the need for display etc. The distinctions are not quantifiable.

83. However, there are certain categories of expenditure that may seem to be more obviously than others simply means to an end. Both the Nordhaus and Tobin study for the United States and the Japanese study already described attempt some limited estimates for household expenditures which they deduct from consumers' expenditure and from GNP in arriving at their computation of "welfare".

84. Nordhaus and Tobin make a very notional and provisional estimate of costs of commuting to work, which they take as a clear case of a regrettable necessity. Their estimate is arrived at simply by taking one fifth of total personal expenditure on transport. They add an estimate for "personal business expenses". The two estimates together give a deduction of 7 or 8 per cent from the official figure of personal consumption expenditure.

85. The Japanese estimate is more refined. 51/ First, as in Nordhaus and Tobin, certain actual costs are deducted from consumers' expenditure. These are: (a) commuting expenses (based partly on railway statistics for season tickets,

---

51/ Measuring Net National Welfare of Japan, pp. 139 ff. and 190 ff.

partly on household expenditure surveys) and (b) estimates of "personal business expenses", including some legal fees and some services of financial institutions; in addition, a quite elaborate estimate is derived from household expenditure surveys of what are described as "ceremonial expenses" which appear to be regarded as a social necessity. In addition, a deduction is made by imputation for "losses due to urbanization". Commuting comes in once again - but now as an imputed loss of time. (Daily travel to and from work in excess of 30 minutes each way, for employees in cities above 300,000, is given an imputed value equal to the average wage.) To this is added a (relatively small) estimate for the cost of traffic accidents (deaths by a "value of life" figure; injuries by average insurance compensation).

86. A number of theoretical points arise from these types of estimates which need not be gone into in detail here. The question may be raised, for instance, whether high costs of travel to work may be offset by the lower costs (and greater amenity) of living at a distance from the workplace. It may also be suggested - from the point of view of international comparison - that time lost in travel to and from work is by no means a peculiarity of urbanized societies. In many rural societies - depending on the patterns of land tenure - farmers and farm workers can spend many hours a day, on foot or otherwise, in going to and from the field. 52/ Might a similar reckoning for some peasant societies result in relatively bigger deductions for "costs of rural life" than those suggested for cities?

87. These various deductions for Japan, for 1970, are as follows:

Percentages of GNP, 1970, current prices

Deductions from official figure of consumers' expenditure:	
Commuting expenses	0.2
Personal business (including ceremonial) expenses	2.4
	2.6
Losses due to urbanization:	
Commuting	1.1
Traffic accidents	0.6
	1.7

88. This discussion of instrumental household expenditures has been restricted to regrettable necessities. A more important issue arises. Current expenditures on education and perhaps on health services perform a different function from most forms of consumption. Some authorities hold that educational and health expenditures, whether private or public, should be regarded as developmental or

52/ See, for example, the description of peasant life in southern Italy in the 1930s in Silone's Christ Stopped at Eboli.

investment expenditure rather than as consumption. The difficulty is that, although these expenditures certainly yield a long-term return, it is hard to quantify the return in a convincing manner. This point is taken up in the discussion of valuing "human capital", paragraphs 179 ff.

89. However they are treated, the essential thing is that educational and health expenditures should be separated in the accounts for household expenditure. Although this separation is provided for by SNA, it is by no means always done in practice. The need for such a separation is particularly felt if it is desired to estimate "total consumption of the population" by combining private with public expenditure on certain functions (as described in chap. III, especially paras. 118 ff.). That concept urgently requires the application of a common classification of public and private expenditures at least in respect of education and health - whether they are to be treated as investment or as current outlays.

90. The importance of showing separately the expenditures by households on education and health tends to be ignored simply because in many countries the amounts are small items in total household expenditures (and often difficult to identify). But the data are badly needed for international comparisons since the proportions of public and private expenditure vary quite widely between countries according to institutional arrangements.

Enterprise subsidies to households

91. Enterprises make two kinds of expenditure that may be regarded as supplements to the value of household consumption but are not so regarded in SNA.

(1) Forms of "income in kind" to employees. The SNA recommendations and normal national practices exclude expenditure by firms on medical and recreational facilities and social services, treating them, like business travel and entertainment, as inputs into production and as being undertaken for the benefit of the enterprise as well as of the employees. In a set of more detailed proposals for the analysis of enterprise expenditure by purpose, the Secretariat suggests that "outlays on employee welfare, morale and upgrading" should be separately distinguished as a special category of intermediate inputs. 53/

(2) A second category of enterprise expenditures, also normally treated as inputs since undertaken for the benefit of the enterprise, is the financing by advertising of newspapers, radio and television programmes etc. Such expenditure reduces the cost of newspapers, radio and television programmes to the general public (although such services are covered by the selling price of the products advertised). 54/

53/ "Draft classification of outlays of industries by purpose" (COIP) (ST/ESA/STAT.83). This is a provisional classification for discussion. Among other categories proposed are research and development costs and costs of pollution abatement and control (see chap. IV below).

54/ The draft COIP includes an item for "sales promotion" in general.

92. It is often suggested that such categories of enterprise inputs should be separately distinguished so that they could, if desired, be treated as additions to the value of household consumption.

93. For the United States, the National Bureau of Economic Research is engaged in estimating such expenditures as part of its project on "The measurement of economic and social performance". Some preliminary estimates from the project put the amounts concerned (in 1969) at 1.5 per cent of GNP for expenditure for employees and 0.8 per cent for the general public (para. 91 above). 55/

94. No similar estimates for other countries have come to hand. But it is relevant that French statistics of industrial capital expenditure distinguished until 1967 between "productive" and "social" investment; 56/ in 1964, the Statistical Office of the European Communities invited all member countries to observe this distinction in their investment records for Community purposes. However, this proved impracticable for several countries and the distinction was abandoned. 57/

An alternative treatment for durable consumer goods

95. It has often been suggested that it would be appropriate to extend the capital account of the household sector - now limited, so far as purchases of tangible assets are concerned, to dwellings and assets of unincorporated businesses - to include purchases of consumer durables such as vehicles and household appliances. 58/ Such purchases would then be excluded from consumers' current expenditure and replaced by some imputation for the services annually provided by the durable goods (a kind of "rate of return", analogous to the imputed rental value of owner-occupied dwellings, which would also be added to household incomes).

96. One formal advantage would be to remove the apparent inconsistency between the treatment of owner-occupied dwellings and that of other durable consumer goods. But apart from the normally much longer life of dwellings, the present treatment can be justified by the fairly wide market for rental dwellings (even if it can be considerably distorted by rent controls or special fiscal treatment of owner-occupation); information is also available on borrowing costs and maintenance costs for house-purchase; from these data, imputations of rental values can be derived without departing too far from financial realities. The information for imputing rental values to cars, household appliances etc. exists but is much more restricted.

55/ R. and N. Ruggles, op. cit.

56/ "Social" investment being canteens, recreation facilities, housing etc. for employees.

57/ See Annual Investments in Fixed Assets in the Industrial Enterprises of the Member Countries of the European Communities, 1970-1972 and 1964-1970, Statistical Studies and Surveys 2/1974 and 2/72 (Luxembourg, Statistical Office of the European Communities, 1974).

58/ An estimate for Sweden, made in 1930, is reported by Paul Studenski, op. cit., vol. 2, p. 19.

97. More important, however, is the presumption that the understanding of trends and fluctuations in consumers' expenditure and saving patterns would gain from a separation of outlays on durables, which have some characteristics of an investment decision, from outlays on other goods and services. Thus Goldsmith's estimate of trends in the personal savings ratio in the United States in the first half of the century, treating outlays on durables as consumption, surprisingly showed no significant increase in the savings ratio and even the probability of a decline. When expenditures on durables were deducted from consumption and added to saving, Goldsmith was able to show at least that the savings ratio was not declining. 59/

98. These reasons may not justify the amount of rather dubious imputation required by the alternative treatment. The change would also disturb application of the extensive analyses of consumer demand patterns that have been built upon the present system. However, there are good reasons for analytical experimentation with alternatives.

99. The alternative treatments need first an estimate of the stock of consumer durables and secondly a reasonable method of imputing the annual value of the services that they render.

100. The stock of consumer durables can be estimated either by the perpetual inventory method or by data from household surveys or market research surveys indicating the proportion of households holding specified durable goods (but not, as a rule, their present value). For historical data, the perpetual inventory method would normally have to be used; this requires estimates of average life and, if a net stock concept is used, of depreciation rates.

101. A number of stock estimates based on the perpetual inventory method have in fact been made, especially for the United States where they derive largely from the original work of Goldsmith. One estimate for 1968 puts the total value of consumer durables in national wealth at $234 billion (current prices), 7.6 per cent of total national wealth. 60/ A preliminary estimate for the United States from the NBER project puts the value for 1969 (in current prices) at $261 billion (9.3 per cent of a conceptually somewhat different estimate of national wealth). 61/ The Japanese study estimates the stock of consumer durables, including cars, from surveys of household assets for bench-mark years (1955 and 1970), interpolated by annual purchases and assumed lengths of life. 62/

59/ R. W. Goldsmith, A Study of Saving in the United States (Princeton, N.J., Princeton University Press, 1955), p. 83.

60/ Statistical Abstract of the United States, 1974, p. 400, described as an updating of Goldsmith's estimates. Estimates of capital stocks for business have been made for several years by the Department of Commerce; it is understood that official estimates of consumers' capital are in progress.

61/ R. and N. Ruggles, op. cit.

62/ Measuring Net National Welfare of Japan, p. 155 ff. The average length of life of all the items considered is assumed to have fallen from 20 years in 1955 to 5 years in 1970, "due to the changes in products and life styles with the development of a consumption society".

102. For several countries, information is available about the stock of certain consumer durables or at least about the proportion of households owning them. 63/ From such data it would be possible, but venturesome, to make estimates - but only very rough estimates - of the value of such assets.

103. Recognizing the need for fuller estimates of household assets, the Statistical Commission at its eighteenth session approved provisional international guidelines for the establishment of balance-sheets in the framework of SNA 64/ including a supplementary table (para. 8.34 and annex VIII.3) showing:

Opening stocks;

Final consumption expenditure (defined as in SNA);

Reconciliation:

Depreciation and obsolescence;
Revaluation due to price changes;
Other;

Closing stocks;

for each of the following items:

Furniture, fixtures, carpets and other floor coverings;

Heating and cooking appliances, refrigerators, washing machines and similar major appliances, including fittings;

Motor-cars, trailers and caravans; motor cycles and bicycles;

Wireless and television sets and gramophones;

Photographic equipment, musical instruments, boats and other major recreational durables.

104. It may be noted, also that the guidelines of the Council for Mutual Economic Assistance for the construction in national wealth estimates in centrally planned economies also propose the inclusion of consumer goods, although (as in market economies) estimates are in practice made by few countries (see E/CN.3/461). The definition of such assets is wider than that generally used in market economies. It covers, in principle, all goods with a life of more than a year; thus the proposed list includes many articles of clothing.

63/ See, for example, Statistical Abstract of the United States, 1973 (Washington, D.C., United States Bureau of the Census, 1974), p. 332 (including estimates of holdings according to income groups); Annuaire statistique de la France, 1974 (Paris, Institut national de la statistique et des études économiques, 1974), p. 552; Annual Abstract of Statistics, 1974 (London, United Kingdom Central Statistical Office, 1974), p. 324.

64/ Provisional International Guidelines on the National and Sectoral Balance-sheet and Reconciliation Accounts of the System of National Accounts (United Nations publication, Sales No. E.77.XVII.10).

105. Towards a System of Social and Demographic Statistics suggests the compilation of series on the proportion of households having certain types of durable goods, divided by income, socio-economic class etc. 65/

106. Estimating the annual value of services rendered by consumer durables requires an estimate of length of life (corresponding to that required for a stock estimate based on perpetual inventory); if an estimate of net value is proposed, some figure of the depreciation/obsolescence rate must be assumed. A rate of interest should be imputed to correspond with the return on other (e.g., financial) investments. 66/ The preliminary estimates for the NBER project for the United States give imputed rentals for consumer durables, in 1969, of $106 billion, 67/ which is not very different from the actual purchases in that year ($91 billion in 1969, as recorded in the national income and product accounts). Year-to-year fluctuations in purchases are likely, of course, to be much more volatile than the imputed services of durable goods. The alternative treatment transfers the fluctuations in expenditure from consumers' expenditure to their capital account - which has both merits and drawbacks for analysis.

107. For the Japanese estimates, the assumed stock (based on assumed lengths of life) is depreciated annually at 5.5 per cent a year (the rate of interest on time deposits) and this depreciation is taken as a measure of annual services. Because of the very rapid increase in the stock of durables at constant prices (the estimated net stock increases by about 10 times from 1960 to 1970) and also because of the assumption of diminishing lengths of life, the ratio of imputed services to actual expenditure rises very rapidly - from 54 per cent in 1960 to 88 per cent in 1970. 68/

108. The alternative treatment thus has an important effect on the trend in durable consumer goods but very little on the trend in total private consumption.

65/ Towards a System of Social and Demographic Statistics, table 13.1.

66/ The appropriate rate of interest may be taken to represent the opportunity cost of purchasing durables. It may be related to the "true" interest charge in hire-purchase finance or to rental charges in the market (particularly for cars); but both would for many reasons give unrealistically high rates. Perhaps the rate on medium-term bonds is as good as anything. The interest actually paid through hire-purchase should be deducted. For a discussion see F.T. Juster, Household Capital Formation and Financing 1897-1962 (New York, Columbia University Press, 1966).

67/ R. and N. Ruggles, op. cit., p. 18.

68/ At constant prices. Measuring Net National Welfare of Japan, pp. 158 and 159.

Alternative treatments of consumption of durables

	1960	1970	Ratio of 1970/1960
	(billions of yen, 1970 prices)		
Total private consumption, official a/	15,766	37,585	2.4
Less expenditure on durables	358	2,912	8.1
Plus imputed services of durables	195	2,551	13.1
Alternative total consumption	15,603	37,224	2.4

a/ NNW estimates plus items deducted from official estimates (expenditures on consumer durables, commuting expenses and personal business expenses).

109. In conclusion, it may be said that the arguments for changing the present system of recording actual expenditures on consumer durables do not seem persuasive. But in addition to actual expenditures:

(a) The regular compilation of estimates of total stocks of consumer durables, by surveys and/or the perpetual inventory method, should be promoted as a practical instrument for improving the analysis and forecasting of expenditure patterns of households and for more illuminating international comparisons;

(b) There is room for more discussion of the methods of imputing values both to stocks of durables and to the annual values of services rendered, with a view to agreement on conventions that could be followed in analysis and that could be used for comparisons of research results.

Chapter III

INTERMEDIATE AND FINAL EXPENDITURES OF GENERAL GOVERNMENT

110. The argument about which government activities are truly final products and which are intermediate or instrumental activities directed only to maintaining the functioning of the whole social and economic apparatus is as long-standing as the argument about the inclusion in national product of housewives' services.

111. The convention now accepted in SNA and by most market economies is to treat all government expenditures on goods and services as final products. 69/ In addition to the argument about "finality" of such expenditure, two criticisms are commonly raised. First, certain kinds of current expenditure, e.g., current costs of research and development or outlays on pollution control, are treated as final expenditure when carried out by government but as intermediate inputs when carried out by enterprises - introducing an apparent inconsistency. Secondly, for much government expenditure there are no appropriate units by which output can be measured; hence, for estimation of output at constant prices the government contribution must be reckoned in terms of the quantity of input of factors (mainly numbers employed). Only national estimates of productivity can be introduced and these differ from country to country. (The same applies, of course, to some private services.) This difficulty in measuring output is outside the scope of this paper but it can be used as an argument for excluding the services concerned from measures of real product.

112. Among the objections to a change of practice are: (a) the general objection, to which a good deal of importance is attached in this paper, that significant changes in treatment and hence in the major magnitudes of the existing accounts are damaging to public use of the data and disrupt the analytical structures built on the accounts - as well as being expensive to execute; (b) if some government services are excluded from final products, the amounts concerned must be treated in one of three ways; they must be omitted from output (treating the factor returns as a redistribution, as with non-material services in the Material Product System) or reallocated by imputation between the sectors, industries etc. deemed to benefit from them (this treatment would not only involve very substantial imputations but would also remove further from perceived realities the production accounts of industries) or be allocated to a dummy industry fictionally established to receive them - which seems a superfluous and inconvenient complication, difficult for the non-specialist to grasp. 70/

113. But the even greater difficulty would probably be that of securing agreement - internationally or even among any group of national experts - about which government services are to be regarded as intermediate and which (if any) as final. A change in practice would thus run the risk of a further disturbance to international comparability. An account of earlier views on the treatment of government services is given by Studenski. 71/ To illustrate more recent views,

---

69/ The French exclude general administration services and financial services from the concept production intérieure brute but include them in produit national brut.

70/ True, this procedure is adopted in SNA for the financial services of banks etc.; but in that case the amounts concerned are much less important.

71/ P. Studenski, op. cit., vol. 2, p. 17.

accompanied by empirical estimates, we may return to the Nordhaus and Tobin estimates for the United States and the "net national welfare" estimates for Japan.

114. Nordhaus and Tobin propose the following reclassification of United States general government expenditures: 72/

	Billions of dollars in 1965 (1958 prices)
Public consumption	1.2
Public investment (gross)	50.3
"Regrettables"	47.6
Intermediate goods and services	15.6
	$114.7

115. "Public consumption" is very narrowly restricted - to the postal service and recreation. Public investment covers education, health and hospitals, housing, commerce, transport, conservation and development of resources, agriculture and one half of atomic energy development. Under SNA treatment, a proportion of these items would anyway figure as government investment (it will be remembered that in the United States national accounts no distinction has hitherto been made between the current and the capital expenditure of government); but Nordhaus and Tobin include the whole of, e.g., education on the grounds that it can be regarded as raising productivity. "Regrettables" include most of the expenditures that would figure as government current expenditure in SNA: national defence, space research and technology, international affairs and finance, veterans' benefits and the other half of atomic energy on the ground that these items "in our judgement do not directly increase the economic welfare of households". "Intermediate goods and services" cover general government, sanitation and civilian safety - "the costs of maintaining a sanitary and safe natural and social environment". In the contributions to the "measure of economic welfare" are included only "government consumption" and (corresponding to the treatment of consumer durables) an imputed value for the services of the capital stock derived from the forms of investment specified under "public investment (gross)" in paragraph 114. Taken together, these two items amount to 8 per cent of official GNP (1958 prices) as compared with 18 per cent for government purchases of goods and services in the official accounts.

116. The Japanese estimate 73/ also proceeds by a reclassification of national accounting data on general government expenditures by function; but it includes "education and culture", "health and hygiene" and "social welfare" as public consumption in the estimate of national welfare. Nearly all other items of current expenditure, among them defence, are excluded as "instrumental". As in the Nordhaus and Tobin estimate, no item for investment as such appears in Japanese aggregate "welfare" but imputed annual services of certain government capital stocks "related to livelihood" are included; 74/ the main ones are the tobacco and salt monopoly,

---

72/ Nordhaus and Tobin, loc. cit., p. 27. The figures are derived by a rearrangement of the functional classification of federal, state and local government expenditure given in the United States national income and product accounts.

73/ Measuring Net National Welfare of Japan, pp. 132 ff.

74/ Annual depreciation calculated at 8.2 per cent of net stock plus interest rate of 6.5 per cent a year (interest in local bonds). The stock data are drawn up by the agency.

the postal service, the forestry administration and the Electric Development Corporation. Other government assets such as the railways and the speedway corporations are regarded as "production-related" and the annual services regarded as inputs into production. Government consumption plus the imputed services of "livelihood-related" government capital come to 5 per cent of official GNP; in the official national accounts, government consumption of goods and services plus fixed capital formation amount to 17 per cent of GNP 75/ (figures for 1970 in current prices).

117. These reclassifications illustrate the considerable size of the adjustments involved. But they serve to indicate also the inevitably subjective nature of any such rearrangement. Moreover, the rearrangement necessarily depends on the extent of detail in the existing government accounts. The classification of government expenditures by purpose recommended in SNA is a relatively aggregative one, with nine one-digit categories. 76/ Yet this has apparently been found impossible to complete in full by a considerable number of countries, even by several statistically advanced countries. 77/ For a variety of reasons of national as well as international analysis, in addition to the kind of analysis discussed above, more detailed classifications of government activities seem essential (e.g., for comparison of anti-pollution activities, discussed elsewhere in this paper). The Statistical Office of the United Nations has, indeed, put forward in draft a very much more detailed purpose classification than that in SNA (E/CN.3/479). This is an area of national accounting that is certainly in need of active promotion.

Total consumption

118. One purpose for which a closer analysis of government expenditure is needed - and one that is related to the discussion above - is the proposal for applying the useful and welfare-related aggregate of the "total consumption of the population". This aggregate (which in a somewhat different form is one of the major aggregates in the Material Product System) 78/ brings together:

(a) Consumers' expenditure on goods and services as defined in SNA (including imputed items);

(b) Current expenditure on goods and services of general government attributable to households (such as education, health services, welfare services);

(c) The value of subsidies paid by general government on goods and services attributable to households;

(d) Current expenditure on goods and services by enterprises 79/ and non-profit-making bodies attributable to households.

75/ As reported in Yearbook of National Accounts Statistics, 1972, vol. I, (United Nations publication, Sales No. E.74.XVII.3).

76/ A System of National Accounts, table 5.3.

77/ As shown by a glance through the Yearbook of National Accounts Statistics, 1974, (United Nations publication, Sales No. E.75.XVII.5). This is not necessarily because detailed expenditure statistics are lacking but presumably because the categories in which data are available are too diverse to fit into even a simple uniform functional grouping.

78/ It is restricted to goods and material services in MPS.

79/ See paras. 91-94 above.

119. The introduction of "total consumption of the population" as a series complementing SNA is recommended in Provisional Guidelines on Statistics of the Distribution of Income, Consumption and Accumulation of Households 80/ and discussed in Towards a System of Social and Demographic Statistics. 81/ As suggested above, the usefulness of this combination of "consumption" categories is greatly enhanced if the private expenditure of households as well as public expenditure shows separately those categories that are provided both out of private expenditure and out of government expenditure (see also chap. II, paras. 88 ff.). Only then is it possible to compile such important aggregates as total expenditure on such welfare-related categories as health, education etc. This is, of course, provided for in SNA but is by no means always provided in practice.

120. It is true that there may be considerable statistical difficulties in establishing private expenditure 82/ on such services as education and health, especially in mixed systems where the bulk of expenditure falls on public provision and private expenditure is consequently fairly modest. Yet approximations should be possible from household expenditure surveys. If the information collected for national accounts is to be used more effectively for welfare measurement and for international comparisons of specific elements in welfare such data are essential.

121. The concept of total consumption is used in the International Comparison Project (ICP) 83/ as a basis for comparison of consumption "invariant to institutional differences in the ways in which nations finance expenditure on health, education and like areas". The results for the countries included in the first phase of ICP are summarized below. In each case, the ICP figure of total consumption of the population is compared with the SNA figure of consumers' expenditure, both expressed in comparable purchasing power (Fisher "ideal" indexes). The differences are accounted for by "government components of final consumption expenditure of population". The major categories of "government components" are:

Rent subsidies;

Medical supplies;

Services of doctors, dentists, nurses;

Hospitals;

Entertainment and recreation;

Education (teachers, educational books and supplies). 84/

122. The authors observe that the necessary data for both government and private expenditure were not always available in published sources and were obtained by special inquiry.

80/ United Nations publication, Sales No.E.77.XVII.11, paras. 1.6 and 5.7-5.11.

81/ Towards a System of Social and Demographic Statistics, chap. XIII.

82/ And expenditure by private non-profit-making bodies.

83/ Irving B. Kravis and others, op. cit. See especially chap. 12.

84/ Ibid., see table 13.15.

Per capita consumption 1970
(ICP binary comparisons US = 100)

	ICP total consumption (1)	SNA consumers' expenditure (2)	Column (1) as a percentage of column (2)
Colombia	16.8	16.6	101
France	68.1	67.2	101
Germany, Federal Republic of	61.5	57.8	106
Hungary	38.3	31.1	123
India	6.1	5.7	107
Italy	48.1	45.0	107
Japan	47.4	45.5	104
Kenya	5.6	5.0	112
United Kingdom	63.6	55.7	114

Source: Kravis, op. cit., tables 13.1 - 13.9.

123. It must be noted that these ratios are not an indicator of total social provision by government. Expenditure out of social provision in the form of cash transfers is of course included in SNA consumers' expenditure.

Conclusion

124. (a) It is an interesting and useful exercise, shedding some new light on the nature of government operations in the economy, to attempt various reclassifications according to the final purpose - as distinct from the immediate function - of government expenditures.

(b) It is, however, doubtful whether a useful purpose could be served by attempting to get general agreement on conventions for the division of all forms of government expenditure between such broad and uncertain categories as "intermediate" and "final".

(c) However, in view of the usefulness of the concept of "total consumption of the population", it may be possible to reach agreement on the more specific problem of what items of government expenditure could be regarded as direct additions to household consumption.

(d) For many reasons, it is still more important to push forward the presentation of more detailed functional classifications of government expenditures than those now available for several countries. Arguments over the philosophical distinctions between final and instrumental expenditures serve little purpose when the data to make broader and uniform comparisons are absent. Certainly the problems of detailed data collection and analysis are considerable (i) when government

accounts are presented, as they sometimes have to be for financial control, in institutional classifications that do not fit national accounting categories and (ii) when a large proportion of general government expenditure is undertaken by a great number of local authorities or specialized agencies whose accounts are difficult to classify - or, sometimes, even to obtain. 85/

85/ This presents acute problems for national accounting even in the United States, with its 78,000 local governments. The NBER project, in co-operation with the official statistical agencies, includes a large-scale collection of such data (which can be regarded as microdata in view of the number of units) according to uniform classification by types of revenue and functional expenditure categories.

Chapter IV

MEASURES OF ENVIRONMENTAL CONDITIONS AND POLLUTION

125. In the past few years there has been a remarkable flowering, in both theory and practice, of statistical measurement of the state of the natural environment and of environmental damages. These measures - whether physical or financial - are, however, still at a somewhat experimental stage. The problems of measurement are inherently complex because of the great number of physical elements involved in any assessment of environmental conditions and of their effects on human life and health. Some elements that are generally regarded as important for human welfare - such as aesthetic qualities - are in any case hardly susceptible to objective measurement. But even for some of the environmental elements that are, in principle, subject to measurement - such as the physical conditions of air, water and soil - there is considerable uncertainty among the scientists about what is most important to measure. Because of general public recognition, especially in industrial and urbanized societies, of the fact that environmental damage has become a serious threat, the efforts to monitor it are bound to go on increasing; so will the application of policy measures designed to reduce damage. There can be no doubt of the need to improve methods of measurement and to publicize what is being done. And the exchange of national experience will continue to help forward the application of effective policies.

126. Statisticians can play an essential role in helping the agencies directly concerned with environmental problems to improve and rationalize the measurement systems; to apply statistical techniques both to monitoring procedures and to assessing the costs and benefits of policy actions already taken or under consideration (the benefits being generally more diffused and difficult to quantify than the costs); and to integrate the statistics with socio-economic data.

127. It would be premature to make definitive international recommendations for measurement in this area of scientific uncertainty. The methods used must remain flexible and subject to modification as knowledge increases. At the same time, the need for international diffusion of the results of national experience cannot be met unless there is clear understanding about what is being attempted and achieved in individual countries. This need calls for the use of consistent concepts, definitions and classifications wherever possible.

128. A beginning has been made both by the United Nations and by other international agencies. Expert meetings, starting in 1972, have been organized by the Statistical Commission of the United Nations in conjunction with the Conference of European Statisticians. In these discussions, the data organizing activities of the United Nations Environment Programme, Food and Agriculture Organization of the United Nations, World Health Organization and United Nations Educational, Scientific and Cultural Organization have been taken into account. 86/ A report

---

86/ See "Conclusions of the seminar on environmental statistics", Warsaw, 15-19 October 1973 (ECE/CES/SEM.6/11).

proposing objectives for environmental statistics was presented to the Statistical Commission at its eighteenth session (E/CN.3/452). OECD has made substantial efforts to collect, assess and publicize the results of work done in member countries and is understood to be preparing a set of guidelines for the measurement of environmental damages.

129. Naturally enough, the first and major concern in organizing environmental statistics is to establish adequate physical measurements - which are in the first place problems for chemists, biologists, hydrologists and medical experts. It would not be appropriate to discuss these in detail here but some features of them are particularly relevant to the monetary aspects with which the present paper is mainly concerned.

Physical measurements of environmental pollution

130. Physical measurement of environmental pollution may take three forms:

(1) Measures of the state of the natural environment - air, water and soil - and, by repeated monitoring, of changes in that state. Such measures have been made for a long time, especially in monitoring quality of air, as a normal function of public health administration. 87/

(2) Measures of the quantities of discharge of substances regarded as pollutants.

(3) Measures of the consequences of pollution for human health, for animal, bird and marine life and for plant contamination.

131. Some relevant characteristics of these measurements should be kept in mind.

(a) Concern with environmental pollution generally begins at a local level and particularly where pollution is worst and exposure of the population greatest. The scientists and administrators naturally look first at dirty water, not at clean water. Hence, in many countries the data available tend to cover selected areas that cannot be regarded as representative samples of conditions in the nation as a whole. This may not be of great direct importance for operational policies in pollution control but it is important if attempts are to be made to aggregate pollution effects on the national level.

(b) The consequences of pollution depend not only on emissions of a single pollutant at a single source, which are relatively easy to measure. There can be synergetic effects due to the chemical combination of a number of different polluting elements. And the tracking of pollutant effects over wide areas - through air even more than through water - is technically very complex and costly (as in the tracking of toxic residuals in birds or in plants).

87/ Starting, perhaps, with the miner's canary; and promoted, before the present wave of concern with all forms of pollution, by the disastrous urban smogs associated with primitive coal-burning methods. Quantitative estimates of pollution are nothing new. As early as 1913, the Mellon Institute gave an estimate for Pittsburgh of $20 per head lost through bad combustion (put at $60 in 1959). Environmental Damage Costs (Paris, Organisation for Economic Co-operation and Development, 1974), p. 191.

(c) It is frequently emphasized that pollution effects are non-linear. "A low CO content of the air is harmless, at a somewhat higher level it becomes a nuisance, and above that level fatal". 88/ Moreover, the toxic effects depend on how many people (or other forms of life) are within the area of exposure. This is obviously very relevant to the implications of physical data for pollution control policies and their costs and benefits. There may be an economically optimal degree of purification but it is exceedingly difficult to ascertain it in practice.

(d) Efforts to associate pollution with human health in a quantitative way are in a still less advanced state; however, such measurements must be made in order to assess the over-all effects whether in terms of mortality and morbidity statistics or in terms of money values. However, a number of studies have been made and some are reported below. From the point of view of social analysis, one additional difficulty is that medical research may not cover the social and economic characteristics of the victims, that is, the degrees of exposure of different classes of people.

(e) In one sense, it is a helpful feature of pollution that the greater part of it originates in a relatively small number of industries and activities (metal manufacturing, oil transport and refining, some chemicals, pulp and paper, electricity generation, use of automobiles, home heating). Although the consequences extend far beyond these activities, it is possible, at least as a first step, to concentrate the recording systems on relatively few sections of the economy.

(f) It was suggested above that physical measurements of the state of the environment at different times could be used to derive a consistent system of stocks and flows in much the same way as in economic accounting. However, because of scientific uncertainties, consistency is by no means assured. The various channels through which residuals may return to the environment are not necessarily all known. The changes in state may not correspond with records of disappearance from the productive process. 89/

132. In so far as economic and social measurements must flow from physical data, it must, then, be recognized that the "state of the arts" in the scientific areas concerned with environmental pollution is not yet sufficiently advanced to establish a comprehensive system of recording. There is, at the present stage, a dilemma. A great mass of observations and records exists; but these were drawn up, often, for special purposes and to meet local needs and differing in classification and units of measurement. From one point of view, scientific

---

88/ R. Hoeting, "Environmental deterioration, economic growth and national income", paper prepared for the fourteenth general conference of the International Association for Research in Income and Wealth, Aulanko, Finland, 19-23 August 1975.

89/ Lord Ashby, Chairman of the British Royal Commission on Environmental Pollution, is reported to have said, in 1973, that although the background concentration of carbon monoxide should theoretically have increased to a point at which drastic action would be needed, in fact it appears to have remained unchanged for about 25 years: some "scavenging" process transforming carbon monoxide seems to exist. (Reported in The Art of Anticipation (Martin Robertson, for Science Policy Research Unit, University of Sussex, 1975), p. 29.)

progress can best be promoted by the rationalization of data collection by selecting and regularizing those indicators believed to be most promising. From another point of view, knowledge of interactions and of what indicators are really important for analysis is so uncertain that the best solution may be to experiment with every set of observations that comes to hand. The situation in a way resembles the state of economic indicators half a century ago, when empirical verification of the numerous theories of business cycles was fairly primitive. The solution then found in the United States by Wesley Mitchell and the National Bureau of Economic Research was to collect and codify all statistics that might be relevant and to try to determine causality and sequences by discovering empirical relationships without strong preconceptions about what relationships might hold.

133. Some compromise seems to be needed. The volume of existing or possible measures is so great that progress is unlikely to be made without some rationalization; and the state of knowledge is not so deficient that it is impossible to distinguish the more from the less probable hypotheses. The United Nations Secretariat report states that "The development of these /environmental/ data should not be delayed by devoting considerable resources to elaborating the structure of a comprehensive system ... Indeed it is doubtful that a statistical system can ever be complete and definitive". (E/CN.3/452, para. 66).

134. The report urges the promotion of a "relatively simple set of environmental statistics" at an early stage and sets out a suggested programme of priorities, although still in rather general terms. It does, however, propose a provisional list of 20 "permanently significant categories" of pollutants as a framework for international classification and data collection, to be co-ordinated with the United Nations Environment Programme's "Earthwatch" monitoring. (E/CN.3/452, para. 101).

Monetary measurements of pollution

135. Efforts to collect, or impute, data in money terms also fall into three broad classes:

(1) Statistics of actual expenditures on the abatement or control of pollution. The data, of course, exist but are not necessarily identified separately in the accounts of enterprises and public authorities.

(2) Estimates of the hypothetical costs of achieving given physical standards of purity in air, water or soil.

(3) Estimates of various kinds of damage caused by or resulting as consequences of pollution.

Some examples of each class are reviewed below.

Statistics of actual expenditure

136. Probably the most comprehensive statistics of the direct costs incurred by the economy to combat pollution are those recently developed, as the first of an annual series, by the Bureau of Economic Analysis of the United States Department of Commerce. The estimates are presented so as to fit the framework of national

accounting concepts and classifications. Beginning with data for 1973, an annual return has been collected from nearly all non-farm businesses of capital expenditures on plant and equipment "for air, water and solid waste pollution abatement" 90/ (earlier surveys were made by the McGraw Hill Company and other organizations). These figures of capital expenditure are incorporated in a comprehensive estimate of all expenditures, current and capital, for pollution abatement and control (PAC) in 1972. 91/ These estimates also are expected to be made annually. The sources and methods used, as well as the results, deserve careful study by any organization contemplating data collection; only a few points can be made here. The results are summarized in table 1.

137. One major source of estimates is the extension of the survey of capital expenditure by non-farm businesses to their current expenditures. Data on federal, state and local government expenditures are derived from the financial reports of these bodies (special provision is now made for separate reporting of anti-pollution spending by federal agencies) and in some cases from an analysis of contract awards. Cremeans observes that the collection of data from the public sector, especially from local governments, presented quite as much difficulty as that for business. 91/ Some estimates are derived from reports to agencies such as the Federal Power Commission. The figures for household expenditures, relating mainly to automobile emission control devices, are estimates from several sources. It will be seen that a comprehensive estimate would hardly have been possible until public interest in the problem had stimulated the collection of data by a variety of organizations.

138. Among the main problems of definition are:

(a) New plans or processes may be introduced that reduce costs but at the same time reduce pollution (e.g., the recent shift of a large part of the paper industry from the sulphite to the less polluting sulphate process). 92/ The aim is to exclude expenditure when the reduction of pollution is only incidental. (The questionnaire on capital expenditures asks separately for expenditure on equipment whose only purpose is pollution abatement and for a "best estimate" of the cost of special features for pollution abatement embodied in other equipment.) As an increasing proportion of new equipment incorporating anti-polluting devices comes into operation, it will be increasingly difficult to identify the specific costs of pollution abatement.

90/ United States Department of Commerce, Survey of Current Business, July 1974 (reproducing the questionnaire) and July 1975.

91/ John E. Cremeans and Frank W. Segal, "National expenditures for pollution abatement and control 1972", Survey of Current Business, February 1975. The methods and main figures are also discussed in John E. Cremeans, "Conceptual and statistical issues in developing environmental measures: recent U.S. experience", Review of Income and Wealth, June 1977.

92/ This is an international feature of the paper-making industry. See Pollution by the Pulp and Paper Industry (Paris, Organisation for Economic Co-operation and Development, 1971).

(b) Pollution-reducing equipment may often result in marketable by-products or possibilities for recycling waste material. The estimate of "costs recovered" in table 1 is an over-all estimate.

(c) The list of pollutants needs to be defined. The Department of Commerce questionnaire includes a specific list.

(d) It is recognized that a questionnaire to businesses is unlikely to capture the costs of closing down whole enterprises that are unable to meet anti-pollution standards and of replacing them by the expansion of alternative and perhaps more costly processes.

(e) A distinction is made between "end-of-line treatments" involving the separation or treatment of pollutants before they are emitted from the factory (by the installation of filters, dust collectors etc.) and "change-in-production-processes" involving the substitution of new processes or materials etc. In 1974, nearly 80 per cent of the capital expenditure was for the former category.

139. As table 1 shows, the expenditures are classified in accordance with the United States national accounting system so as to identify clearly PAC expenditures that are included in GNP and to take account of expenditures that are excluded from GNP. In particular, business expenditures on current account are treated in the national accounts as current inputs and enter into GNP only as components of the final products in which they are embodied. 93/ The government expenditures, both current and capital, are included in GNP as final output and can be deducted if so desired.

140. Some results are worth quoting. The total expenditure of $18.7 billion in 1972 is equal to about 1.6 per cent of GNP. 94/ The capital expenditure by business is about 5 per cent of their total expenditure on new plant and equipment, but this proportion varies immensely; it is around 20 per cent for non-ferrous metals and paper and about 10 per cent for petroleum, electric utilities, chemicals, blast furnaces and steel mills, and stone clay and glass industries. These seven industries account for more than 80 per cent of the capital expenditure on pollution abatement and control of all businesses. 95/

141. So far as is known, this is the most comprehensive national estimate of actual expenditure on pollution abatement and control. There are clearly great difficulties in identification and possibilities of bias among business respondents to the necessary questionnaires, especially since pollution control has its political undertones. However, it is understood that the majority of respondents took considerable trouble to understand the purpose of a complicated set of questions and to give detailed replies.

93/ The same applies to government enterprises. These are agencies whose current costs are substantially covered by the sale of goods and services. The most important in the present context are some state and local government operations for sewerage and sewage treatment.

94/ The proportion is not affected significantly by the fact that perhaps one quarter of the expenditure (business current costs) does not enter directly into GNP.

95/ The figures quoted are for 1974. Current expenditure is not at present shown by industry.

Table 1. United States of America: national expenditure for pollution abatement and control, 1972

(billions of dollars)

Personal consumption	1.92
Business:	
Capital	4.98
Current:	
Private	3.37
Government enterprises a/	1.20
Less costs recovered	-0.55
Government:	
Federal	0.45
State and local	1.88
Government enterprises: capital a/	3.55
Regulation and monitoring (government)	0.35
Research and development:	
Private	1.28
Government	0.30
Total	18.74 b/

Source: Adapted from U.S. Department of Commerce, Survey of Current Business, February 1975, p. 9. The figures exclude agricultural business, some professional services and non-profit organizations.

a/ Current costs stated separately from capital costs because the former are netted out, like business current costs, in calculating GNP; the latter are treated in the United States national accounts, like other government purchases of plant and equipment, as part of total government expenditures without distinguishing current from capital costs.

b/ Of which: Air, 6.54; water, 8.59; solid waste, 2.72; other, 0.89.

Hypothetical costs of environmental purification

142. Rather more estimates, of varying degrees of completeness, have been made of the costs of cleaning up pollution - that is, of achieving stipulated or assumed standards of purity of air, water or soil.

(a) United States

143. The United States Environmental Protection Agency (EPA) published in 1971 phased estimates - admittedly tenuous - of costs of achieving the air and water quality standards already established in response to federal legislation. 96/ The total costs, taken as the cumulative requirements over the six-year period 1970-1975, are put at $105 billions, of which about one third is capital expenditure; the annualized costs rise from $9 billion in 1970 to $18 billion in 1975 (presumably at prices of around 1970).

144. It is, of course, pointed out that the standards established by 1970, to which the estimates refer, have a limited significance. Not all sources of pollution are covered and the standards themselves are likely to be upgraded as time goes on.

145. It is tempting to compare these hypothetical estimates with the actual expenditures on pollution abatement in the United States previously quoted (nearly $19 billion in 1972). There are, however, considerable differences of definition and coverage which prohibit any precise comparison. (Thus, the EPA figures appear to include a much wider coverage of costs for solid waste disposal than those of the United States Department of Commerce; on the other hand, the EPA total quoted does not include, for lack of data, any allowance for state and local authority expenditure on sewers.) The orders of magnitude of the two sets of figures, even allowing for non-comparability, might suggest, in broad terms, good progress towards the achievement of the stipulated environmental standards; but the differences of definition and coverage illustrate the need for establishing uniform statistical classification and conventions to allow public understanding of the significance of the mass of data now becoming available. For costing calculations, whether actual or hypothetical, the framework of classifications used for national accounting offers the most convenient and best understood basis.

146. More complete and refined estimates of pollution are being developed by the National Bureau of Economic Research in their study of the "Measurement of economic and social performance"; these are adapted to the national accounting framework. While the NBER makes use of many of the EPA data, differences in their results illustrate the problem raised by having different methods of approach and different standards. As a particularly striking example, the EPA figures just quoted include $6 billion for cumulative cost of abatement of air pollution by "private mobile" equipment (presumably mainly automobiles). NBER's estimate for

---

96/ Cost of Clean Water and Cost of Clean Air (Washington, D.C., United States Environmental Protection Agency, 1971). The figures are summarized in Environmental Damage Costs (Paris, Organisation of Economic Co-operation and Development, 1974), p. 117.

"households", mainly for fitting all gasoline vehicles with pollution control equipment necessary to meet 1977 standards, is nearly $11 billion. 97/

(b) Japan

147. The NNW Measurement Committee write in their report 98/ that they would like to have estimated directly the total cost of damage caused to "health, human life, animals, plants and properties" by the discharge of polluting factors. In the absence of sufficient data, however, they have adopted the alternative of estimating, so far as is practicable, the expenditure necessary to restore air and water quality to an assumed "normal physical environmental level" and to give "adequate" treatment to domestic and industrial wastes. Instead of taking specific "standards" for air and water quality, however, they set a base year in which "the quantity of emitted pollution factors is imagined to have no harmful effect" (i.e., it is assumed that the natural absorption capacity of the environment was able to absorb the discharges of the base year). They then estimate the additional discharges since the base year and the costs of treating them. The base year taken is generally 1955; estimates are made for each subsequent year to 1970. 99/ For soots, dusts and domestic and industrial wastes (presumably because they are longer established sources of pollution) the total discharge is reckoned as polluting.

148. The estimates are limited to certain specified pollutants, by no means a complete list. 100/ The general method (as distinct from the alternative of using actual observations of pollutant concentrations) is (i) to estimate the physical quantity of discharges using standard coefficients for each activity (e.g., the emission of sulphur oxides by each industry is calculated from consumption of oil and coal and their sulphur contents); and (ii) by various methods, to estimate the capital and current cost of treatment of these discharges (e.g., costs of residual oil desulphurization, costs of removing excess biochemical oxygen demand (BOD) from water or, for automobiles, the cost increment in the United States of 1976 cars over 1970 cars due to various forms of anti-pollution equipment).

149. In addition to these estimates of hypothetical costs, the Japanese report includes a relatively small figure for "environmental maintenance costs". These estimates are based on actual current expenditures by government and industry on pollution control, treatment of wastes etc. For industry, the main source appears to be special inquiries into investment for these specific purposes, undertaken annually from 1956.

97/ NBER preliminary estimates for air pollution, with a detailed two-digit industry breakdown, are given in R. and N. Ruggles, op. cit., table 4.

98/ Measuring Net National Welfare of Japan. For data and methods, see pp. 172 ff.

99/ For the emission of automobile exhaust gases, 1960 is taken as the base year (because observations showed no carbon monoxide except in Tokyo at that time).

100/ Biochemical oxygen demand (BOD) for water; sulphur oxides, soots and dust for industrial air pollution; exhaust gases from automobiles (nitrogen oxide, carbon monoxide and hydrocarbons).

150. The figures in table 2 are extracted from the report (in the report they are also given at constant prices, using for most purposes the over-all deflators for capital formation).

Table 2. Japan: anti-pollution cost estimates

(billions of yen, current prices)

	1965	1970
1. Hypothetical costs for reduction of pollution to base-year levels		
Water pollution (BOD)	981	1 506
Air pollution:		
SO	670	1 798
Soots, dusts	158	400
Auto exhaust gas:		
(NOx, HC, CO)	207	1 151
Wastes:		
Domestic	71	107
Industrial	846	1 139
Total	2 933	6 101
2. Environmental maintenance; actual costs a/		
Government (national plus local)	74	243
Private (industry)	26	126
Total	101	369
Gross national product (market prices)	32 812	73 237

a/ Since the main figures in the report are related to net product (net of depreciation), the investment figures for pollution control are not used directly; instead an annual charge for use of capital equipment is imputed based on a seven-year life (plus an estimate for running costs for industry). The gross annual investment figures would be somewhat different.

151. In total, these anti-pollution costs add to the surprisingly large sum of about 9 per cent of GNP in both 1965 and 1970. 101/ (The methods of calculation can hardly take account of any changes in the ratio of pollutant emissions to the polluting activity, such as changes in the process or materials used, but only to changes in the volume and weights of the different activities.) In the NNW Measurement Committee's estimates of "net national welfare", these costs are treated as negative items.

152. It is a statistical curiosity that the Japanese estimate for 1970 (given in table 2) of about 6,500 billion yen, converted at the official exchange rate of 360 yen to the dollar, comes to $18 billion - very close to both sets of annual costs quoted above for the United States in the early 1970s. But before risking any conclusion, it should be observed not only that the methods and variables used differ substantially but also that:

(a) The Japanese GDP, at official exchange rates, was about one fifth that of the United States. However, on the latest calculation of relative purchasing powers, the Japanese real GDP (in 1970) is put at about 30 per cent of that in the United States. 102/ Thus the relative cost of anti-pollution measures would also rise above that given by the official exchange rate but the rise would be somewhat less than that of GDP since capital goods prices are higher, in relation to those in the United States, than over-all GDP prices. On this reckoning, the anti-pollution cost in Japan, reckoned at comparable prices with the United States, might fall by one or two percentage points from the 9 per cent quoted in paragraph 151 above.

(b) The over-all density per hectare of population in Japan is about 13 times that in the United States (probably greater still in the main urbanized and industrial areas). The volume of pollution-creating activity may also be a greater proportion of national product in view of the different structure of the Japanese economy.

(c) There could be a substantial difference between the NNW Measurement Committee's method for Japan - counteracting pollution in excess of that in a base year when no serious pollution is assumed to have existed - and the EPA method for the United States - reducing pollution over a period of years to what are regarded (or were regarded in 1970) as standards practicable for enforcement.

153. It would not, however, be at all surprising if more strictly comparable methods did in fact result in a pollution burden, in relation to real income, considerably greater in Japan than in the United States. The methods used by the NNW Measurement Committee are highly pragmatic; they may be regarded as an ingenious and revealing use of a limited body of data to illustrate the dimensions of the problem. More refined methods would require far more data about both pollutant emissions and costs of treatment. It also seems desirable to check the calculated emissions against actual observations of pollutant concentrations in air and water.

101/ It is not entirely clear why the two categories of hypothetical costs and actual costs should be added together; but they are so added in the Japanese report.

102/ I. B. Kravis and others, op. cit., pp. 6-9, tables 1.1, 1.3, 1.4.

Netherlands

154. The first issue of a Central Bureau of Statistics annual handbook of environmental statistics 103/ for the Netherlands contains one table of monetary costs. This relates to the investment and current costs, as of 1969, of water purification (removing degradable organic material). The figures show:

	Billions of guilders (1970 prices)	
	Investment	Annual costs
Action already taken	1.2	0.2
Action still to be taken a/	7.6 to 9.7	1.0 to 1.35

a/ "The (possible) action necessary to eliminate the pollutants present in the water in 1969".

The above figures compare with a gross national product of about 105 billion guilders (1970 prices) in 1969. Allowing for the investment cost to be spread over, say, five years would thus give an annual cost, for water purification alone, equal to 3-4 per cent of GNP. Again, methods of calculation are bound to differ but it is not surprising to find a substantially larger proportion of GNP than that quoted for the United States.

Estimates of environmental damage costs

155. A different approach is to try to value in money terms the amounts of damage caused by pollution - to life, to health, to production, to materials and to nature. A number of experiments have been made, admittedly on rather tenuous bases. Among the purposes are (a) to set in some perspective, at least by orders of magnitude, the main problems caused by pollution and (b) to display some of the gaps in knowledge and in available information that need to be filled to provide a balanced quantitative background for more effective policies.

156. Most of the research results available relate to rather specific cases of pollution damage. A number of them are reviewed by R. E. Wyzga of the OECD Environment Directorate. 104/ The majority relate to the effects of air pollution in Canada, the United Kingdom and the United States. They illustrate clearly some of the common problems involved.

103/ Algemene Milieustatistiek 1973 (s'Gravenhage, Centraal Bureau voor de Statistiek, 1974); an English text is also available. The bulk of the book consists of very full statistics and maps, in physical units, of waste emissions, concentrations of pollutants, treatment equipment and animal and vegetable life, in addition to a variety of tables on demographic and health conditions etc.

104/ Environmental Damage Costs.

Damage to life and health

157. The first set of problems are essentially problems for medical statisticians. Studies have been made of the number of deaths and/or hospitalization cases from diseases for which air pollution may be responsible (respiratory and bronchial diseases, lung and some other cancers, cardio-vascular diseases). The problem is to estimate the proportion of such diseases that can be attributed specifically to pollution. For some studies, fairly arbitrary assumptions - and indeed guesses - are made (e.g., that 20-25 per cent of the total number of cases can be so attributed). 105/ In another (British) study, the basic method was to take the excess of the rate of incidence in urban areas over that in rural areas as a measure of the effects of pollution. 106/ The question that arises is whether it is practicable for medical records to provide a more scientific assessment, for such diseases, of the extent to which air pollution can be regarded as responsible. This is obviously a matter of extreme difficulty for clinical diagnosis; is there a possible alternative solution in a classification of a sample of cases according to the circumstances (places of work and residence) of the victims? 107/

158. The second set of problems concerns the valuation of damage to human life and health. Costs of treatment can often enough be estimated from hospital accounts, social security records etc. In addition, several studies estimate the costs of premature death (requiring ideally an age, sex and, if possible, occupational distribution of victims) by taking the (discounted) present value of lost future earnings; to this can be added the temporary loss of production and income from sickness. 108/ The British study referred to analyses the costs of bronchitis and lung cancer assumed to arise from pollution as follows:

105/ Studies for the United States by Ridker (1958), Lave and Siskin (1963), Riggan (1970). See Environmental Damage Costs, pp. 56 and 60.

106/ An Economic and Technical Appraisal of Air Pollution in the United Kingdom (London, United Kingdom Atomic Energy Authority, 1971).

107/ For a number of useful papers containing statistical studies relating respiratory disease to degrees of pollution, socio-economic characteristics etc. (and to other factors such as tobacco smoking) see Ecology of Chronic Respiratory Diseases, Warsaw, 1972 (report of an international symposium).

108/ Some studies add an imputed value for lost services of victims not previously gainfully employed. Wyzga illustrates the immense range of uncertainty of such estimates by comparing United States studies adopting what appear to be similar methods for losses due to specific diseases but varying by factors of two or more (in Environmental Damage Costs).

	Bronchitis	Lung cancer
	(millions of pounds a year)	
Economic costs (related to GNP)		
Loss of production	£ 16	£ 0.4
Treatment	14	0.4
Premature death	-	0.6
Economic costs (non-GNP)		
Housewives' services	4.1	0.3
Women not receiving sick payments	3.2	-
Students	0.2	-
Social costs		
Premature death	30	19
Disamenity of illness	70	1.3
Total	£137.5	£22

159. The "social costs", by far the largest, are based: for death, on an arbitrary value of £1,000 per year of life lost; 109/ for sickness, on the ranges of legal compensation awarded for similar misfortunes. The range of uncertainty surrounding such estimates is enormous. It may be suggested by the sceptics that the usefulness of such figures - as distinct from a straightforward record of the number (and characteristics) of victims - is in the sphere of public relations rather than of social science. Nevertheless, such estimates are often enough made and can be widely quoted; there is room for discussion about suitable conventions. Moreover similar problems have arisen for a long time in determining compensation for death and disease in juridical practice; in many countries, the need is felt by both victims and lawyers for an agreed and rational basis of assessment. This is related to other aspects of the "value of human life" and is discussed further below (paras. 179 ff.).

Other material forms of damage

160. Studies have also been made of damage from air pollution 110/ to:

(a) Materials: deterioration, corrosion and soiling due to exposure to pollution. A study by the Midwest Research Institute 111/ put the annual loss by

---

109/ It is explained that since deaths from bronchitis mostly occur in old age (including delayed effects of earlier exposure) the losses of earned income (economic costs) can be regarded as small.

110/ Summarized in Environmental Damage Costs.

111/ Systems Analysis of the Effects of Air Pollution on Materials (Kansas City, Mo., Midwest Research Institute, 1970).

deterioration in the United States on a list of 53 materials at $3.8 billion - of which one third is for "paint". The estimate is made by comparing rates of deterioration in polluted and unpolluted environments, assuming 40 per cent of the extra deterioration in the former is due to pollution. The British study already referred to gives, for apparently similar losses, a figure of only about £80 million; but it adds twice as much again for the costs of extra cleaning, due to pollution, of laundry and household goods (including cars).

(b) Plant losses

(c) Losses of property values: derived by comparing market prices of dwellings in different types of areas. A number of statistical experiments have been made but, it appears, with inconclusive results, probably because of the impossibility of satisfactorily isolating the pollution effects from the great number of other variables affecting house prices. Similar experiments have been made in the United States and the United Kingdom in attempts to use, inter alia, differences in house prices to estimate the value put on freedom from noise (e.g., near motorways or airports).

161. It is notable that most of the studies cited above relate to air pollution and relatively few to the effects of water pollution. 112/ One reason may be that the studies have been made in countries where pollution of water - whatever other damaging effects it may have - is not nowadays responsible for much serious disease. The situation could be very different in other parts of the world (see for example the Italian study reported below).

162. The most comprehensive estimate of the total damage costs of air and water pollution that has come to hand is one made for Italy in 1969 by an interdisciplinary research group of the Ente Nazionale Idrocarburi (ENI). 113/ The report adopts several of the basic methodologies used by the other studies reported above. The purpose was not only to estimate the existing annual damage costs but also to extrapolate them to 1985 on the assumption of no substantial changes in the policies and legislation relating to polluting activities. The intention would be to compare the forecast damage costs with the costs of specific new anti-pollution programmes. 114/

163. Although the damage costs are aggregated to a national total, many of the basic estimates were derived by taking into account the distribution of population between areas of the country with different degrees of pollution and risks of exposure.

164. This ambitious and, in many ways, original set of estimates is summarized in table 3.

112/ Apart from a number of cost benefit studies concerned with the loss of recreational value (and fishing value) from polluted water bodies.

113/ Summarized by G. Muraro in Environmental Damage Costs, pp. 136 ff. A report was made by G. Scaiola to the Stockholm Conference on the Human Environment (1972) under the title "Economic costs and benefits of an anti-pollution project in Italy".

114/ In fact, for one or two items, the damage cost was taken as equal to the expected costs of "cleaning up".

165. The total damage cost in 1970, taking a mean of the wide range given, is equivalent to slightly under 1 per cent of GDP. Damage was expected to increase by 1975, on the assumption of no policy change, and at 1968 prices, by 3.2 times - 8 per cent a year. The assumed growth rate of the economy as a whole is not made clear in the summaries available but can hardly be so great. Nor is it made explicit whether allowance is made for autonomous technological change, e.g. in industrial processes, that may reduce (or increase) the rate of pollution.

Table 3. Italy: Environmental damage costs by air and water pollution, 1970 and 1985

(billions of lire, 1968 prices)

		1970	1985
1.	Health	130	490
2.	Cultural assets	42-43	134-158
3.	Agriculture and zootechnics	12-13	35-46
4.	Tourism and free time	67	120
5.	Water: industry and drinking	24	83-84
6.	Ecological assets	47	91
7.	Other damages	44-165	143-602
	Total	366-489	1,096-1,591
	Rounded total a/	400-578	1,120-1,615

Source: G. Muraro, loc. cit.

Notes

Line 1. Treatment costs, loss of wages, loss of housewives' services, premature deaths (present value of future income).

Line 2. Deterioration of archaeological assets, works of art, monuments, books and records. Based largely on hypothetical costs of a programme for conservation and restoration.

Line 3. Proportion of net output of certain products in areas affected by water pollution.

Line 4. Variety of estimates.

Line 5. Estimates for 1968 and 1981. Based mainly on additional treatment costs.

Line 6. Estimates for 1968. Loss of fish and timber and wild life.

Line 7. Estimates for 1967 - a variety of losses: deterioration of buildings, clothes, cars, consumer goods and "various activities". The wide range is based on classification of population into "black zones" (most affected by pollution - with about 4 million people) and "polluted" zones (about 14 million people).

a/ As given in source: presumably allows for up-dating items for which data given relate to earlier years.

166. In any case, the Italian figure, although defined as a "minimum" estimate, is surprisingly small in relation not only to the estimates for Japan given above, but even to the estimates for the United States. It is true that the Italian authors are measuring damage costs while the other estimates relate to actual anti-pollution expenditures or to the hypothetical "cleaning-up" costs. Nevertheless, one would not have expected such vast differences in view of the very wide range of costs covered by the Italian study. If international comparisons are to be useful, there is a clear need for a serious confrontation of the concepts, coverage, methodologies and kinds of data used in this type of study.

Conclusion

167. The examples given are perhaps sufficient to show that:

(a) Calculations of major environmental variables in monetary terms are practicable and could help to evaluate the social and economic consequences of policy (or of the absence of new policies).

(b) Statistics of actual expenditures on pollution abatement and control can be obtained through the normal official statistical systems. How far they can be regarded as objective must depend on the respondents - and this perhaps to a rather greater extent, since the motivation of expenditure is involved, than with other statistical series. But estimates of the costs of reaching given standards and, still more, estimates of environmental damage are essentially exercises for multidisciplinary research and experiment, not for routine collection of statistics.

(c) Both public understanding and the application in practice of the whole range of environmental statistics, monitoring and research - in physical and monetary terms - would benefit from co-ordination of classifications and definitions at both the national and the international level. Official statistical offices, which have much experience in the linking of differing statistical systems, could give a great deal of help, especially in promoting the necessary linkages between the environmental statistics now being developed and the established systems of economic, social and demographic statistics.

Chapter V

THE MEASUREMENT OF ASSETS

168. The discussion in previous chapters has been mainly concerned with the flows of goods and services that have a special bearing on the measurement of welfare. To what extent is it also relevant to consider the measurement of stocks, or assets, related to these flows?

169. For the further development of SNA, provisional international guidelines have been developed for integrating the measurements of stocks and flows into an internally consistent system. 115/ Assets are divided into four major categories:

(1) Tangible reproducible assets;

(2) Tangible non-reproducible assets;

(3) Intangible non-financial assets;

(4) Financial assets (and liabilities).

For each category, and for each sector, a record is proposed on the following (simplified) basis:

Opening stock at market prices of Time 0

Changes in period:

Transactions (purchases and sales)

Revaluations of the stock

Closing stock at market prices of Time 1.

170. Issues relevant to each of the first three categories of assets listed above will be considered; the fourth, financial assets, which does not appear to be directly relevant, will not be considered.

Tangible reproducible assets: equipment and structures

171. For the most part, tangible reproducible assets are the fixed assets of enterprises and government plus dwellings. The main issue that arises for the

---

115/ Provisional International Guidelines on the National and Sectoral Balance-Sheet and Reconciliation Accounts of the System of National Accounts (United Nations publication, Sales No. E.77.XVII.10).

present discussion is the treatment of consumers' durable goods. The provisional guidelines propose the omission of such goods from the standard balance-sheets but suggest instead a supplementary table (see chap. II, paras. 95-109, where this question is dealt with). 116/

Tangible non-reproducible assets: natural resources

172. For this category, the draft guidelines introduce the important distinctions between: (a) assets used in commercial production, such as land, timber tracts, fisheries and subsoil deposits of coal, oil, gas and minerals (together with mines and sites), for which actual transactions are recorded in the national accounts; (b) natural resources in the public domain, such as water bodies, the atmosphere, roads, parks etc.; these are not normally bought and sold although specific outlays on their improvement (or spoliation) may enter the national accounts in one form or another. Historical monuments and works of art also fall in this second category, only actual transactions being recorded.

173. The guidelines propose as standard practice comprehensive balance-sheets and reconciliation accounts for category (a) but the exclusion of category (b), mainly because of the conceptual and practical difficulties of valuing either the assets or the stream of benefits that they yield. 117/

174. The assets - and changes therein - of category (a), natural resources that are commercially exploited or exploitable, are certainly very relevant to any broad evaluation of the implications of economic activity. They cover the depletion of natural resources and also the additions to natural resources that may come about through new discoveries or through technical changes affecting their exploitability. Methods of estimation, however, necessarily involve two degrees of heroic approximation. In the first place, the physical units in which, for example, mineral reserves must originally be estimated are necessarily based on conventions and assumptions (often differing from one authority to another). Secondly, the process of valuation involves a further set of conventions and assumptions. For subsoil assets, the guidelines propose the use of the "estimated net proceeds of sale of the extracted minerals" discounted by the rate of return "expected by investors in mining or quarrying enterprises". It is clear, as the guidelines recognize, that "large and sudden" revaluation may be implied, especially at times of rapidly changing prices and markets.

175. Thus, even in this area the difficulties and to some extent the subjectiveness of asset valuation are substantial (e.g., estimating in 1975 the expected rate of return on oil and gas deposits). Nevertheless, the market process and commercial valuations do provide a certain data base.

116/ One estimate of total tangible reproducible assets for the United States (based on perpetual inventory methods) puts the proportion of assets that are not used in direct production for sale (i.e., dwellings, consumer durables, half of government assets and assets of non-profit organizations) at well over half the total. R. W. Goldsmith, National Wealth of the United States in the Postwar Period (Princeton, N.J., Princeton University Press, 1962), table A.1.

117/ Construction work for the improvement of such assets would, however, be included as an increase in tangible reproducible assets.

176. To value the stocks of category (b), natural resources in the public domain, does not appear to offer particular advantages. The man-made elements, such as roads, can of course be valued in principle by the perpetual inventory method, if that is regarded as useful.

177. A regular record of the physical state of air and water bodies, on a local basis, is also useful, indeed necessary, as has been stressed in chapter IV. Methods can be imagined for attaching a valuation to changes in the state of these resources. This may be done by reckoning actual expenditures on pollution abatement and control as increases in the value of the natural assets concerned. 118/ This is, of course, a very unsatisfactory measure. A better measure would be to count as an addition to assets only expenditure in excess of that needed to maintain the state of the water or air as it was at the beginning of the period; a deficiency of expenditure would be regarded as disinvestment and a loss of assets. 119/ To incorporate such estimates into the balance-sheets is, however, just a formal way of treating the expenditures on pollution abatement and control - if they can be obtained. The discussion in chapter IV stresses some of the basic problems of making these estimates in the present state of scientific knowledge.

178. It does not seem, therefore, that the usefulness of national accounting systems, for any of their main purposes, would be much enhanced at present by such uncertain imputations. The thrust of statistical endeavour should be directed towards the collection of the basic information, which is a sufficiently complex task.

Intangible non-financial assets: human capital and knowledge

179. The provisional guidelines propose that balance-sheets should include under the heading of intangible non-financial assets only assets in which commercial transactions occur (patents, copyrights, leases etc.). The category may, however, be taken to include also such intangible assets of a society as the stock of "human capital" and the stock of scientific knowledge which are certainly, in the broadest terms, the most valuable assets of a society. A number of efforts have been made to construct both a theory and empirical applications for the measurement of human capital in monetary terms. 120/

The educational element in "human capital"

180. The element most often taken into account for differentiating the "value" of one individual against another is some indicator of the amount of education

---

118/ Just as the provisional guidelines propose the inclusion in balance-sheets of actual transactions in works of art.

119/ An analogy: at one time the United Kingdom Central Statistical Office considered, but renounced for practical reasons, the possibility of including in capital formation any excess of current expenditure on maintenance of buildings over some pre-determined level of expenditure necessary for "normal" maintenance. Such estimates have actually been made, at various times, in other countries.

120/ For a recent empirical study for the United States see J. W. Kendrick, op. cit.

received. The stock of human capital, in the most elementary terms, is thus measured by the years of schooling embodied in the population at a given date.

181. The justification from an economic point of view is the fact that the number of years of schooling above a certain compulsory minimum particular to the country, appears to be related to earnings (it is not necessarily, of course, a linear relationship and certainly not the same relationship in all countries or in a single country at all times). The income flows from education can thus be capitalized. From this kind of calculation, the "return" in terms of income or output from an increment of investment in education may in principle be calculated and compared with the corresponding returns on other forms of capital outlay. Of course, such a calculation can apply only to the circumstances of a particular time in a particular country. It must be recognized, too, that the differential earnings from additional education depend not only on market conditions of supply and demand for qualified persons but also on the variety of not very flexible institutions and traditions that determine pay differentials.

182. It can be claimed that even if the allocation of resources to education in general should not be determined by this kind of calculation, yet it may serve some purpose in assessing priorities within a programme of educational development by matching marginal returns in terms of pay against marginal costs (e.g., how does the cost of providing a year of post-graduate work in physics, when measured by the expected lifetime pay of the student, compare with the corresponding cost and pay for an extra year of Byzantine art?). Such assessments are useful only if the pay differentials are accepted as measures of the relative contributions, in some sense, of individuals. It is true that national accounts, when used as indicators of economic progress, imply some such presumption although even then the presumption must be heavily qualified. But a proposal to extend the acceptance of market values from the sphere of market activities to areas where the market would not be generally regarded as the dominant criterion for resource allocation should surely be treated with very great caution.

183. Nevertheless, assessment of the educational state of a population does play a role in the explanation of economic progress. It was used by Denison in seeking to evaluate one element in the "quality of labour" as a measurable factor in the level and rate of growth of GNP in the United States and some western European countries. 121/ Denison combined the years of education at different stages embodied in the labour force with (somewhat impressionistic) estimates of the income differentials associated with additional years of education, with the differential varying, but not very markedly, between the countries reviewed. He did not, however, find it necessary to express educational states in terms of the monetary value of the "stock" of education; he used instead indexes of the "quality of labour", over time and between countries, based upon differences in calculated years of education weighted by the income differentials. These indexes may be regarded rather as "social indicators" than as monetary measures of "human

---

121/ E. F. Denison, The Sources of Economic Growth in the United States and the Alternatives Before Us (New York, Committee for Economic Development, 1962) and Why Growth Rates Differ (Washington, D.C., Brookings Institution, 1967).

capital". 122/ Denison's survey covered only countries with relatively similar systems; an extension of the method to countries with very different educational levels could prove still more illuminating.

184. The collection of such basic data about the educational state of a population can be extremely valuable; it is often embodied nowadays in population censuses. To estimate the pay differentials and to isolate from many other factors the association between pay rates and education calls for a great deal more information and research. 123/ While highly appropriate as a topic for academic study on the international as well as national level, this approach to valuing "human capital" does not at present seem to warrant official guidance which would prejudice the answers to a number of complex economic and sociological questions.

Health as an element in "human capital"

185. The other main element in "human capital" may be the state of health of a population, of which the most summary measure is life expectancy at various ages. To this can be added mortality and morbidity in respect of various diseases, disabilities etc. 124/ These elements in the state of health could no doubt be expressed in terms of money, using for example an estimate of future earning power. Such valuations, if sufficiently disaggregated, could be one criterion for the allocation of resources within medical services - but certainly not an exclusive criterion. The basic "unit of account" is simply the loss of production due to a disease, expressed in man (or woman) years; valuation adds something if it is intended to compare the "returns" on expenditure on health services with those from some other form of expenditure. But the implications that the returns to health expenditure on the treatment of non-producers (other than children with a future productive capacity) are to be treated as zero may not be welcome. (Nor may be the logical implication that the diseases of high earners are worth more expenditure than those of low earners).

186. The alternative is the egalitarian one of treating all man (or woman) years of future life expectancy as equal. If the demographic data are known and if there is an acceptable convention about the "value of life" in terms other than expected earning power the calculation is simple enough. But its usefulness for macro-economic purposes is dubious.

122/ Towards a System of Social and Demographic Statistics suggests as one educational indicator "average number of years of education completed" by the population classified according to sex, age and national or ethnic origin (table 17.1).

123/ Reference may be made, for example, to the current work by Jan Tinbergen on education as a factor in income inequalities. For a summary of studies made in several countries about the relationships between education and pay, see G. Psacharopolous, Returns to Education: An International Comparison (Amsterdam, Elsevier Scientific Publications, 1973).

124/ For some illustrative indicators, see "System of social and demographic statistics (SSDS): draft guidelines on social indicators".

187. As was pointed out in paragraph 159 above, however, estimates of the value of life are made in other more specific contexts. Some valuations for calculations of environmental damage costs were quoted and it was pointed out that the same problem of valuation arises in compensation cases in legal practice. Cost-benefit studies, too, may involve such valuations. Operational decisions may be strongly influenced by them. For example, the choice between alternative road improvement schemes may depend upon balancing the benefits of time-saving against those of reducing accidents. 125/ For such specific purposes, an analysis and rationalization of the methods of valuation could be helpful and statisticians could usefully extend their professional contributions to the subject. At the present time, however, this is an appropriate topic for research workers rather than statistical offices.

125/ For this purpose, the United Kingdom Department of the Environment lays down quantitative guidelines for valuing time-saving, fatal accidents and non-fatal accidents. But, for obvious reasons, egalitarian valuations are adopted. Usher, in "Measures of changes in life expectancy" in M. Moss, op. cit., discusses the problems of measurement in general. He also calls attention (p. 210) to the wide range of valuations implied by certain operational decisions and by various researchers in the United States.

Chapter VI

APPROACHES TO INTERNATIONAL COMPARISONS: A HIERARCHY OF NEEDS

188. As indicated in paragraph 2 (b), the Committee for Development Planning of the United Nations expressed a very general feeling in stressing the need for measurements supplementing national accounts that "more accurately reflect genuine differences in economic welfare." 126/ A background paper for the Committee went on to suggest that "the spread of recorded per capita gross product is likely to be significantly greater than that of the per capita output of usable goods and services"; and that an indicator at uniform international prices of per capita "production and supply of consumer necessities common to all societies would be useful both for intercountry comparisons and for assessing changes over time". 127/

189. It is, of course, impossible unequivocally to distinguish "necessities" from other goods and services in the usual statistical categories of output or expenditure (food, clothing, housing etc.). In some countries and for some people a large proportion of consumption of food, for example, is very far from a necessity. It is well enough known, too, that economic development brings with it an increasing elaboration of goods and services (a more complex transport and distribution system, an increasing intervention of financial services, additional costs in packaging and advertising, more elaborate processes of manufacture etc.); this elaboration means that the price to the consumer becomes a multiple of the cost to the original producer of the basic product. Nor is it practicable for people in an economically complex society (other than an adventurous or energetic minority) to escape from the costs of economic complexity - even if they should wish to escape.

190. One approach would be to make use of data that is available or that could be collected on consumption in physical units. FAO already publishes statistics of supplies per head of many food-stuffs and textile fibres. For housing, data are available for many countries of dwelling space per person or per household and of the proportions of dwellings with running water etc. The social indicators and indicators of levels of living could extend the boundary. Although these indicators are invaluable in providing profiles of the various aspects of the state of a society, they do not in themselves permit the construction of unambiguous and objective aggregates that would serve as alternatives to per capita gross product. However, consumption of specific foods and of textile fibres could be weighted by prices representing some international average of costs of production of the basic commodity ("farm-gate" or c.i.f. import prices for food), ignoring the international differences both in quality and in the amounts of processing, distribution, taxation etc. embodied in the prices actually paid by the consumers. No doubt,

---

126/ Official Records of the Economic and Social Council, Fifty-fifth Session, Supplement No. 5, para. 17.

127/ The International Development Strategy; First Over-all Review and Appraisal of Issues and Policies (United Nations publication, Sales No. E.73.II.A.6).

this would considerably narrow the apparent gaps between rich and poor societies. The problem of deciding which items and what proportion of consumption should be regarded as necessities would still remain.

191. Another approach might be to make use of the extensive data collected - at present published for only 10 countries - for the International Comparison Project (ICP). 128/ The consumption data in great detail are expressed, for multilateral comparisons, in terms of "international dollars" (average prices for the countries included). The figures can be so arranged as to provide a kind of hierarchy of commodities that could be used to form some impression of degrees of "necessity", and to yield a more informative perspective on relative standards. It must be noted, however, that the consumption data, described as "quantities" valued at the international prices, are basically consumer expenditures incorporating the intercountry differences in quality and amounts of distribution etc.

192. A simple example - variety of comparisons of consumption per head between Kenya and the United States - may suggest some possibilities. The straightforward comparison of private consumption per head as shown by SNA data and valued at official exchange rates shows total consumption per head in Kenya at 3.0 per cent of that in the United States. The first modification introduced by ICP is to add to private consumption elements of government expenditure (education, health services etc.) that can be regarded as directly supplementing private expenditure; however, the ratio remains at 3.0. When the figures are converted at an exchange rate representing the weighted average purchasing power, the ratio rises to 5.6. 129/ If we take only a few major categories of consumption that may be regarded as representing "necessities", the following results emerge: 130/

Kenya

(United States = 100)

1.	Food	16.7
2.	Clothing and foot-wear	2.3
3.	Housing (gross rents and fuel)	2.8
4.	Total 1, 2, 3	8.2
5.	Education	13.6
	Total 4 and 5	8.7

Restricting the comparison to food greatly narrows the gap between the consumption levels of the two countries. Including clothing and housing as these are defined in

128/ I. B. Kravis and others, op. cit.

129/ This is the Fisher "ideal" index (geometric mean of Kenya and United States weights). Figures are from table 13.8 of Kravis, op. cit.

130/ Table 14.5 of Kravis, op. cit.

ICP - which are items greatly affected by differences in quality - widens the gap again. 131/ If education is also treated as a "necessity", the gap is once more narrowed.

193. A further disaggregation is shown in table 4, where the ICP data on consumption per head, under 25 headings, are ranked according to the Kenya/United States ratios. 132/ This ranking could, with many qualifications, be interpreted as one approach to the hierarchy of needs suggested above. More strictly, perhaps, it is a hierarchy of priorities as observed from the two consumption patterns. The gap widens from bread and cereals - Kenyan average consumption being two thirds of that in the United States - as we move down the list. The high place of purchased transport (line 2, mainly bus fares) in the Kenyan consumption pattern is particularly significant, since transport may not rank high in conventional lists of "necessities". Equally significant, if the consumption pattern is to be regarded as the result of collective value judgements, is the high place of education (line 6, mainly government expenditure on teachers' salaries in first and second stage education). The same applies to medical care (line 10).

194. The point in the scale at which "necessities", or priorities, end is left to the user's discretion. If, for example, the top six items of the 25 were to be taken as priority items of consumption then, as the cumulative percentages in the last column show, the average level of "priority consumption" in Kenya is shown as 23.6 per cent of that in the United States; if the top twelve are taken, the proportion becomes 12.9 per cent.

195. These arithmetical calculations (which need to be interpreted in the light of the special methodology used for ICP) are recorded simply to illustrate one of the many ways in which consumption standards may be compared.

131/ The estimates for housing (gross rents) admittedly cause great difficulties for comparison. Data on dwelling space are not available for Kenya. But the ICP comparison for India with the United States shows a consumption ratio for gross rents of 4.0; if floor area per person is taken, the India-United States ratio rises to 16.4 (table 9.1 of Kravis, op. cit.).

132/ The figures are rearranged from tables 14.4 and 14.5. A more detailed classification, under 109 headings of consumption, is given in appendix tables 14.4 and 14.5 of Kravis, op. cit.

Table 4. Kenya/United States of America: ratios of consumption per head

		Consumption per head: quantities valued at international prices (I$)		Kenya as percentage of United States of America	Cumulative percentage
		Kenya	United States of America		
1.	Bread and cereals	37.4	55.7	67.2	67.2
2.	Purchased transport	7.1	28.4	24.8	52.9
3.	Fruits and vegetables	23.1	114.9	20.1	34.0
4.	Fish	2.0	13.2	15.5	32.8
5.	Spices and sweets, sugar	6.5	47.6	13.7	29.3
6.	Education	20.1	148.3	13.5	23.6
7.	Milk and cheese, eggs	10.3	77.5	13.3	21.9
8.	Oils and fats	3.3	29.8	11.1	21.3
9.	House supplies and operation	7.1	83.2	8.5	19.5
10.	Medical care	11.1	131.6	8.4	17.5
11.	Meat	9.8	192.5	5.1	14.9
12.	Miscellaneous services	12.1	241.5	5.0	12.9
13.	Coffee, tea, cocoa	1.6	32.3	4.9	12.7
14.	Foot-wear	2.0	40.9	4.9	12.4
15.	Beverages	3.1	72.5	4.2	12.0
16.	Tobacco	2.1	61.8	3.4	11.6
17.	Fuel and power	4.3	153.3	2.8	10.7
18.	Gross rents	10.5	381.2	2.7	9.1
19.	Recreation	5.3	244.4	2.2	8.3
20.	Clothing	5.5	283.5	1.9	7.6
21.	Furniture, appliances	2.7	186.9	1.5	7.1
22.	Personal care	1.3	90.2	1.4	6.9
23.	Transport, operation costs	2.4	288.2	0.8	6.4
24.	Transport equipment	1.7	253.7	0.7	5.9
25.	Communication	0.3	42.2	0.7	5.8
	Total consumption	192.6	3 295.3	5.8 a/	5.8

Source: I. B. Kravis and others, op. cit. Derived from Summary Multilateral tables 14.4 and 14.5.

a/ This ratio comes from the multilateral comparisons. The bilateral Kenya/United States ratio quoted above is 5.6.

196. In conclusion it may be said that it is doubtful whether internationally comparable data can be compiled representing consumption of "necessities" in any strict sense. It is also doubtful whether there is any convincing way of comparing standards of life by any single figure that could replace GNP per head, at least for countries with very different economic and social structures. There is thus a real danger that the misleading use of money income per head, expressed in United States dollars, will persist as a general international criterion, simply because of its convenience and familiarity and because of the absence, in easily available form, of other indicators.

197. An aggravating factor results from the need to use official exchange rates for the purpose of converting magnitudes to a common currency. Official exchange rates are often unreliable guides to aggregate purchasing powers of currencies; and they can also fluctuate so that the apparent relative position of the purchasing power of countries may change, meaninglessly, overnight. The use of a mixed bag of currencies as a numéraire (on the principle, for example, of the new special drawing rights unit) instead of the United States dollar or any other single currency might be a small but not a fundamental improvement.

198. A much more important, but long-term, approach to realities can be made as the coverage of the International Comparison Project extends to an increasing number of countries. Although ICP may not in the foreseeable future cover all countries of the world, a wider coverage may become representative enough to allow (a) generalizing by some kind of stratified sample for groups of uncovered countries and (b) a more accurate use of short-cut methods based on a relatively few physical indicators of consumption etc.

199. A somewhat different approach, suggested in paragraph 190 above can be made through a fuller exploitation of available data on consumption of important foodstuff, textile fibres, fuels etc., in physical units. This approach could not cover more than a portion of total consumption (nor could it distinguish, except arbitrarily, between industrial and household consumption of certain commodities). But it could offer a useful supplement to GNP per head for public use.

200. In the end, however, it must be recognized that the concept of level of living is by its nature intensely complex and incapable of reduction to simple quantitative terms. In this lies the importance, for any evaluation of social and economic priorities in different parts of the world, of research into and publicity for the different patterns or profiles of living and the various ways in which scarce resources (not only monetary resources) are used for alternative ends.

Chapter VII

CONCLUSIONS

201. The purpose of this paper has been to review monetary measures of welfare that may be used to supplement national accounts and balances, with special reference to the use of such measures for international comparison and to their feasibility for government statistical work. It was stressed that the aim was not to suggest a reshaping of the national accounts but to consider supplementary measurements that would set in a broader perspective the indicators of economic performance exhibited by the major aggregates of the national accounts.

202. The question was raised (para. 18 ff.) whether such supplementary measures may be used to construct a different aggregate from the gross domestic product, designed to measure in monetary terms either "welfare" or some estimate of total "production" embracing both market and non-market activities. While the issue is open, the difficulties of finding agreement on the concept and measurement of any such aggregate are likely to render it inappropriate for official and especially international use. The basic problem would be to define just what is being measured.

203. The other course is to encourage the open-ended presentation of a number of welfare-related measures - whether or not these are included in the national accounts themselves - that could aid the interpretation and assessment of the familiar national accounting aggregates for policy formation, for economic and social analysis and for international comparisons.

204. This paper has not attempted to deal with one of the most important of all aspects of welfare, the distribution of income and wealth within national societies, since that has been the subject of separate consideration by the Statistical Commission of the United Nations. However (as with social and demographic statistics), most of the topics dealt with in this paper, if they are worth measuring at all, would gain greatly in significance from measurements with a distributional dimension - a disaggregation by geographical area, by income groups and by other socio-economic characteristics. The statistics of environmental conditions and pollution, in particular, need a regional dimension for most operational uses.

205. Table 5, at the end of this chapter, contains a list of the various topics discussed in earlier chapters, together with an attempt to summarize very briefly some of the considerations relevant to each.

Data needs

206. An important distinction must be made between the different kinds of data required for the various measurements - assuming that the measurements are considered worth making. For some, the basic data must be in monetary terms from the start. These are items already included in the accounting (or survey) data from which the existing national accounts are derived: household "instrumental"

expenditures (1.6 in table 5); enterprise subsidies to households (1.7); government expenditure on functions that some would regard as "instrumental", such as law and order (2.1) or on contributions to households, such as health and education (2.2); government and enterprise expenditure on environmental functions (3.1). In these cases, however, the separation of the types of expenditure specified, including the appropriate analysis of both central and local government accounts, calls for a very considerable statistical effort.

207. For the other topics, the majority of those discussed, the statistical problem falls into two parts: non-monetary or "physical" data, which are needed as a starting point; and the problem of imputing values.

208. The non-monetary data fall into several groups of varying degrees of availability and difficulty of collection:

(a) Demographic data: needed for analysis of occupational status by age and sex etc. These are generally available (needed for productive household activities (1.2, 1.3, 1.4)). They are also relevant to "human capital" (4.3).

(b) Time-budgets: needed for analysis of productive household and leisure activities (1.2, 1.3, 1.4, 1.5) and for some instrumental household activities, such as commuting (1.6); for the last item, however, data may be obtainable through household expenditure budgets. Occasional data exist for a few countries. 133/

(c) Own-account production data (1.1). Although estimates are generally made, they often need considerable improvement in accuracy and in coverage.

(d) Ownership surveys of consumer durables (1.8) or sufficient historical data on household expenditure (up to 10 years perhaps) to compile a perpetual inventory of stocks. Ownership surveys exist for most countries for automobiles and for many countries for a range of other goods.

(e) Physical measures of pollution emissions and other environmental damage (flows and measures of states). A wide variety of statistics is needed, as discussed in chapter IV. Special importance may be attached to:

(i) Monitoring data on the state of air, water etc. A great deal of information exists but there is need for agreement on standards and methods;

(ii) Estimates of waste emissions and use of "public goods" (especially water) for at least selected industrial processes;

(iii) Medical data on relationships between specific pollutants and disease.

(f) Sample surveys and micro-data sets. For many of the topics discussed, the accounts of empirical analyses - such as the Nordhaus/Tobin and Japanese estimates - show a reliance on over-all estimates, admittedly tentative and experimental, which is often the most that can be done from the data now available. For operational and analytical purposes, however, over-all estimates for a nation

---

133/ See paras. 62 ff. and 74.

are inadequate. This applies particularly to the complex of environmental statistics but also to many of the other topics where a geographical disaggregation or a disaggregation by income groups or other socio-economic factors is important (e.g., the impact of government activities on the welfare of particular groups). Thus the building up of rather detailed statistics (probably by samples) can be a very necessary approach to providing a body of useful data.

209. For most of the topics, obtaining these non-monetary statistics presents by far the biggest practical problem for the statisticians. The second set of problems - the imputation of monetary values - presents basically philosophical or conceptual problems. Once the appropriate method is settled, the data for imputation are not, for the most part, too difficult to find (e.g. the appropriate wage to impute to housewives), especially since a rather wide degree of approximation is generally acceptable. But the exceptions are quite substantial: for example, if it is desired to impute values to changes in mortality and morbidity for reckoning pollution damage or to value the educational state of a society by valuing the income differentials due to education, the necessary data are not always easy to find.

Priorities

210. An effort has been made in table 5 to describe certain items tentatively as priority items. It is recognized, however, that it may not really be useful to ascribe priorities applicable to all countries. Too much depends on the importance attached to the various topics in the very different circumstances of individual societies. Priority depends, too, on the weight to be given to each of these topics in relation to all other demands on limited statistical capacity. This is one reason why the usefulness of suggesting an alternative aggregate for welfare or some concept other than gross domestic product may be doubted; statistical offices may be prepared to put resources into some of the measures suggested but not into others and the selection may well differ, for good reasons, from one country to another.

211. In considering, from the point of view of supplementary measures of welfare, what useful action may be taken in these areas by the Statistical Commission of the United Nations and by government statistical offices and without trying to assign priorities to every item discussed the following suggestions are put forward for consideration.

(a) As regards the various topics considered, it is suggested that the following may be regarded as particularly important for a wide range of countries:

(i) The establishment of a system of environmental statistics, comprising especially:

Data from government and enterprises about money expenditures on pollution abatement and control;

Special-purpose classifications of industries or industrial processes particularly liable to emissions of pollution;

Co-ordination of the various measurement activities of environmental and other organizations to allow integration with the general body of economic and social statistics;

(ii) The promotion of a more detailed functional analysis of expenditures by general government, providing a separation particularly of expenditures that supplement private consumption ("collective consumption", such as health and educational services) classified in the same way as private consumption to allow the calculation, by function, of "total consumption of the population". 134/

(b) As regards the imputation of money valuations to non-market activities (other than those normally included in national accounts):

(i) It is recognized that in many cases imputations may well be considered inappropriate for official statistical services. They necessarily depend heavily on untestable assumptions that may be thought to give an appearance of authority and accuracy that they do not deserve. Much depends, however, on how substantial are the differences between different plausible assumptions;

(ii) At the same time, the non-monetary data that would be required for imputation (e.g., numbers of full-time and part-time housewives or students; amount of time spent in travel to and from work; numbers and kinds of people afflicted by pollutants; number of people with different educational qualifications etc.) have great value in themselves, without any monetary imputations, for policy, for analysis and for international comparisons. The provision of these non-monetary data by statistical offices, so far as possible according to uniform standards, needs to be actively encouraged. Many are incorporated in the proposals for social and demographic statistics;

(iii) Nevertheless, the imputations - such as those for Japan and the United States described earlier - provide a powerful new approach to the understanding of economic and social change just because they can be measured, in the common unit of money, against the national accounting variables. They can mislead if the underlying assumptions are not very specifically explained. While the making of substantial imputations may be regarded as more appropriate for unofficial researchers and research organizations than for government statistical offices, the important point is that government statistical offices should ensure that the basic non-monetary data are available;

(iv) The few national essays in imputation available do not (as examples given above show) easily lend themselves to comparison - partly because of differences in methodology and definition. A more intensive study

---

134/ This also involves more detail than is at present provided by many countries about private expenditures on health, education etc.

of these differences, as well as of differences inherent in the relevant social and economic conditions of the countries concerned, may well promote the use of these monetary measures for international comparisons of the elements in welfare involved.

(c) One statistical instrument for the measurement of several welfare-related variables in the household economy is the time-budget (included among the proposals for the extension of social and demographic statistics). The techniques, definitions, interpretation and use of time-budgets may deserve further study in countries not so far familiar with them, especially with a view to promoting comparability.

212. One final remark: for most of the topics discussed (one exception is the functional analysis of government expenditures), not much is gained by frequent (e.g. annual) measurements. The trends are likely to be slow-moving and the value of the estimates lies essentially in the better interpretation of long-term tendencies.

Table 5. Summary of some characteristics of the topics discussed

	Topic	SNA treatment	Included in SSDS	Market or non-market activity	Kind of basic data needed	Usual basis for monetary imputation	Tentative priority: For non-monetary data	Tentative priority: For monetary data
1.	Household economy (chap. II)							
	Productive activities:							
1.1	Own-account food etc.	Final output a/	a/	NM	Physical output	Producers' price	Yes	Yes
1.2	Housework	Excluded	b/	NM	Demographic; time-budgets	Market pay	Yes	No
1.3	Students	Excluded	b/	NM	Education statistics; time-budgets	Market pay	Yes	No
1.4	Volunteers	Excluded	b/	NM	Time-budgets	Market pay	No	No
1.5	Leisure activities	Excluded	b/	NM	Time-budgets	Market pay	No	No
1.6	Instrumental activities (travel to work)	Final output a/	b/	M	Time-budgets; household budgets	None	Yes	No
1.7	Enterprise subsidies to households	Intermediate a/	a/	M	Enterprise expenditures	None	*	Yes
	Durable consumer goods:							
1.8	Stock	Included in assets	Yes	NM	Ownership survey; perpetual inventory	Replacement cost	Yes	No
1.9	Flow of services	Excluded	No	NM	Imputation	Depreciation, interest	*	No
2.	Government expenditures on goods and services (chap. III)							
2.1	Intermediate (e.g., law and order)	Final output a/	Yes a/	M	(Functional analysis of government expenditure)	None	*	Yes
2.2	Final (education, health ...)	Final output a/	Yes a/	M		None	*	Yes
3.	Environmental and pollution variables (chap. IV)							
3.1	Expenditures on pollution abatement and control	Intermediate or final d/	No	M and NM	Functional analysis of government and enterprise expenditures	None	*	Yes
3.2	Hypothetical costs of restoration	Excluded	No		(Variety of physical and expenditure data including medical statistics)	Various	*	No
3.3	Damage costs	Part included a/	No	M and NM		Medical costs, value of life, cities' social costs	Yes	No
3.4	Input-output balances	Excluded	No	NM	Engineering and chemical data and estimates	Various	Yes	No
4.	Measurement of assets (chap. V)							
4.1	Commercial natural resources	Included as assets	No	M	Physical quantities	Market values	Yes	Yes
4.2	Public goods (air, water ...)	Excluded	No	NM	Physical quantities	?	Yes	No
4.3	Human capital	Excluded	f/	NM	Educational and income statistics	Value of life, value of education etc.	Yes	No
5.	Alternative international comparisons (chap. VI)				Adjusted expenditures; physical quantities	ICP e/	Yes	Yes

* Not relevant.

a/ Included but not generally specified separately.

b/ Included in form of time-budgets.

c/ Intermediate and final not distinguished.

d/ Intermediate or investment for enterprises; final (current or investment for government).

e/ International Comparison Project.

f/ The stock of educational attainments of the population is measured in non-monetary terms only.

كيفية الحصول على منشورات الامم المتحدة

يمكن الحصول على منشورات الامم المتحدة من المكتبات ودور التوزيع في جميع أنحاء العالم . استعلم عنها من المكتبة التي تتعامل معها أو اكتب الى : الامم المتحدة ،قسم البيع في نيويورك او في جنيف .

如何购取联合国出版物

联合国出版物在全世界各地的书店和经售处均有发售。请向书店询问或写信到纽约或日内瓦的联合国销售组。

HOW TO OBTAIN UNITED NATIONS PUBLICATIONS

United Nations publications may be obtained from bookstores and distributors throughout the world. Consult your bookstore or write to: United Nations, Sales Section, New York or Geneva.

COMMENT SE PROCURER LES PUBLICATIONS DES NATIONS UNIES

Les publications des Nations Unies sont en vente dans les librairies et les agences dépositaires du monde entier. Informez-vous auprès de votre libraire ou adressez-vous à : Nations Unies, Section des ventes, New York ou Genève.

КАК ПОЛУЧИТЬ ИЗДАНИЯ ОРГАНИЗАЦИИ ОБЪЕДИНЕННЫХ НАЦИЙ

Издания Организации Объединенных Наций можно купить в книжных магазинах и агентствах во всех районах мира. Наводите справки об изданиях в вашем книжном магазине или пишите по адресу: Организация Объединенных Наций, Секция по продаже изданий, Нью-Йорк или Женева.

COMO CONSEGUIR PUBLICACIONES DE LAS NACIONES UNIDAS

Las publicaciones de las Naciones Unidas están en venta en librerías y casas distribuidoras en todas partes del mundo. Consulte a su librero o diríjase a: Naciones Unidas, Sección de Ventas, Nueva York o Ginebra.

Litho in United Nations, New York
36061—August 1977—3,450

Price: $U.S. 4.50
(or equivalent in other currencies)

United Nations publication
Sales No. E. 77. XVII. 12