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**HANDBOOK
OF THE
INTERNATIONAL
COMPARISON PROGRAMME**

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PREFACE

The present Handbook is part of the technical documentation prepared for phase VI of the International Comparison Programme (ICP). The ICP is a world programme to produce estimates, comparable across countries in real terms, for the gross domestic product and its main aggregates. In the process, purchasing-power parities are obtained and used instead of exchange rates for converting data into a common currency.

The aim of the present document is to contribute to spreading technical knowledge needed at the national level by staff responsible for work on the ICP, especially in developing and newly participating countries. It deals mainly with ICP data requirements and offers guidance for related country operations. Moreover, the document is expected to help promote uniform understanding of the methodological principles in various countries and regions, thus ensuring minimum ICP standards to obtain comparable regional results and to facilitate linking them into a world comparison.

There is a wide range of written information available on general methodology of international comparison of prices and volumes, mainly published along with the reports on previous phases of the ICP. However, in the 25-year history of ICP, this is the first attempt to publish a Handbook that includes practical instructions on how participating countries should act in order to achieve a successful application of the general methods. Reflecting the needs for practical guidelines on the tasks country statistical offices have to carry out, the United Nations Statistical Commission, at its twenty-fifth session, gave priority to the publication of a Handbook for the ICP. 1/

In preparing the Handbook, the Statistical Division of the Department of Economic and Social Development received valuable assistance from a variety of sources. The conceptual framework and initial outline of the Handbook were elaborated by the late outstanding ICP experts, Messrs. Hugo Krijnse-Locker and Laszlo Drechsler. Acting as a consultant to the Secretariat, Mr. Drechsler prepared major portions of the first draft of the Handbook, which was supplemented by the work of Mr. Michael Ward of the World Bank. Professor Alan Heston of the University of Pennsylvania, with financial support from the World Bank, assisted the Secretariat by preparing a revised version of the full text of the Handbook. This draft text was widely circulated for comments and, working closely with the Statistical Division, Professor Heston incorporated the various comments received into the draft. The working document on the expenditure classification, included in annex III, was prepared by the Secretariat.

In its present form, the Handbook reflects, to the extent possible, the various useful suggestions forwarded to the Statistical Division during the several rounds of consultations with experts. In this regard, the substantial contributions of national and international organizations, such as the World Bank, the Organisation for Economic Cooperation and Development, the Austrian Statistical Office and the Institut national de la statistique et des études économiques (INSEE) of France, deserve particular mention. Naturally, one publication cannot answer all the questions in a programme as complex as the ICP. Thus, although the Handbook is intended to serve as a major source of information on ICP methods and their application, it will need to be supplemented by additional technical documents from time to time. Moreover, it is meant to be used together with any documentation prepared for the regional comparisons associated with ICP.

It is possible that, on the basis of further experience with comparison work in phase VI, it will be found useful to issue a revised ICP Handbook sometime in the future. The Statistical Division welcomes communications from users of the Handbook, country and international organizations involved in ICP work, concerning their experiences with the applicability of the Handbook.

1/ Official Records of the Economic and Social Council. 1989, Supplement No. 3 (E/1989/21), para. 108.

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I. INTRODUCTION

A. Purpose of the Handbook

1. The purpose of this Handbook is to assist national statistical agencies in collecting basic data and organizing their work so as to enable them to participate in the International Comparison Programme (ICP). Over the nearly 25 years of the ICP, a large volume of written material and much practical experience has been accumulated; however, guidance to participating countries in the form of a handbook has not been available. The United Nations Statistical Commission, at its twenty-fifth session, in 1989, attached high priority to the preparation of a Handbook on the ICP. The Commission considered that, in spite of the impressive progress achieved in the theoretical and methodological work of international comparisons in the past two decades, those working in national statistical offices on the ICP had received only limited guidance, since detailed instructions on the work to be carried out were often lacking. To remedy that situation the Commission urged the Statistical Office of the United Nations Secretariat to make arrangements for preparing a handbook on the ICP as soon as possible.

2. The present Handbook relies extensively on country experience and operating procedures developed during earlier ICP work. There are extensive publications on methods and results of the ICP, ^{2/} as well as many unpublished working papers that are often more theoretically oriented than appropriate for a handbook to be utilized in the practical work of the ICP. The reference section of the Handbook cites the more theoretical references, and annex II contains a brief discussion of some methodological aspects of the ICP. However, the main body of the Handbook is practical in its orientation, focusing on those tasks that national statistical offices will need to carry out when participating in the ICP. Countries participate in the ICP directly through an organization such as the European Communities (EC), a regional group such as the Economic and Social Commission for Asia and the Pacific (ESCAP) or an intercontinental grouping, for example, the Organisation for Economic Cooperation and Development (OECD). The history and organization of the work associated with groups of countries, and the combined overall world comparison of the ICP are described in annex I.

3. The remaining sections of this chapter include a description of the international role of the ICP in terms of price and output statistics (section B); the basic ICP framework (section C); an outline of the basic data required from participating countries and its relation to national statistics (section D) and uses of the ICP results (section E). Chapter II shows the expenditure breakdown used in the ICP, while chapters III and IV treat the problem of item selection and price collection, including problems specific to particular expenditure groups. In chapter V, an outline of how the ICP data are processed is presented, with some methodological details provided in annex II.

B. The Place of the ICP in international statistics

4. The ICP produces internationally consistent price and quantity comparisons across countries for many of the components of and the total of gross domestic product (GDP) built up from detailed prices and expenditures. As discussed in section E below, these comparisons are useful for a variety of purposes. GDP, which represents the total of final expenditures of a country during a year, has been the focus of the ICP because it is the single measure most often used to represent the total economic size of countries, and on a per capita basis to represent the flow of goods and services available to countries to contribute to their economic well-being. The ICP generates its results on the basis of hundreds of item price comparisons for many detailed headings of expenditure on GDP.

5. The ICP is unique in that it requires both country statistical offices and international agencies to split responsibilities in compiling and processing the basic price and expenditure data. This sharing of work and exchange of information either between neighbouring countries at regional meetings or through ICP intermediaries requires more interaction than most international statistical programmes; however, these shared tasks have the benefit that countries learn the practices of other countries in some of the difficult areas of international statistics such as deflation of government services or imputing rent to owner-occupied dwellings.

6. Because some of the burden of averaging and weighting across countries is assumed by the secretariats of country groups, country statistical offices do not have to take on these tasks. All of the procedures of the ICP are discussed in this Handbook, but greater emphasis is given to those tasks that are the main concern of national statistical offices.

7. The draft revision of the System of National Accounts (SNA) discusses the ICP in the context of price and volume measures. National accounts statisticians generate deflators of various components of GDP and comparable real quantity or volume estimates over time. The ICP in essence is an attempt to extend national accounts so as to produce comparable price and volume estimates across countries. The benchmark ICP comparisons produce national accounts across participating countries that provide users consistent volume measures. In the phase V benchmark, for example, all national currency expenditures are expressed in a common currency unit (CCU), say 1985 dollars, at detailed and higher levels of aggregation. In terms of ICP terminology, there is a purchasing-power parity (PPP) between national currencies and the CCU that allows for the conversion of national currency expenditures to the CCU, permitting volume comparisons between countries. Related to the PPP is another concept, the national price level which expresses the PPP as a ratio to the exchange rate.

1. National Price levels and related concepts

8. Consider the following comparison for Japan and the United States for 1985 and 1988, taken from OECD National Accounts (1960-1989) (OECD, 1991), which illustrates several of the basic concepts of the ICP. The value for Japan is expressed in current dollars, converting current yen per capita GDP at exchange rates in column (1) and at PPPs in column (2), labelled nominal and real. Because the current United States dollar is the numeraire for the OECD countries, its GDP per capita is the same in both columns. In columns (3), (4) and (5), the exchange rates, PPP over GDP, and their ratio are provided. When national currency GDP is converted by PPPs, the result is referred to as real product or real output. The use of real as an adjective in international comparisons is to contrast it with conversions at exchange rates, termed nominal. This usage is similar to national practices calling constant price series real and current price series nominal.

Table 1. Aggregate ICP illustration

	<u>Per capita GDP</u>		<u>Exchange</u>		
	Nominal (1)	Real (2)	Rate (3)	PPP (4)	Price level (5)=(4)/(3)
Japan					
1985	10 981	11 805	238	222	0.933
1988	23 190	14 288	128	208	1.625
United States					
1985	16 581	16 581	1.0	1.0	1.0
1988	19 558	19 558	1.0	1.0	1.0
Japan/United States					
1985	0.662	0.712			
1988	1.186	0.73			

9. Table 1 illustrates how exchange rates can fluctuate from year to year without any necessary change in the relative purchasing power of the two currencies. It also shows how use of exchange rates as converters can produce implausible results, such as those in column (1) in the last two rows. At exchange rates, Japan is reported at 66.2 per cent of the United States per capita in 1985 and 118.6 per cent in 1988, during a period when Japan was growing only slightly faster than the United States. The more plausible and more stable comparison in column (2) is one of the principal advantages of using PPPs to convert national currency totals to a common currency.

10. Column (5) is termed the national price level of a country, and is simply the Japan/United States PPP divided by the yen/dollar exchange rate. Though not a common term, the national price level is a simple concept well understood by travellers, who often refer to countries as being expensive (a high national price level) or inexpensive to visit. In fact, historically, there have been many casual efforts to estimate PPPs precisely because so much interest attaches to how both relative prices and overall prices differ across countries.

11. The national price level allows one to compare the relative costs of the bundle of goods making up GDP between countries. For components of GDP such as investment, the term comparative price level is used. Since there are often large differences for countries between comparative price levels of various components of GDP and the national price level, this is a useful concept for many types of analysis. Two other useful price level concepts are country group price levels, as, for example, the price level of Africa or the EC relative to the numeraire, and within-country price levels (e.g., provincial, regional or urban). These concepts are further explained below in the discussion of international prices.

12. National price levels vary systematically, rising with the level of per capita GDP of countries. If the United States is the numeraire and its national price level is taken as 100, then it was found in the 1980 benchmark study that the price level for low-income countries was about 30 to 40, middle-income countries in the 50 to 80 range, and higher-income countries in the 80 to 140 range. Two countries that would be regarded in the middle and lower middle-income range, Argentina and Nigeria, both had national price levels in 1980 above 100. National price levels so far above the levels of similar countries immediately suggest unusual exchange rate policies, which was borne out by subsequent major depreciations of the currencies in both countries. Similarly, sharp movements of the national price level over time are usually a signal of important changes in the international position of a country. 3/

2. National accounts and the ICP

13. The systematic attempt to integrate PPP and real product comparisons with national accounts was only begun in the 1950s. Looking backwards, the ICP can be seen as a logical extension of the national accounts from current and constant price data in national currencies to an intercountry set of international accounts. In national accounts, the price deflators associated with obtaining constant price GDP and its components are of interest in themselves as a measure of temporal price movements. In the ICP, the PPPs allow us to convert national currency aggregates into a CCU allowing volume comparisons; the national price level, derived from the PPP, is the spatial deflator across countries, and like the GDP temporal deflator, is analytically interesting in and of itself.

14. It was noted above that at the operational level the ICP is different from other national accounts work for one fundamental reason. Country statistical offices can obtain constant price national accounts using price information of their choice to obtain deflators. However, for the ICP, country statistical offices must coordinate with other countries so that price comparisons across countries can be made for a comparable bundle of items. As will be discussed in chapter III, this is usually the most difficult task of the ICP.

15. In most countries, GDP can be obtained from expenditure, income or production-side estimates. The ICP may, in principle, include all three approaches to obtaining GDP, but the only operational choice is between the expenditure and production approaches. In fact, thus far the ICP has made all of its comparisons across countries by expenditure category breakdowns, that is, household consumption, government consumption, capital formation and net exports (i.e., exports minus imports). The alternative of breaking down gross domestic product by industrial categories, for example, value added produced by agriculture, mining, manufacturing etc. and their component sectors, is for many purposes more attractive. However, in general, comparability by industrial category is much lower than comparability by expenditure category, since production pattern differences among countries are generally much larger than final use (expenditure) differences. In addition, the preferred approach to the production side would require price comparisons for both final product and inputs (double deflation) for each industry breakdown, a much larger data demand than for comparisons from the expenditure side.

16. Despite these difficulties, there remains a strong interest on the part of various users for industrial category breakdown comparisons, especially for studies of growth and productivity. Several pioneer studies in this field (mostly using bilateral comparisons of product and productivity, restricted to some branches of activities) have already been carried out using different methodologies (Paige and Bombach, 1959). Although the ICP has not yet ventured into this difficult and costly field of the international comparison work, some researchers have reworked the final expenditure results to come up with an adjusted industry of output set of numbers reflecting purchasers values. A major research effort carried out at the University of Groningen by Maddison, Pilat and Van Ark has worked at obtaining PPPs for the production accounts at a fairly detailed level but has not made price comparisons for inputs. However, this project has provided a major stimulus for additional work on the production side.

17. While cooperation between countries for price comparison work has been emphasized in this introduction, it should also be made clear that countries have much to gain from one another in the comparison of expenditures. The expenditure framework of the ICP allows Governments to think more coherently about the overall consistency of their GDP expenditure estimates, particularly those relating to household consumption. Comparisons of the percentage distribution of consumer expenditures between countries immediately signals a country regarding the areas where their national accounts compilations may require review, especially when total consumption has been estimated as a residual. As discussed in chapter II, as countries work with regional coordinators, there is much sharing of information about how to make use of administrative records, household surveys and commodity flow information so as to break down residual expenditure groupings into meaningful detail.

C. The ICP Problem in outline

18. The PPP calculation can be conceived as a special price index computation, where the dimension of the comparison is space, instead of time. In other words, instead of comparing the prices of two time periods (in a given country) the prices of two countries (in a given period) are compared. Consider two countries, A, the numeraire, and B. For a given item, we can write the ratio of the national currency expenditures on the item of the two countries as,

$$(1) q_B \cdot q_B / q_A \cdot q_A = E_B / E_A$$

where q refers to quantities, p refers to prices, and E to expenditures. In equation (1), we can rearrange terms to get

$$(2) q_B / q_A = (E_B / E_A) / (p_B / p_A).$$

The left-hand side gives a measure of the quantities of the given item in B relative to A. The term (p_B / p_A) is the $PPP_{B/A}$ for the item. We can then rewrite equation (2) as:

$$(3) IQ_{B/A} = (E_B / E_A) / PPP_{B/A}$$

where $IQ_{B/A}$ denotes a volume index of the item in B relative to A.

19. A relationship that is valid for a given item can be generalized to an aggregation of items; thus, for an aggregation like capital formation, the relationship in equation (3) above will also hold. More generally, we can think of the quantity index between B and A being derived from the ratio of the national expenditures in B and A divided by the purchasing-power parity. This will hold whether the quantity index pertains to an item, or to an aggregation like food, capital formation or all of GDP.

20. The form of equation (3) emphasizes the derivation of quantity indexes from expenditures and prices, which is the usual procedure in the ICP. In this case the quantity comparison is derived and should, where possible, be checked against direct quantity comparisons. For example, when in phase III initial results became available showing that meat consumption in the United States was low compared to

several European and Latin American countries, checks were made against physical indicators of meat consumption. In this case, direct quantity indexes supported the indirect estimates. When direct information on quantities or quantity indexes are readily available and/or price information is difficult to obtain, it may be preferable to rearrange equation (3) and to derive PPPs from expenditure ratios divided by direct quantity ratios.

21. The overall PPP for GDP is built up from comparisons of item prices within smaller groups of expenditures that, in the terminology of the ICP, are referred to as basic headings. The requirements for basic headings are (a) that value data, representing national expenditures, can be estimated for each basic heading and (b) that the basic headings be as homogeneous as possible from the point of view of the potential dispersion of the price ratios across countries of the goods and services belonging to each respective heading. Usually, the basic heading level is chosen on the basis that, within a basic heading, more detailed expenditure weights are not available. Since country groups will differ on the amount of expenditure detail that is available, the number of basic headings distinguished has varied between 150 and 258 for different regions and country groups within the ICP.

22. Within each basic heading, a country will provide prices for a selection of individual items from a set of written specifications developed by the ICP over the years. Within a basic heading, price ratios of individual items, such as a kilogram of long-grain rice in a plastic bag, are aggregated to produce a price parity at the basic heading level. The price ratios and basic heading parities are all denominated in CCUS, national currency units per unit of the numeraire currency. For example, if country A is the numeraire country and its price of long-grain rice is \$2 per kilogram, and the price in country B is 28 rupees a kilogram, the price ratio will be 14 Rs/\$.

23. The parity for a given basic heading is an average of the price ratios of the representative items that belong to it, taking into account all of the prices supplied by all the countries in a group. In most country groups, these basic heading parities are unweighted averages, and they can be obtained in several ways. This averaging will usually be carried out by ICP staff imposing no workload on country statistical offices; the procedures are discussed in chapter IV in some detail because an understanding of these methods is important for countries in making their item selection.

24. Once the price parities for each basic heading have been obtained, they in turn need to be averaged over all of GDP in order to get a term like $(p./yq)$ in equation (2) or $PPP./$, in equation (3) above. There is considerable literature on the alternative ways of carrying out this aggregation of basic heading parities. The literature is large because this aggregation involves weights and is another variation of the index number problem that has occupied economists and statisticians for decades. These issues are important but generally do not affect country data collection, and so discussion is reserved for annex II.

25. The inputs provided by country statistical offices to the ICP, then, are expenditures at the basic heading level and prices of items appropriately representing for that country each basic heading. This is the first and most basic step in moving from national data to international comparisons of real volumes and purchasing-power parities.

26. The regional and central organizations of the ICP then produce price parities at the detailed heading level. This stage of the work both provides a check on country data, often followed by an exchange of inquiries about the prices for particular items, and generates the inputs for the next stage of the ICP.

27. When countries and the regional and central ICP personnel have been satisfied that the price and expenditure inputs are clean, the next set of estimates is made. For each country group, such as ESCAP, the group expenditure matrix in national currencies, with basic headings on the rows and countries on the columns, combined with a comparable matrix of basic heading parities, is transformed into a matrix of real expenditures in common currency units. Entries of this latter matrix can be compared across countries at the detailed heading level or any higher level of aggregation up to GDP. Usually results are published for some 55 aggregates, such as construction, where national currency expenditures, real volume indexes, purchasing-power parities and national price levels are provided. In some regional comparisons, results have been published at the basic heading level, but whether or not they are published, the basic input

expenditure and parity data at the basic heading level can be made available to those interested in these data.

28. The procedure used in the ICP to generate the matrix of real expenditures is described in annex II. In effect, a set of international prices are used to value the basic heading national quantities (basic heading expenditures divided by parities) in each country. These international prices are an average weighted by the quantities in each country. What is important to understand about the international prices is that their pattern will be different in each region and from the world pattern. This has advantages, for example, one can compare country group price levels with the world, as well as the disadvantage that volume comparisons between countries will depend on which set of international prices are used.

D. Value of the ICP data provision to country statistical offices

29. Country statistical offices see both sides of the ICP, the development of the basic price and expenditure data inputs and the final regional and world output. In chapters II and III, the relationship between existing national statistics on expenditures and prices and the expenditure and price necessary for the ICP is discussed in detail. Specifically pointed out are the ways in which the ICP data requirements may be coordinated with national statistical programmes.

30. Some statistical offices have found that the price specifications provided by the ICP can be usefully integrated into their regular data collection surveys. Examples of this, such as the use of producer durables specifications by Hong Kong to develop a new import price index or the need for national average prices providing a stimulus for broader regional coverage of the consumer price index for a number of African countries, are discussed in chapter III. In general, the organization of the ICP data needs are intended to facilitate statistical offices in integrating these price and expenditure requirements into their regular national accounts estimates and price survey programmes. The more the ICP can supply meaningful data requirements that are close to or complement national statistical objectives, the less will be the burden of participation to country statistical offices.

31. If most of the ICP data needs can be integrated into regular data collection of national statistical offices, it is likely that benchmark comparisons can be generated routinely, even on an annual basis. The Statistical Office of the European Community (EUROSTAT) has been moving in this direction since its 1985 comparisons, and the remainder of the OECD countries also have annual comparisons as a goal. In the near future, it may not be possible for ICP comparisons to be carried out on an annual basis in regions with a large number of developing countries. However, it is still an important goal to integrate as many data requirements of the ICP as possible into routine collection of participating countries, because this will reduce national and international resource requirements for statistics.

32. A survey of the 22 African countries that participated in phase V of the ICP for 1985 was recently conducted. The results indicate that the methodology and data collection procedure used in the ICP has led to an improvement in basic statistics in the overwhelming majority of those countries, especially in the field of price statistics. The particular gains include more uniform classifications of expenditures, more attention to item specifications and quality differences in time-to-time price measurement, and improved outlet and spatial coverage. Several of these points are discussed in more detail in chapter III.

33. The price embodied in national accounts is a national average price, and this is the price concept of the ICP. Where internal prices within countries differ substantially for the same item between provinces and States, or between rural and urban areas, it is particularly important for countries to have this information as a guide to cost-of-living differences within the country. The national average price, built up from prices in various rural and urban centres, not only provides information on the degree to which various parts of a country are economically integrated, but in some countries it provides a basis for cost-of-living pay differentials within the country. Finally, regional price information generated in obtaining national average prices may allow countries to better measure regional differences in per capita income, or the regional distribution of poverty.

E. Uses of the outputs of the ICP

34. In addition to the aggregate result, namely the PPP over GDP that allows countries to convert per capita incomes to a comparable basis, the output of the ICP provides results at the basic heading and summary category level. Looking first at the aggregate results, these have been of considerable interest for both research and, at the regional or group level, assessment purposes. Regarding research, for many applications, analysts like to examine a dependent variable, such as infant mortality, in relation to an income measure and, usually in empirical applications, real GDP converted at PPPs is preferable to an exchange rate measure. In the Human Development Report (UNDP, 1991), the Human Development Index (HDI), for example, has been constructed using a measure of real product derived and extrapolated from ICP benchmark studies as one part of their overall index.

35. Both the European Communities and OECD regularly publish results of the ICP as part of their national accounts. The results have also been used for administrative purposes within EC, where for example, some social disbursements in the Community have also been made partly dependent on the PPP-based per capita GDPs of member countries. This operational use of the ICP results has, of course, reinforced the interest of those countries in actively participating in this activity.

36. At the world level in general, ICP results have not been used for assessments in the United Nations, or for concessionaire loan rates in the World Bank. The principal reason for this is that both institutions had an operational system in place prior to the ICP, and there was natural reluctance to immediately change it when improved estimates became available. Further, the benchmark estimates were usually available with a lag of several years and only covered a portion of the countries of concern to the United Nations and the World Bank. It has been the position of the Statistical Commission at recent sessions that, at the world level, ICP results would not be used for administrative purposes.

37. The ICP results at the detailed heading and summary category levels provide rich information of interest to both researchers and countries. First, the ICP output allows countries to compare their per capita quantities of expenditures on food, education and the like with countries from their region or group. Often, these comparisons turn up surprising results. For example, a comparison of the share of capital formation in national currencies between India and the Philippines based on the 1980 phase IV study reveals that, in 1980, the share for the Philippines was 30.6 per cent, 25 per cent higher than in India, where the share was 24.5 per cent. This illustration presents the investment share of GDP expenditures at national prices. Even when national currency expenditures for all components of GDP are converted to a common currency by, say, the exchange rate, it still preserves the national shares and in effect makes the comparison at national prices.

38. If one is interested in comparing the volume of capital formation in the two countries, however, then the valuation of investment goods in each country should be at a common set of prices, such as the international prices of the ICP. When investment goods are valued at international prices, the share in the Philippines drops to 21.7 per cent and in India the share also drops, but only to 23.2 per cent, so, on this basis, the volume of capital formation out of GDP is larger in India than in the Philippines.

39. This illustrates two points. The first is that prices of investment goods are high relative to other prices in both countries and, in fact, in most of the developing countries. This occurs despite the fact that construction costs are generally lower in low-income countries. The differences in international and national prices stem from comparative production costs, transport costs particularly for many African countries, and frequently from policies such as quotas and tariffs that raise the price of imported capital goods in the domestic market. For both India and the Philippines, these effects raise the relative prices of producer durables and more than offset the low construction costs in both countries.

40. The second point is that there can be big differences between national and international prices even for countries at similar income levels, as is illustrated by the example. In the particular case of India and the Philippines, it is probably the fact that India now produces more of its equipment and has lower construction costs than the Philippines that accounts for the fact that India's share of investment in GDP is larger in international prices while smaller in national prices.

41. This illustration also suggests why explanations of economic growth across countries based upon investment to GDP ratios in national currencies may be very misleading; the latter may greatly overstate the amount of new plant and equipment put in place in comparison with countries where investment goods are less expensive. Again referring to the example, the expected rate of growth that one would expect in the Philippines would be much greater if investment share were 30.6 per cent rather than 21.7 per cent. Where the growth process is related to the volume of capital formation, it seems appropriate to compare investment at international prices. As pointed out below (para. 45), for other purposes such as measuring savings efforts, shares at national prices are more appropriate.

42. Health and education expenditures as a percentage of government expenditures or GDP are often compared across countries. When these ratios are compared across countries in national prices, they give a measure of the domestic resources devoted to these uses. However, ratios in national prices do not provide a good index of the quantities of medical and health services being provided, because relative prices of these services differ greatly between countries. Even though the volume and price estimates are subject to large errors for health and education, it is informative for national policy purposes to have ratios in both national and international prices. This is an output of the ICP not only for comparison resistant services such as health and education, but also for a wide variety of expenditures where volume measures are subject to less variance.

43. To summarize, the ICP output provides a way for each participating country to see how its relative prices compare to those of countries of similar or different income levels. For example, the relative price of energy products can be compared across countries. While it is common to compare petrol prices across countries by converting the litre price at exchange rates, this only tells part of the story. For example, in 1985, the price of petrol in Pakistan was Rs 18 per litre, or \$1.07 at exchange rates, while in the United States it was \$0.74 per litre. This makes petrol appear to be about 45 per cent more expensive in Pakistan than in the United States. However, the national price level of all consumption goods in Pakistan was about 30 per cent that of the United States. Therefore, within the market basket of Pakistanis, petrol would appear to be almost five times ($1.45/.3 = 4.8$) as expensive, relative to other goods, as in the United States.

44. Many of our illustrations have pointed to the advantages of PPPs and of taking account of the differences between national and international prices. It should also be made clear that there are many instances where national prices are more appropriate. Consider, for example, country savings rates. These are usually directed at measuring a country's effort to set aside currently available output in order to augment future production. The trade-offs faced are based on national prices and so comparisons at savings rates would normally not involve PPPs. Likewise, comparisons of international asset and debt positions would usually be based on exchange rates, not on PPPs.

45. Another way of thinking about PPP and exchange rate conversions may aid in understanding the contrast. Consider maps of the world that are printed in two dimensions. In those versions that simply flattened out the globe, such as the Mercator projections, Greenland and countries at high latitudes were always made to look very large, that is, Greenland was pictured as larger than South America, when it is one sixth the size. Equal area maps, such as the Mollweide projection, elongate or warp lands in higher latitudes and stretch the outer meridians. The National Geographic Magazine (1988) has recently chosen to replace the Van der Grinten projection, which had been used since 1922, with the Robinson projection. Both of these latter maps are a compromise between the Mercator and the Mollweide projections, but in the Robinson the distortion of high latitude countries is reduced. Clearly, whatever map we use does not change the Earth that we are trying to represent. In an analogous manner, the way in which the ICP, or exchange rate conversions, represent the GDP of the countries of the world in no way changes the economic conditions of the world's population. However, the ICP representation is more stable over time than, say, exchange rate conversions, and also represents the components of expenditures in a way that is more comparable across countries.

2/ See, for example, I. B. Kravis and others, *A System of International Comparisons of Gross Product and Purchasing Power*, United Nations International Comparison Project: phase one (Baltimore, The Johns Hopkins University Press, 1975); I. B. Kravis, A. W. Heston and R. Summers, *International Comparisons of Real Product and Purchasing Power*, United Nations International Comparison Project: phase two (Baltimore, The Johns Hopkins University Press, 1978) and *World Product and Income. International Comparison of Real Gross Product*, United Nations International Comparison Project: phase three (Baltimore, The Johns Hopkins University Press, 1982); United Nations and EUROSTAT, *World Comparisons of Purchasing Power and Real Product for-1980*, phase IV of the International Comparison Project: parts one and two (Sales Nos. 86.XVII.9 and 86.XVII.10); EUROSTAT, *Purchasing Power Parities and Real GDP. Results 1985* (Luxembourg, 1987); EUROSTAT, *Comparison of Price Levels and Economic Aggregates. 1985: The Results for 22 African Countries* (Luxembourg, 1989); Organisation for Economic Cooperation and Development, *Purchasing Power Parities and Real Expenditures. 1985* (Paris, 1987); United Nations, Economic Commission for Europe, *International Comparison of Gross Domestic Product in Europe. 1985*, Statistical Standards and Studies, No. 41 (New York, 1988).

3/ The concept of real exchange rate should be mentioned in relationship to the concepts in the Handbook. The real exchange rate of a country is the exchange rate in some base year that is moved to another year on the basis of changes in relative prices between the two years of the given country and the numeraire country. A change in the real exchange rate is the reciprocal of the change in the national price level of a country. For further discussion, see Kravis and Lipsey (1982).

II. EXPENDITURE DATA NEEDED

A. Gross domestic product as defined for ICP-purposes

46. The ICP, from the beginning, has focused on comparisons of gross domestic product from the expenditure side. GDP is a basic concept in the United Nations System of National Accounts (SNA). Most participating countries base their national accounting system on the recommendations of the SNA, and the SNA gives a detailed description of the content of the gross domestic product. Therefore, the basic conditions in respect of the comparability of this concept are relatively easy to meet by participating countries. Nevertheless, country practices may differ to some extent from international recommendations and, if these differences are not recognized and corrected, they could lead to incompatibilities in the ICP results. Therefore, a thorough scrutiny of the content of GDP is required.

47. As the present Handbook is prepared, the 1968 SNA, the so-called Blue Book, is being revised. At this stage, most of the recommendations for the revised SNA are known, though they will not be formally considered by the Statistical Commission until 1993. Where no special mention is made, it may be assumed that references in this chapter refer to both the old and the new SNA. Where changes recommended for the new SNA are likely to be accepted, as in the case of health and education expenditures, references will be to the new system. Where the final outcome is uncertain, this will be indicated in the text.

48. For the ICP, GDP is compared across countries by expenditure category breakdowns, that is, household consumption, government, capital formation and net exports. The principles on which the accounts are sectored are discussed in part I of this section, while the four sectors are discussed in parts 2 to 5. This section concludes with a discussion of the timing of the collection of expenditures, while sections B and C treat other expenditure aggregates and the basic expenditure headings.

1. Sectoring of the expenditure accounts

49. Four basic sets of expenditure data are necessary for the ICP: household consumption, government, capital formation and net exports. Under the 1968 SNA, the coverage in household consumption could vary from country to country because of differing institutional relationships, especially as they applied to health and education. Largely as a result of the ICP work, an alternative presentation of consumption will be introduced in the new SNA.

50. The basic distinction that the new SNA introduces is between consumption expenditures and actual consumption. This is illustrated in the diagram below:

	<u>Consumption expenditures</u>		<u>Actual consumption</u>
	<u>of households</u>	<u>of government</u>	
Individual consumption	IC	TC	Households = IC + TC
Collective consumption		CC	Government = CC
Consumption expenditures	IC	CC + TC	IC + CC + TC

In this tableau, IC represents individual consumption purchased by households, TC represents individual consumption of households that is purchased or financed by government and CC is collective consumption of government purchased by government. In the ICP, then, household consumption is actual consumption of households.

51. Non-profit institutions will continue to be a separate sector in the new SNA. In principle, actual consumption of households for the ICP should include expenditures by non-profit institutions, such as for education, under the headings where they are actually consumed.

2. Household consumption

52. Household consumption, as defined in the ICP and in the proposed new SNA concept of "actual total consumption of households" consists of:

- a. Goods and services purchased by households;
- b. Goods produced by households for their own consumption or received as remuneration in kind;
- c. Goods and services accruing to households free of charge or at a substantially reduced rate, financed by government or non-profit institutions serving households.

53. Items (a) and (b) above were also covered by the household consumption expenditure concept of the 1968 SNA. However, the third item, goods and services accruing to households free of charge or at a very reduced rate, was either included in the final consumption of the financing sector (government or non-profit institutions serving households) or was missing entirely from the gross domestic product. As mentioned above, the 1968 SNA does not have a concept of actual consumption of households (or, in earlier terminology, total consumption of the population).

a. Some consumption boundaries

54. Goods and services purchased by households should cover everything that households buy, if these items are designed for consumption. Goods purchased by households primarily for use in production (e.g., tools purchased by members of households to be used in an unincorporated enterprise owned by them) should be excluded from household consumption and should be treated as intermediate consumption. In principle, also, goods that are used both for consumption and production purposes, for example, a physician's car, which is used for both private and business purposes, should be apportioned between household consumption and intermediate consumption according to estimated use.

55. Purchases of household durable goods (such as television sets, cars) should be included in household consumption of the accounting year in which they are purchased, in spite of the fact that these goods serve consumption purposes over several years and may also be paid for in installments over several years. Dwellings and similar structures (such as holiday homes) are the only exceptions; they have to be treated as capital formation of the period when they are purchased. For these items, consumption of the reference period consists of the imputed rent, that is, the rent the household would pay for the same dwelling if it was rented rather than owned.

56. Household consumption is the consumption of resident households (as opposed to the consumption of resident and non-resident households on the domestic market). Thus, purchases of goods and services abroad by resident households are included, and purchases by non-resident households (e.g., by foreign tourists) on the resident market are excluded. In general, as a first step in the calculation of the consumption of resident households, the consumption on the domestic market is determined (since no distinction can be made at the point of purchase as to whether the customer is resident or not), and as a second step the estimated amount of the purchases of resident households abroad is added and the estimated amount of the purchases of non-residents on the domestic market is deducted. (However, this is generally done only at the level of total household consumption.)

57. Consumption of goods and services connected with business travel expenses is treated as intermediate consumption and excluded from household consumption.

58. Interest payments by households on borrowed funds or for consumer credit (installment) payments are treated as transfers and excluded from household consumption. However, household consumption includes payments for financial services of banks to households for credit cards, checking accounts and

so on. The new SNA will recommend that a charge be included in household consumption for the imputed service charge of financial intermediaries.

59. The net difference between consumer spending and winnings on lotteries or other legalized gambling are also included in household consumption. For non-life insurance, the difference between insurance premiums paid and claims received by households is included in household consumption as representing a purchase of insurance services.

60. Purchased consumption is to be valued at the prices actually paid by the households. Thus, taxes (sales, excise, value added) and delivery costs are included in household consumption. Similarly, if the purchase price represents a reduction from the regular price, because of a sale or discount, it is the purchase price that should be used. Any interest charges resulting from late payment, as for example with credit card purchases, are not included in the price.

61. Consumption from own production by households (e.g., potatoes, fruits, meat produced by farmers and consumed by the same households) are valued at producer prices, that is, at prices the households would receive if these products were sold at the nearest market point. Processed own-produced products should be valued at the prices of the processed products (e.g., as butter and cheese and not as milk); however, this value should exclude the results of the service-type activities carried out within the households (e.g., value created by cooking). As already mentioned, the consumption of own dwellings should be valued at imputed rents.

62. When employers buy goods to supply to their employees, these goods are to be valued at the cost to the employer, as in the case, for example, of food consumed by members of the armed forces. If the employer provides workers products of the firm itself, they are to be valued at those prices at which such products could be sold by the firm. Uniforms supplied by employers should be included in household consumption only if it is usual to also wear them off duty.

b. Consumption financed by other sectors

63. In earlier phases of the ICP, allocating all medical and education expenditures to household consumption was presented as a departure from the rules of the SNA. As discussed above, with the introduction in the new SNA of the concept of actual consumption in addition to the concept of consumption expenditures, this difference in presentation between the ICP and the SNA will disappear.

64. The concept "goods and services accruing to households financed by other sectors" needs some elaboration. In particular, the following should be made clear:

- a. What kind of goods and services are involved;
- b. How the consumption of these goods and services should be determined;
- c. What the term "other sectors" means;
- d. How those cases are to be treated where the financing of the expenses is shared by households and other sectors.

65. As to the kind of goods and services involved, not all goods and services financed by other sectors should be allocated to actual household consumption. Only those goods and services that are consumed by individuals (explicitly) rather than collectively (implicitly) contribute to the consumption of households and that, in a sense, are closely linked to the welfare of the population, should be so allocated. As noted, these goods and services are referred to in the terminology of the new SNA as "individual consumption", while that part of government expenditures that should remain in government final consumption is termed "collective consumption". Expenditure on health, education, welfare and housing belong to individual

consumption, while expenditures on public administration, including administration of education and health programmes, defence, research and community services belong to collective consumption.

66. Consumption financed by sectors other than households should be valued at the cost of these expenses. Cost in this context means compensation of employees, intermediate consumption, consumption of fixed capital and taxes on production, if any.

67. The definition of "other sectors" in this context means mostly government and private non-profit institutions serving households (such as charity organizations, the Red Cross etc). Expenses by enterprises, if they serve household consumption purposes directly, are included in remuneration in kind and not in expenditure financed by other sectors. Transfers in kind from abroad (gifts) also are covered by the consumption of households financed by other sectors.

68. In the new SNA, there will be no consumer subsidies and in no case will any of these subsidies be treated as government final expenditure. When goods and services are provided free or at such nominal prices that they do not influence demand, then the items are to be valued at cost. When goods and services are sold at a price that is sufficient to influence the level of demand; then they will be valued at that price regardless of the level of subsidy that may be involved.

69. A comment should also be made about the provision of radio and television services to consumers. In those countries in which these services are commercially provided, they show up in higher prices of the items creating the advertising revenues, and as intermediate costs to the firms. Where radio and television are provided to households by government, they are usually treated in government. Where they are part non-profit and part government, these services are in both consumption and government. A consistent treatment would be to transfer these expenditures where commercially financed from the products that finance them, or from government and non-profit organizations, to household recreation expenditures. Thus far, neither the SNA nor the ICP has attempted these difficult transfers.

3. Government consumption

70. As defined above, government consumption is collective consumption. The difference between household consumption and actual consumption is matched by an adjustment between government consumption expenditure and actual consumption. Put another way, the transfer of individual consumption removed from government consumption expenditures is added to household consumption expenditure to give actual consumption.

71. Government consumption is to be valued at cost, that is, compensation of employees, intermediate consumption, consumption of fixed capital and taxes on production, if any. This value should be netted by fees and sales of government to other sectors, for example, the value of the postcards sold by museums, and any other small-scale cost-offsetting recoveries from these sectors.

72. There are only a few rules to which special attention should be drawn. Government consumption on defence includes not only current expenditures but also expenditure on military durables that are offensive weapons and their means of delivery. Capital items that are purchased by the military but that could have a civilian use will in the new SNA be treated as capital equipment. If a military durable that had originally been treated as government consumption is converted to civilian use, for example, a military hospital is handed over to the government for public use, or motor vehicles such as trucks are sold to commercial operators, this should be treated as negative government consumption in the given period and a corresponding increase in capital formation of government for the hospital and of the household sector for trucks.

4. Capital formation

73. While there was no difference in the concept of capital formation between the 1968 SNA and the ICP, there will be some important changes in the new SNA that will also affect the ICP. Capital formation,

according to the new SNA, will no longer be restricted to material capital formation only, that is, the change in stocks and fixed capital formation. Research and development (R and D) expenditures will still not be part of capital formation but the payment of a licence for R and D use will be treated as a fee for a service. Human capital will still be excluded from capital formation. However, with respect to capital formation, several important extensions will be recommended in the new SNA.

74. One change already noted is the treatment of military durables. In the new SNA, all mineral exploration and development will be treated as capital formation. Further, all improvements and developments of land such as land reclamation or planting of forests will be capital formation in the new SNA.

75. Development of computer software and databases, whether for internal use or commercial sale, will be treated as part of capital formation. Under certain circumstances, this will also be true for the development of literary and artistic works.

76. These changes will not immediately affect the ICP but in the future the ICP will want to follow the new SNA. This is likely to have implications for the basic headings of expenditures and the core commodity list in subsequent rounds of the ICP.

5. Net exports

77. Net exports, that is, exports minus imports, is the last expenditure category on the use side of the gross domestic product. Exports and imports cover all transactions in goods and services between resident and non-resident economic units. There is no difference in this respect between the SNA and the ICP. From what has been said earlier, it follows that exports and imports also cover direct exports/imports by households (purchases by non-resident households on the domestic market and purchases by resident households abroad), as well as direct exports and imports by government.

78. The ICP has chosen to work with net exports rather than deal separately with exports and imports. The reason for this is mainly that it would require major price collection to make price comparisons separately for exports and imports since they include both intermediate and final products. In the future, the current ICP treatment of the net foreign trade balance is likely to be further reviewed.

6. Dating of expenditure totals and details

79. The ICP comparisons are on a calendar-year basis. Many countries construct their national accounts on a year beginning on some date other than 1 January. For these countries, it is necessary to move their estimates to a calendar basis. Unless there is reason to believe this change in dating would greatly affect the expenditure detail, it is normally done at the level of consumption, government, capital formation and net exports.

80. Many countries derive their basic GDP estimates from measures of output. In subsequent calculations estimates of expenditure categories are made where consumption is often derived as a residual. More detailed expenditure estimates may not be available for the most recent year for GDP because the expenditure survey or a commodity flow survey used to generate expenditure detail is either not done annually or lags in time behind estimates of the GDP total. What is usually done in such cases is to apply expenditure detail for the most recent year available to obtain estimates for the ICP benchmark year.

81. One advantage of the commodity flow approach is that it allows for improvements in the estimates of the commodity composition of household and government consumption. It has also proved useful for countries to examine their resulting detailed expenditure distribution in relation to countries at a similar level of income as a check on anomalies. Where the expenditure weights for the consumer price index are only changed on the basis of periodic surveys, the detailed expenditures generated for the ICP from the commodity flow approach may also prove useful for price index purposes.

82. It often happens that countries have GDP expenditures for an ICP benchmark year, and more detailed expenditures may be available from one or more earlier years. In the absence of benchmark year detailed expenditure or commodity flow surveys, the most recent data should serve as control totals. For example, if the consumption total is known for the benchmark year, but the food percentage distribution is available for the previous year, then the food percentage of consumption for the previous year would be applied to the benchmark year GDP to obtain an estimate of food expenditures in the benchmark year. And if the best detailed breakdown within food expenditures was for a still earlier year, then that distribution would be applied to the estimated benchmark year food total.

B. Breakdown of GDP by aggregating of basic headings

83. The task of the ICP is to compare not only the levels of gross domestic product but also its structure. This structure can be expressed in terms of more detailed aggregates, such as bread and cereals, non-alcoholic beverages, or operating costs of transport, as well as in larger aggregates, such as food or consumption of households. These aggregate categories can be used for volume comparisons, or are equally interesting in comparing purchasing-power parities, as was discussed above for capital formation.

84. There are several criteria that have been used to break down GDP into the 55 aggregates given in table 2. The breakdown starts with the main functions of the expenditure categories, distinguishing household consumption, government consumption, capital formation and net exports. The next criterion applied is the purpose/use of the goods and services consumed; for example, food, clothing, transport and communication are distinguished. Additional criteria are applied whenever feasible; these distinguish goods from services, and, within goods, durable goods from non-durable goods.

Table 2. Breakdown of GDP into expenditure aggregates

1.	Household consumption
2.	Food, beverages and tobacco
3.	Food
4.	Bread and cereals
5.	Meat
6.	Fish
7.	Milk, cheese and eggs
8.	Oils and fats
9.	Fruits, vegetables and potatoes
10.	Other food
11.	Beverages
12.	Non-alcoholic beverages
13.	Alcoholic beverages
14.	Tobacco
15.	Clothing and footwear
16.	Clothing
17.	Footwear
18.	Gross rent, fuel and power
19.	Gross rent
20.	Fuel and power
21.	Household equipment and operation
22.	Furniture

23. Household textiles
24. Appliances
25. Other household goods
26. Medical care
27. Pharmaceutical-therapeutical products
28. Medical and health services
29. Transport and communication
30. Equipment
31. Operation
32. Purchased transport
33. Communication
34. Recreation and education
35. Equipment for recreation
36. Recreational and cultural services
37. Books, periodicals etc.
38. Education
39. Miscellaneous goods and services
40. Restaurants, cafes etc.
41. Other goods and services
42. Net purchases abroad
43. Government consumption
44. Capital formation
45. Machinery and equipment
46. Non-electrical machinery
47. Electrical machinery
48. Transport equipment
49. Construction
50. Residential buildings
51. Non-residential buildings
52. Other construction and civil engineering work
53. Changes in stocks
54. Net exports
55. Gross Domestic Product

85. Regional comparisons may adopt a more detailed breakdown than the world comparison. However, this more detailed breakdown must be compatible with the breakdown presented above, that is, it should always be possible to arrive at the most detailed analytical categories of the world breakdown by combining the analytical categories of the regional breakdown.

C. Breakdown of GDP by basic headings

86. Each expenditure aggregate is divided into one or more basic headings; however, the function of the two breakdowns is quite different. The breakdown of GDP into aggregates serves data presentation purposes: the organizers of the ICP would like to derive (interspatial) quantity indexes and purchasing-power parities for each expenditure aggregate. The basic heading breakdown, on the other hand, is a technical stratification or classification, the main purpose of which is to permit better estimates of the larger expenditure aggregates. As mentioned in chapter I, it is not intended to publish the results at the level of the basic heading breakdown, though they are made available to users for research purposes.

87. In terms of the general theory of statistics, the basic headings serve the purposes of stratification in order to improve accuracy. This stems from three factors:

- a. It is expected that the dispersion of the individual price ratios is smaller within the basic headings than between the basic headings within large expenditure aggregates;
- b. The coverage of all expenditure aggregates is ensured;
- c. The basic heading breakdown enables weighting to be applied (i.e., to compile weighted instead of unweighted averages of the parities) at a relatively detailed level.

If no basic heading breakdown were applied and the purchasing-power parities of an aggregation such as clothing were compiled as an unweighted average of the purchasing power ratios within the category, this would provide less accurate results because weights would to a large extent be neglected.

88. The point made in subparagraph (a) above requires some qualification. Between basic headings of food, such as vegetables and cereals, there may be less price variation than within a basic heading such as recreational equipment. The point being made is that within large aggregates such as food, price variation will be reduced by sampling items at more detailed headings. Similarly, though overall price variation for recreation may be quite large, by separating out basic headings such as recreation equipment from entertainment, the price dispersion for all of recreation will be reduced.

89. In delineating basic headings from each other, two principles have to be followed:

- a. The basic headings should be as homogeneous as possible;
- b. Sufficiently reliable weights (i.e., detailed expenditure data) should be available for each basic heading.

90. Homogeneity of basic headings should be interpreted in terms of the dispersion of the individual price ratios across countries. The smaller this dispersion, the more homogeneous a given basic heading is considered. Of course, when basic headings are initially delineated, no prior information is available on the dispersion of the individual price ratios. Most of the basic headings used in the ICP correspond to national accounting or survey divisions that have been devised for other purposes. However, this delineation, which has been based on the kind, type or function of the products in a basic heading, tends to produce relatively homogeneous groupings, even in respect of the dispersion of the individual price ratios. For instance, the dispersion of price ratios within the category "footwear" can be expected to be smaller than within the broader category "clothing and footwear", and within the category "men's footwear" it should be even smaller than within the category "footwear".

91. The expenditure data for basic headings are used mainly as weights, but frequently very important weights. For example, some countries find it difficult to separate government consumption between wages and salaries and purchases of goods and services. However, parities for these basic headings are different across countries. It is therefore important to make the best possible estimate of the distribution of collective consumption between these two headings. Even expenditure weights for these headings of limited accuracy are likely to be more useful than using no weights at all. This is because no weights at all would implicitly assign equal weights in this example; only if it is not possible to improve on that default option, should countries not attempt expenditure estimates at the basic heading level.

92. In all phases of the ICP, the number of basic headings distinguished at the world level has been about 150, although the number distinguished in some regional comparisons (especially in the developed regions) has been substantially higher. The world expenditure and basic heading list for phase VI of the ICP is provided in annex III of the Handbook, along with a description of the types of goods and services included under each heading.

III. TASKS RELATED TO PRICE DATA

A. Outline of Price requirements

93. The quality of ICP comparisons depends heavily on the individual item prices and the price parities at the basic heading level. This chapter is devoted to the problems of country selection of representative items (specifications) and the development of national average prices. The remainder of this section outlines the general character of the sequence of item selection, price collection and review of prices submitted by participating countries and discusses the core commodities. Section B deals with some principles of selection of the price sample by countries, and section C deals with the principles and practice related to obtaining national annual averages for the price sample for the ICP. The remaining parts of the price discussion are taken up in chapter IV, which deals with special pricing problems as they occur for specific categories of expenditure, while chapter V outlines how the price as well as the expenditure data submitted by countries are then processed to generate the ICP outputs.

94. Selecting and pricing representative items constitutes the most difficult, and typically quantitatively largest, most costly and time-consuming part of ICP work for national statistical agencies and ICP organizers. The scenario may differ from comparison to comparison; however, the main stages of this work are the same in all comparisons. These are:

- (a) Development of a list of representative items to be priced by a country; this list will be based on important items that are common to the existing national price data archives in the region or country group and draw on the core commodities;
- (b) Collection of the price data not readily available from regular surveys;
- (c) Submission of the national average prices for the items selected to the ICP organizers appropriate to the country;
- (d) Checking the price ratios and parities at the basic heading level and correcting any unsatisfactory basic data.

95. The selection of the representative items to be priced should take place before the reference period so that arrangements can be made for the inclusion of additional price observations in national surveys, when necessary. Prices collected for national statistical purposes, such as those used in the calculation of consumer price indexes, can be used for ICP purposes. Indeed most of the ICP specifications incorporate items collected in national price surveys of participating countries. However, in most countries, some additional pricing will be necessary. For national purposes, the items selected have to represent goods and services that are comparable between time periods in the same country; for ICP purposes, the selected items have to represent goods and services that are comparable across countries. Thus, items that are important in a given country but that do not exist in any of the partner countries are not useful for ICP purposes. On the other hand, items that are comparable across countries but that are not in the sample of national price observations may be very useful for ICP purposes. To sum up: when a country participates in the ICP, it will need to enhance its national collection of price data to obtain the necessary ICP price observations; and it will suggest for inclusion in the ICP regional and core specifications some of the items it collects for national purposes that are not currently in ICP core or regional lists. The incorporation of ICP specifications into national statistical programmes and the continual modification of the ICP specifications according to the pricing experience of participating countries are strongly encouraged in order to increase the overlap and up-to-date character of items priced for national and international purposes.

96. The way in which the ICP facilitates price collection is through its written specifications, which describe the items that are suggested for pricing. At the world level, there are specifications that have been found during the various benchmarks to be items suitable for comparison across a number of countries. In phase VI of the ICP a subgroup of these specifications has been designated core

commodities and they will serve as a basis for overlap of price observations across the regional or group comparisons. Countries in each region will be asked to include in their pricing as many of the core commodities as possible that are available on their markets. Within each regional group or other grouping of ICP countries there will be a set of commodities that will include many items specific to the country group plus most of the core commodities.

97. The core commodity list is a list of goods and services that in the experience of ICP countries, have been found to be common across large numbers of countries in all regions of the world. It is necessary that some countries in all regions provide enough prices from the core commodity list to provide coverage of all the basic headings to permit linking of comparisons between each regional or other grouping of ICP countries.

98. As with items entering national time-to-time indexes, the core commodity list will undergo changes as goods and services appear and disappear from markets. One important role of the core commodity list is to provide a common basis for the list of items to be priced in each region. Interactions between country groups and the central ICP staff generate changes in the core commodity list. Thus, it should be looked upon as a list of goods and services that appear widely available in markets around the world, but a list that will change as the economies of the world change.

99. An example of a specification of a core commodity is a yellow onion:

Item code: Onion, yellow

Description: Common yellow dry cooking onions, globe in shape, all varieties. About 5 cm in diameter.

Exclude: Bermuda, Spanish and green onions.

Unit: One kilogram.

This specification is found in countries in all regions of the world, and so it provides one natural bridge across countries within a basic heading, vegetables. As will be discussed below, even this item may raise questions in some countries that require special treatment.

100. An example of a specification that would be important for East Asian countries in ESCAP is bean curd:

Item code: Bean curds

Description: Curds from soy beans sold moist. If purchased as package, 300-500 g.

Unit: One kilogram.

Specify: (1) Sold in bulk
(2) Packaged

Bean curds are a well-known item of consumption, and while they are found in most countries of the world, they have up to now not been widely enough consumed to be proposed as a core commodity.

101. These specifications illustrate some of the detail involved in the 2,000 or more specifications that are part of the ICP framework. In each of these specifications, the unit for which the price is to be reported is indicated. Often, the price quotation is for a different unit, as is the case for packaged bean curd where 300 to 500 g is the purchase size; in such cases, country statistical offices must convert the price to a kg basis. Note also that in fact the ICP would treat bean curds in bulk and in packages as two different items for building up parities at the detailed heading level. These specifications have been built up through the interaction of country price experts and regional and world organizers of the ICP. By making these specifications available, countries have the option of integrating the collection of ICP item prices into their regular price collection.

102. Typically, participating countries are sent a draft list, built up from core specifications as well as items thought appropriate for their region or country group, which they are asked to review to determine:

- (a) Which items in their existing database they would be able to price exactly as proposed;
- (b) Which items in their existing database they would be able to price if some modification of the definition were made;
- (c) Which items they would not price because they were not important in the consumption in the country;
- (d) Which items might be added to the draft list because they are important both in the country and probably also in other participating countries;
- (e) Which items are not in the existing database but are important in the country and could be priced as additional items.

103. In drawing up their list, countries will want to minimize the resources devoted to pricing additional items under subparagraph (e) above, unless they are items that might usefully be added as a substitute or totally new item to their existing price collection for national purposes. In drawing up their lists, countries will therefore want to take as many items from their existing database as possible, as in subparagraphs (a) and (b) above, with one qualification. It is sometimes the case that the existing database is not available in one place, as when time-to-time price relatives are computed in different centres and the records or price observations are scattered and not in machine-readable form. In such cases, some additional pricing may require less resources than recovering existing national prices. This qualification excepted, countries should use their existing database as much as possible, including urging that items under subparagraph (d) above be adopted for ICP purposes.

104. Some trade-offs do exist between items under subparagraphs (b) and (e) above. Suppose, for example, an ICP specification calls for the price per kg of tomato sauce in tins of 200 to 250 g and the country specification is for tins of 500 g. The relationship is usually not proportional, so one cannot simply give the price of a tin of 250 g as half the price of a 500 g tin. However, if both size tins are commonly purchased in a country, it is sufficient to modify the national price for 500 g to a price for 250 g by the ratio of the prices of these two sizes in a few outlets. Put another way, it would not be necessary to take a price survey of tins of tomato sauce of 250 g and treat this as a new item. Other specifications may be less clear-cut and countries should raise questions about them when they submit their proposed price list to the regional coordinators.

105. The next step may be a regional workshop at which price experts review the list with a regional coordinator to resolve questions of commodity and service definitions and to agree on a final list. Sometimes a price expert will visit a country to draw up the final list. In either case, it is often necessary to visit stores, examine samples or review catalogues in order to settle on an operating version of the list of specifications for which the country will supply prices.

106. After a final sample of items is agreed upon, national statistical offices then have to collect the data and determine the national average prices for the items selected for submission to the organizers. It is neither necessary nor desirable for multilateral comparisons that countries price all items on the list; nevertheless, to obtain reliable PPPs at the GDP level, a relatively large number of average prices (several hundred, at least) have to be provided. While submission of the average prices can take place only after the reference period is over, arrangements for the necessary additional price observations are most conveniently begun much earlier, preferably before the reference period.

107. The third stage consists of a review of the submitted prices by the organizers of the country groups to check for possible errors and to make requests for supplementary data as required. Often errors arise because prices are provided for a different unit than called for in the specification; this quickly becomes apparent when price ratios of items are examined for a number of countries. At the next stage, a preliminary set of basic heading' parities is reviewed by the organizers, often in consultation with the participating countries in a region. This review of basic heading parities makes it easier to discover

possible errors in the item prices ranging from simple clerical mistakes to misinterpretation of the item descriptions or units of measurement.

B. Some Principles of item selection

1. Temporal and ICP Price sampling

108. The item specifications entering into the calculations of parities at the basic heading level serve the same function as the price representatives in the building up of national temporal price indexes, such as the consumer price index, from category price changes. Of course, the dimensions of the comparisons are different in the two cases. It is space (country-to-country) in the case of the PPPS, and time (period-to-period) in the case of the national price indexes.

109. In their time-to-time indexes, most countries compute the ratio of prices in two time periods and take an arithmetic average of the ratios across outlets (APR); or less frequently, countries compute the arithmetic average of prices of comparable items across outlets in two time periods and then take their ratio (RAP) as the measure of price change. 5/ When ratios of average prices (RAP) are the practice, it is clearly the aim to compare the price of identical products in each period at the same outlet, as in the ICP. Whether the time-to-time price relatives are computed at each outlet, and the relatives are weighted across outlets (APR), or prices for identical specifications are averaged across outlets and a price relative calculated (RAP), usually implicit or explicit weights are used at the outlet level. 1/ When the price change for an item has been calculated, these are then combined across items using some weights.

110. However, an item in time-to-time indexes is unlikely to have its own weight. Countries often have quantity weights at a level of detail, such as tinned vegetables, but they are unlikely to have total quantity within countries for a detailed specification, such as a 500 g can of peas. In time-to-time indexes, the weight assigned to the price change of tinned peas is likely to be the whole weight of tinned vegetables. The assumption that changes over time in the price of peas represent price movements of tinned vegetables is basic to price index construction.

111. The analogous assumption for place-to-place comparisons is that items chosen for a heading represent the price structure of the country for that heading. Thus far, the ICP has not developed a sampling frame to spell out exactly how this selection should be done. The aim is clearly to select items in all of the countries that appropriately represent the prices of goods consumed in each country in that basic heading. By using the term important to describe items, it is recognized that certain criteria for item selection exist, but that there is not yet a sampling design that allows guidance as to what are truly representative items. 1/

112. Where countries average ratios of price changes (APR), their task of matching specifications across outlets (space) is substantially reduced and, as will be discussed in chapter IV, the methods developed in these countries may provide some guidance for future ICP work. Because APR countries need not average prices across outlets, more supplementary price collection, or additional processing of existing surveys, will be necessary for these countries, because average prices of individual items are not an intermediate output of the time-to-time price estimation procedure.

113. Where countries follow the RAP approach, there will be a number of (national) average prices available from regular surveys that can be used directly or perhaps with some modification for size of purchase, or other feature, for the ICP. One reason that countries compute average prices and then take ratios is that the average prices are of interest in themselves. Countries participating in the ICP will as a part of their work generate a large sample of average prices that may prove useful for other purposes.

114. One major difference in the spatial comparisons is that the number of potential items in a time-to-time index remains relatively stable from year to year, which is not true across countries. Consider the fact that supermarkets in the United States carry from 10,000 to 20,000 items and brands, while in many countries the number would be under 1,000. This means that single specifications are likely to be a smaller percentage of the total expenditures in a detailed heading in more affluent countries and that

sampling becomes a necessity. However, countries with relatively small numbers of items in their markets may still have a significant number of items that are not common to more affluent countries. In choosing what items to match across countries, the ICP has been guided by two basic principles of item selection, which are now discussed.

2. Importance and identity

115. One principle of item selection that has been generally accepted, if not precisely defined, is that specifications priced by a given country should be sufficiently typical (characteristic) for the country. Pricing uncharacteristic items (i.e., goods or services which, though they exist in a given country, are not important in expenditure budgets and/or are not widely available in outlets for such items), is to be avoided. // Items not commonly consumed may have very high prices (and, just because they are so high, the given product is purchased in a very small quantity, thus, it is uncharacteristic) and can be judged as not important to price.

116. The principle of choosing important products often comes into conflict with the second principle of choosing identical products. This is perhaps the most important issue in price selection. Often a specification can be associated with a brand name so that identity of product can be assumed (in fact, even this need not be the case as firms frequently assign the same model number to items that are either technically different between countries or are produced under the same name in different locations with some modifications for different markets). However, if a brand name is found in a country but is not commonly consumed, then it may poorly represent that basic heading. This conflict between how identical and how important is a product will be less important in a homogeneous group of countries, such as the EC, where brand names can be part of the specification. However, when comparisons are made for core commodities throughout the world, it is often necessary to trade off identity to make sure that items are characteristic of the purchases of a country in a basic heading.

117. In the above discussion, identity of items was spoken of in terms of brand name, but there is more to comparing like with like than just trademarks. The principle of comparing identical items means that there should be no differences in either the quantity or the quality of the specifications selected among countries that significantly influence the use of the given good or service. In particular, identity means that:

- a. The size of the good/service should be the same. As mentioned above, this requirement has a double meaning: the unit price reported not only relates to the same size (e.g., the price of 1 kg of potatoes), but the price originally observed should also relate to approximately the same purchased quantity in each country. It would not be appropriate, for instance, to observe the price of sugar in a 1 kg package in country A while observing it in a 10 kg package (and dividing it by 10) in country B, since the price of a larger size package covers relatively less distributive services (per kg) and is, typically, relatively lower;
- b. The physical and functional properties should be the same (for instance, the thread count of fabrics, the capacity of machines, the life of electric bulbs). This relates to all such properties that may have significant influence on the price of the given product. Shape and colour may also be relevant for some products, although not for others;
- c. Types of outlet should ideally be the same when matching items across countries (this is one of the more important conditions that are discussed further in the following section);
- d. Delivery conditions (e.g., package, warranty, transportation cost included or excluded) should also be the same. This is particularly important for producer and consumer durables;
- e. Other circumstantial factors (e.g., type of restaurants for consumption of specified dishes, access to repair services) should be the same in so far as they have a significant effect

on the price. The set of characteristics that seem relevant are decided upon in the construction of item specifications. In principle, characteristics not listed in a specification are considered to have no influence on the price of an item.

118. How does a country try to balance these criteria? First, those items that a country has in its own database are, in ICP terms, important for the country. If these items match, or can be simply modified to meet ICP specifications, they should certainly be chosen as items for which the country will supply prices. When should a country substitute an identical product that is not a regular part of a country's national price collection for a comparable item for which prices are regularly collected? A necessary condition for substitution is that the identical item is well known and widely available and consumed in a country, where widely can mean all over a country, or in many different outlets even if concentrated in urban areas. If this condition is met, then a country should substitute the identical product when there is reasonable doubt about whether the items are in fact comparable.

119. A corollary of the above is that a country should not substitute a brand-named item that may in some cases be mentioned for illustrative purposes in some ICP specifications simply because it is known to be consumed in the country. Unless the item is widely available and widely consumed, it should not be substituted. What about the case where a brand-named item is consumed in a few places in the country but there is either no item priced in the country that meets the specification or there is considerable uncertainty about whether the specification in the country matches the ICP specification. In general, the brand-named item should not be priced. Secondly, if there are doubts about whether an item priced for national purposes matches the ICP specification, either the item should not be proposed for pricing or the question should be raised with the regional coordinators.

3. Number of items Per basic heading

120. Identity and importance are principles with respect to specifications of individual items. In addition, it may take more items to represent one basic heading than another. In relatively homogeneous basic headings, a low number of specifications - even one specification - may sufficiently capture the price structure of the basic heading. For instance, in the basic heading Eggs (1.1.1.04.5), which in many regions consists overwhelmingly of chicken eggs, one single specification may sufficiently represent the heading, though weight or size will still need to be specified.

121. In a heterogeneous basic heading, such as Glassware, tableware and household utensils (1.4.4.01.0), consisting of thousands of different items and brands, a large number of specifications may be needed. The ICP has offered over 40 generic specifications for this basic heading, because it is so diverse. To be more precise, the homogeneity or heterogeneity of basic headings should be judged not so much in terms of number of items but in terms of their relation to the individual price ratios. If the dispersion of price ratios is small, only a few specifications may be necessary even when it appears that the basic heading is quite heterogeneous in terms of number of distinguishable items. Where price ratios have substantial dispersion, a larger number of specifications is needed.

122. In most country groups, the number of items suggested per specification differs from basic heading to basic heading. These differences have developed as experience has been gained about those headings where there is more dispersion in the price ratios. 9/

C. Obtaining national average annual Prices

123. The ICP seeks national annual average prices for items because these are in principle the prices that should be embedded in the national accounts. National expenditures on items at the basic heading level are represented by the sum of the values of all the different transactions occurring throughout the year on the items over the whole country in a basic heading. The annual national average price when divided into the expenditure on a given item should be the unit value that gives the quantity of the item

purchased in the country during a year. The annual average question will be treated first, and then the more interesting question of how to obtain national average prices will be discussed.

1. Annual average Prices

124. In many countries, it is normal to compute annual average prices for many food items, especially those with seasonal price variations, but this is not common for other items. In practice, where it is not a heavy computational burden, countries have averaged monthly observations of prices regularly collected for other price purposes. Some countries, that have monthly data, have reduced computations by using an average of, say, April and September prices to approximate an annual average for non-seasonal items. Countries experiencing high rates of inflation, or erratic patterns of price change during a year, may find other methods more appropriate.

125. An alternative that has been used in many participating countries is to choose a month for ICP prices, say October, and then move these prices to annual average prices. For example, if the ratio of October prices in the consumer price index to calendar year annual prices in 1993 for footwear is 1.02, then each item price for footwear referring to October would be divided by 1.02 to obtain the estimated annual price.

126. The above discussion takes the annual average to be for a calendar year, which is the norm for the ICP. As discussed in chapter II, a number of countries do not estimate their national accounts on a calendar year basis. Usually, these countries provide the ICP with adjusted calendar year expenditures. It is clearly important that both the national accounts and price observations refer to a calendar year.

2. National average prices

127. There are three sets of prices used in PPP calculations; (a) national prices that are part of those regularly collected by the statistical agencies, (b) prices specially collected for the ICP, and (c) normalized prices. Because normalized prices are generated in a way that makes them national average prices, most of the discussion of this section deals with the first two sets of prices.

128. Normalized prices may be estimated by hedonic regression methods, as in the case of house rents, motor vehicles and other large, complex and expensive pieces of equipment; or normalized prices may be calculated on the basis of pre-defined cost estimates, as in the case of construction projects and buildings. A normalized price is usually constructed as a national average price. Some specially collected prices, such as postal rates, are, by definition, national prices, while many machinery prices are national because there are only a few distributors.

129. However, for a large number of consumer items, prices vary greatly by outlet and region and between rural and urban areas. In contrast to the measurement of time-to-time price changes, where the necessity for absolutely identical items to be priced nationwide is not pressing, the ICP makes more rigorous demands on comparability of specifications across observations within a country. In consumer price indexes, for example, "like with like" comparisons over time for a well specified item are based on a process of averaging price relatives, and there is no need to ensure that the products priced in different shops or outlets, and in various parts of the country, are identical. Indeed, in order to better represent time-to-time price changes, the items included in an index in different regions should be more characteristic of local expenditure patterns, including point of purchase. But for ICP purposes, the items - and the qualities they reflect - should be as similar as possible for a proper comparison to be made.

a. With outlet Price variation and quantity weights

130. For many purposes, the ICP has adopted the potato-is-a-potato principle that says if an identical product is sold in a variety of markets, the ICP will treat it as the same. This means that the national average price of potatoes will include prices from village markets as well as specialty grocers. The reasoning here is that the utility derived from consuming a potato is the same whether it is purchased

from a roadside stall or a supermarket. To the extent that less service is involved in the sale of potatoes in less affluent countries, this principle leads to lower prices, other things being equal, for potatoes in poorer countries. This principle seems to make sense for many commodities, but it certainly is not acceptable for services, so that for say a cheese sandwich to be eaten away from home, the outlet has always been an essential part of the ICP specification. Again, the reasoning on the cheese sandwich is that the consumer's utility depends upon the whole eating out experience, so that whether the sandwich is purchased in a roadside stall, a diner or a full service restaurant clearly needs to be part of the specification.

131. At present, the state of the ICP country practice in calculating national average prices varies substantially. The example below illustrates a number of issues in the construction of national average prices and discusses some approximations that have been made by individual participating countries in obtaining estimates of their average item prices. The example also makes clear why the problem is part of a more general concern for how the core and other specifications of the ICP continue to evolve in each region and across regions.

132. In the example, suppose prices for "'Irish' potatoes, white or red skinned", are collected from each of a broad cross-section of different outlets in countries A and B. In addition to the average price for each type of outlet, the quantities, which are not normally known, are provided.

<u>Outlet</u>	<u>Price in A</u>	<u>O in A</u>	<u>Price in B</u>	<u>O in B</u>	<u>P_b/P_a</u>
	(1)	(2)	(3)	(4)	(5)
Urban speciality	1.00	10	60	5	60
Supermarket	0.80	60	50	10	62.5
Urban market	0.60	10	45	20	75
Hawker/vendor	0.50	10	45	10	90
Rural market	0.40	10	40	55	100
Quantity weight national average	0.73		43.5		59.6
Geometric mean unweighted	0.6258		47.547		75.974

133. In the example, the prices differ across outlets in good part because urban distributors must bear costs, such as transport and taxes, that are an intermediate product. Some of the price difference may be a service element that urban consumers purchase when they go to a supermarket or specialty shop. The average price in each country is computed in two ways, first as a quantity weighted average and second as an unweighted geometric mean. The weighted average price is 0.73 in A and 43.5 in B and the ratio of these averages is 59.6. In this particular example, the ratios of the prices at any of the particular outlets as given in column (5) are all greater than the ratio of the average prices. This may be interpreted to mean that in country A the potato is typically bought in supermarkets and in country B typically in rural markets so that a ratio of the average prices is close to 50 (= 40/0.80, the ratio of rural markets in B to supermarkets in A).

134. Total expenditures in national currencies in A are 73 and in B 4,350. If A is an affluent country and B a poor country, then this example illustrates why the potato-is-a-potato principle, because of the larger amount of intermediate product and customer amenities entering into commodity sales, tends to make some price comparisons lower in low-income countries. 10/ The comparison based on national average

prices does correctly reflect the unit cost of resources involved in each country in getting a kg of potatoes to consumers. Another advantage of the national average price calculation is that it produces the quantity of potatoes consumed in each country when expenditures are divided by average prices. That is, the quantity in A is equal to that in B, namely, 100. If we divide the expenditure ratio of $4,350/73 = 59.6$ by the ratio of average prices of 59.6, we of course get the same result, that each country consumes the same quantity of potatoes.

135. This last point can be illustrated in another way. Consider an arithmetic weighted average of the price ratios. Using country A's quantities, the average of the price in B to that in A is 66.25, and using country B's quantities, the average is 88.25. The Fisher or geometric mean is 76.5. If we now make a quantity comparison between A and B, B will be only 0.78 of the consumption of A. One can interpret this result as saying that, given the outlet, the resources devoted to potato production and distribution in B is only 78 per cent of that in A. Clearly, averaging ratios of outlet prices and comparing the ratios of prices averaged over outlets both have advantages and disadvantages. However, one point is clear, the closer two countries are with respect to the distribution of sales by type of outlet, the less difference it makes which approach is followed.

136. Another point mentioned earlier that is illustrated in the example is that, though it is not a theoretical advantage, there is a convenient feature involved in using the geometric mean if weights are not known. The last row in the example gives the geometric mean of the prices in each country. The practical advantage of the geometric mean is that the last entry, 75.974, is the geometric mean of the price ratios in each outlet, as well as the ratio of the geometric mean of the prices across outlets in countries A and B.

b. With outlet variation but without quantity-weights

137. There frequently are large rural-urban and regional differences in food, services and some other prices. It is therefore particularly important that these differences be captured in the national average price. Often, this may be done on a sample basis, so that a rural-urban price factor can be developed by type of item. For example, usually the rural price for cereals is only slightly lower than the urban price, while for fruits, vegetables and meats, the difference may be 50 per cent or more. The EC countries have developed such factors that allow them to go from capital city to national prices without making special collections of ICP items throughout their countries. Many ICP countries have found that a small pilot survey was adequate to find out the appropriate factors to adjust urban prices to national prices for foods and other expenditure groups.

138. Reality differs from the example above in at least one important respect, namely, that quantities are not generally known. This means that there is uncertainty about how one calculates a national average price or how one averages price ratios. What is the implication of this for country procedure? There is some information on this question for several industrialized countries.

139. Recent price inquiries undertaken in major cities for the purposes of international salary determination clearly show that in some cases the variation in prices for the same product within a given city are even greater (when converted at official exchange rates) than the difference in the average prices for the same item between several of the cities involved in the international comparison. This tendency was also observed in the OECD special direct "three-city" pairwise comparisons carried out for both the United States of America and Canada in their 1980 phase IV survey. 11/ This implies that outlet-specific as well as product-specific pricing may need to be followed to obtain the most robust form of item price matching. Consider the following example, which differs from the potato example in that the quantities are not given, but two regions of each country are represented.

140. For purposes of this illustration, suppose the item is a pair of training sneakers of a major world manufacturer, such as Adidas or Nike, and the price data are as follows:

<u>Outlet</u>	<u>Country A</u>			<u>Country B</u>			
	<u>Price in region</u>		<u>P₂/P₁</u>	<u>Price in region</u>		<u>P₂/P₁</u>	<u>P_B/P_A</u>
	(a)	(b)		(a)	(b)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Urban specialty	60	55	0.92	350	400	1.14	6.52
Department store	40	40	1.00	250	300	1.20	6.88
Urban market	35	35	1.00	220	250	1.14	6.71
Hawker/vendor	30	25	0.83	200	190	0.95	7.09
Rural market	35	30	0.86	230	220	0.96	6.92
Simple arithmetic average	40	37		250	272		
Geometric average	38.82	35.67		245.15	262.82		6.821

In this example, the variation across outlets in each country within each region is substantial. Columns (3) and (6) give the ratio of the price in each region for a given outlet. Prices vary across outlets in each country and region by at least 75 per cent, which is much more than the variation across region in either country.

141. Another way of illustrating this point is provided in column (7), where the ratio of average price by outlet in each region is given between countries B and A. For example, the simple average price in the rural market in A is 32.5 and in B 225, and the ratio is 6.92 (= 225/32.5). The variation in column (7) is quite small, intentionally reflecting the type of empirical finding commented upon in paragraph 120 above. If the ratio of the geometric mean of the prices in each country for each type of outlet were taken, the corresponding entries would also display little variation across outlets. The last row of the example again illustrates an advantage of the geometric mean; the last entry, 6.811, is the geometric average of the ratios of the geometric mean of the prices for each type of outlet as well as the ratio of the geometric average of the geometric mean of the prices across outlets in each region.

142. As a rough generalization, differences in prices between regions and between rural and urban prices within a region and a country can be treated as differences owing to intermediate product, mainly transportation and handling. This is graphically illustrated in the case of the United States, which in the phase I comparisons had the highest prices of any country for tomatoes and the lowest price for canned tomato sauce. Tomatoes were cheap where they were grown and canned, but very expensive to deliver to urban outlets. The potato-is-a-potato principle can be safely applied for rural-urban and region-to-region price differences.

143. However, outlet price variation within urban areas may be due to a significant element of difference in the final service to the consumer in purchasing an item across outlets. Consider the size of error that might occur if countries A and B priced the item in only one of the first three outlets. This might occur, for example, if there was no information on quantities sold by type of outlet. Three of the nine possibilities are given in the first three rows of column (7) and the other six have been calculated using the average price of each outlet type across the region. The combinations are:

Ratio of price in country B to price in country A

Country B's price from

	<u>Urban specialty</u>	<u>Department store</u>	<u>Urban market</u>
	(1)	(2)	(3)
<u>Country A's Price from</u>			
Urban specialty	6.52	4.78	4.09
Department store	9.38	6.88	5.88
Urban market	10.71	7.86	6.71

One point of this example is that, if there is not much information about quantities purchased by outlets, then the result will be subject to much less error if outlet is held constant. That is, the diagonal elements have much less variation than the off-diagonal elements.

144. This example also makes clear that, if weights are not known, it may be even more important to devote resources to holding outlet type constant than to determining regional differences in prices. This can be done, for example, by a small survey that generates estimates of the difference in price by outlet for several varieties of consumer purchases. 12/

145. The more likely situation is that countries do have some information about the importance of outlets and can say one outlet type is more likely to be the volume seller of a particular item. In this case, countries should be guided by the three considerations developed in this section: (a) ensuring that price quotations from important outlets receive more weight in any national average price; (b) treating rural-urban and regional differences in prices according to the potato-is-a-potato principle, averaging their prices by quantities sold; and (c) whenever outlet types within urban areas can be made part of a specification, this should be pursued in collaboration with other participating countries.

4/ An item is important in a country if it is commonly purchased or, at least, well known and easily available in a number of outlets. While expenditures on an item are a necessary condition for it to be important, it is not a sufficient condition. Items that represent a significant proportion, say 10 per cent, of expenditures within a basic heading, are important as used here. However, there are many items that may not have large expenditure shares within the basic heading, but are important according to the criteria of familiarity and availability.

5/ In time-to-time indexes, weights for individual price representatives are not known, nor is country practice consistent in the method used to estimate price changes from individual price observations at the outlet level. The International Labour Office (ILO, 1989, p. 88) has discussed the problem in detail and concluded that there is one practical advantage case for use of the geometric mean in averaging either price ratios or item prices, namely, the geometric mean of price ratios across outlets is equal to the ratio of the geometric mean of average of prices across outlets. As will be discussed below and in chapter V, there are several points in processing ICP data where a choice between arithmetic and geometric means is required, including the basic heading level, where the ICP has usually worked with the geometric mean.

6/ In time-to-time indexes, the weights assigned to each price observation are usually known. The price sample may be self-weighted, or there may be specific outlet weights. Usually, countries implicitly use the same weighting when ICP prices are averaged across outlets.

7/ One criterion of importance that was discussed earlier was expenditure. However, as explained in chapter II, the basic heading level is a level of aggregation below which weights are not generally available by item. Usually, some information on expenditure weights is known within the basic

heading that can be used as a guide to item selection. As discussed in chapter V, some country groups have developed the practice of indicating more important items (where more means larger expenditure weight) in a basic heading by an asterisk (*) and to later use this information in a rough weighting system.

8/ The term "characteristicity" was coined by L. Drechsler (1973). In the text, this term is included as part of the importance of an item.

9/ It should be mentioned that EUROSTAT has developed a different methodology with respect to item selection that emphasizes making the so-called "best" selection of items between each possible pair of EC countries. This procedure is not further discussed here because it has not been thought feasible to pursue it for other country groupings and because it has been fully described by EUROSTAT (1987).

10/ This point has been extensively investigated in Daniel Usher, *The Meaning of National Income Statistics* (Oxford, Oxford University Press, 1974).

11/ Seattle and Vancouver, Chicago and Toronto and New York and Montreal. These cities represent a substantial proportion of the urban populations of the two countries.

12/ The logical extension of the arguments presented here is that specifications should match item by outlet, with less concern with the measurement of national average prices per se. (In this respect, the philosophy of the approach is similar to that adopted in time series analysis by the United States Bureau of Labor Statistics in its 1978 Revision of the United States Consumer Price Index in deciding to go for outlet-specific price matching.) Its validity rests on the assumption that differences in price ratios of products found in different locations will be much smaller than the actual differences in prices. By selecting one or two clearly specified and identifiable price ratios for each commodity, substitutability and certain general features of economic relationships will ensure that ratios will be broadly representative of the average price level ratio, i.e., the "parity" for the overall "group". Similar assumptions are made in a conventional price index when only one or two items are selected to represent general changes in prices of the broad category of commodities to which they belong. In the absence of weights at the item-outlet level, some compromise as suggested in the text is necessary.

IV. PRICE ESTIMATION AND ADJUSTMENT PROCEDURES

146. This chapter takes up a number of practical problems encountered by countries in providing prices and related salary and direct quantity information for the ICP. Indirect price estimation is discussed in section A, and price adjustments, including hedonic regression estimates, as well as a number of other price-slope adjustments, are taken up in section B. Section C discusses the construction sector, and section D discusses some miscellaneous questions, including equivalence in use.

147. Throughout this chapter a recurring theme is that the prices used in the ICP must be consistent with the way quantities have been valued in the national accounts. Food items, such as rice, mealy meal, cooking oils or sugar, are often distributed through a ration system at subsidized prices. Usually, there is a second market with higher prices. Whatever the system, the guiding principle for the ICP is that, however the item is valued in the GDP, that is the price that should be used for comparison. Some countries, for example, value a price-controlled cereal at the legal price, even though there are many "illegal" transactions at higher prices. In such a case, the price for ICP purposes should be the legal price because it is the price that when divided into expenditures will yield the correct quantity. In countries where two markets exist and the item is valued at the quantities in each market, the ICP price should be the quantity-weighted average of the controlled and free price; the two markets should also be reflected in the national accounts.

A. Indirect price comparisons

148. Indirect price comparisons are used when it is difficult to obtain direct price comparisons, most usually where output is not sold, as in general government, education and for some medical services, depending very much on the country. Before taking up specific sectors, it should first be noted that the problems posed for the ICP in health care, education and government are analogous to the problem of obtaining quantity comparisons over time for the national accounts. Suppose all health services were provided free of charge by government. To obtain a deflator for national accounts, it would still be necessary to know what part of the increase in government expenditures on health from the previous year to the current year are due to increased quantities of services provided and how much are due to increased costs of inputs per unit. Health expenditures may rise due to increased cost of inputs per unit, but if there are productivity gains by providers of health services, then part of the input price increase is absorbed by productivity gains. If there is some measure of changes in health service prices over time, then the deflation problem becomes much simpler.

149. This line of reasoning leads to the principle that comparisons should be as close to the final consumption of the service as possible. Consider the case of hospital services, which in most ICP work are compared at least partially on an input basis. It is possible to obtain direct quantity comparisons for hospital services, which are number of beds, or number of bed days. Clearly, bed days comes closer to final use than does simply the number of beds. But bed days does not hold constant the service that goes with a stay in a hospital bed. One could come closer to service by comparing also the number of nurses and physicians, as well as equipment, that are part of the package provided by a hospital in a bed day. In either case, a direct quantity measure is being used to approximate the volume of hospital services. By dividing, say, bed days into hospital expenditures, one would obtain an indirect price measure, namely, expenditures per bed day, that can be used to estimate price ratios across countries.

150. If there are hospitals in all countries that bill patients for the full cost per bed day, then it is better to simply compare charges per bed day. However, since cost per bed day depends on the medical service involved, it would be better still to know cost per bed day for an appendectomy. A still better comparison would be to simply compare the total charges in two countries for an appendectomy of "identical quality", separating the operation costs and surgeon's fee from the hospital charges. Whichever bed day price were used, the quantity would be indirectly derived by dividing price into expenditure. While moving closer to the final service usually improves comparisons, the extent to which health services can be matched across countries will remain less than for most commodity and many service comparisons.

151. In the hospital example, both indirect and direct price and quantity comparisons are considered. There is another intermediate approach that bases comparisons on prices of inputs rather than prices of

outputs. This is most common in education and government, where output prices are not known but where quantities and prices of the main input, labour, are known. The advantages of using wages and salaries versus numbers of employees will be discussed below. This type of comparison is also termed indirect because the prices of outputs are being inferred from the prices of inputs.

152. The principle of basing indirect price comparisons on indicators as close to final output as possible is also appropriate for deflators over time in a country, as well as for comparisons across countries where it may be more difficult to hold quality constant. The organization of this section is to move from quantity-based comparisons to those more directly related to the price of the final service. We begin with education, move to general government, and then to health services. 13/

1. Education

153. Schools are run by governments, by private groups for profit and by non-profit organizations, often religious. Some educational services provided by government may also involve fees to users that cover part of the costs, with the remainder financed by taxation. The services provided by private non-profit institutions and government are also included in the final consumption of households at their cost.

154. There is very little basis for making price comparisons for education on the basis of tuition or fees because they usually do not cover full cost. However, in some regions there are enough private schools with similar financing patterns that it is possible to use school fees as a price of some portion of educational expenditures.

155. The two main quantity indicators available for education are number of pupils and number of teachers, usually broken down into primary, secondary and higher education. These inputs do not, of course, measure the output of education. Attempts have been made to compare student performance on standardized tests across countries, but as yet that work is too fragmentary to offer any alternative quantity indicator. When numbers of teachers have been used, attempts have been made to standardize their quality based on their education. Because it is thought that number of pupils is also a measure of educational output, both teachers and pupils have at times been combined to obtain one direct quantity indicator for education. When this approach is used, the teacher-pupil measure is assumed to be the quantity of educational output, and the price is indirectly obtained by dividing the quantity into expenditures.

156. This direct quantity approach has been thought less satisfactory than use of the price of inputs. Salaries of teachers are a major cost in education and it is usually possible to compare average salaries for similarly trained teachers across countries. It is simpler to control for the quality of teachers by salary comparisons than to adjust quantities. If price parities for education are approximated by salary comparisons, it is assumed, given the same non-salary expenditures, that the educational output of a teacher of similar training is the same across countries.

157. Price comparisons for non-salary expenditures in education are imputed from parities for related detailed headings such as fuel, transport, publications and the like. Where possible, depreciation charges are separately treated and price comparisons are imputed from parities for maintenance expenditures. This is one of several ICP expenditure headings where parities are imputed from parities from other categories.

2. Collective consumption of government

158. Conventionally, the value of the output of these non-market and therefore non-price collective services is measured by the costs of providing them. The most important cost incurred in all cases is the compensation of employees, but total costs also include intermediate consumption and capital consumption outlays. Variations in labour costs, however, do not properly reflect differences in productivity, although, in the techniques applied in ICP, some attempt is made to take account of the

different skill inputs. This is done through the explicit categorization of employment by occupation type, qualifications, length of experience, and skill levels.

159. In calculating the compensation of general public administrative services, including defence, details of the occupational wage structure are required. Estimates are also needed of employers' and employees' total pension, superannuation and social security contributions, as well as of other benefits normally provided as part of total effective personal emoluments. Total compensation for each occupation compared should be an average of all levels of government. Some typical job descriptions for general government are included as core items in the core commodity list.

160. The parities for non-compensation parts of government are usually imputed from parities for related components for which price comparisons have been carried out, such as clothing or publications. A set of weights based on typical expenditure distributions are used to average the imputed parity over all of government intermediate consumption.

3. Medical services

161. The reader may recall that according to the ICP practice, health consumption covers not only expenditures on health by households but also expenditures by government (e.g., services provided free of charge by government hospitals). This is one of the few differences between the 1968 SNA expenditure breakdown and the ICP breakdown of the main expenditure categories.

162. One set of problems in obtaining parities for conversion from national currency to a common currency unit for health services stems from the fact that in a number of countries there are at least three ways in which the pricing of these services can be distinguished from one another:

a. Health services provided by private practitioners or by private health units (e.g., in private hospitals);

b. Health services provided by government or non-profit health units (e.g., government or non-profit hospitals), which, however, still have a market character. These health services may be cheaper than similar private health services; nevertheless, the price at which they are sold covers the whole, or at least a substantial part of the cost of these services;

c. Health services provided by government health units (e.g., government hospitals), which have less of a market character. These government health services are either entirely free of charge or provided for only a nominal fee.

163. The health services provided in each of these three types of units may or may not differ substantially from one another in respect of their qualities. However, there is no price, only costs, associated with free health care, so the only basis of a price comparison would be to assume it is the same or some percentage of the private charge, or to base the comparison on costs. This is an area where ICP methods continue to evolve.

164. What countries actually do is some combination of input and output comparisons, trying always to get as close to output as possible. In practice, this has usually meant carrying out price comparisons for all of Medical Care and Pharmaceutical Products (1.5.1) and Therapeutic Appliances and Equipment (1.5.2), and comparisons of medical and dental fees for well specified procedures for Medical Services Outside Hospitals (1.5.3). While, in some countries, insurance or subsidies operate to reduce the price to consumers, in most cases, the practitioner charges full fee, is reimbursed for part or all of the fee, and the residual is paid by the consumer. For all three of these summary categories, it is possible to specify some drugs or medical procedures as part of the core commodity list.

165. Most free services or medical services charged at less than cost occur in Hospital Care (1.5.4), which also include government clinics. Here, the basis of comparison has varied during the ICP, but a

common method is to break up these expenditures into salaries of professionals and of other workers, maintenance expenditures, such as food, fuel, laundry and the like, and depreciation of hospitals. Wage and salary comparisons are carried out for specified occupations, for example, physicians, lab technicians, nurses, orderlies, or maintenance workers, where it may be assumed that there is no or some objectively estimated productivity differential in these workers across countries. The core items for such comparisons become the occupation specifications for which wages and salaries are compared. Usually, the comparisons for other hospital costs are imputed from parities for analogous detailed headings, for example, food purchases from foods or maintenance from fuels and repair charges.

166. If it is possible to obtain hospital costs per bed day for specified types of illness, and for specified rooms, such as double or four or more, this is an alternative to the input comparison. Sometimes, this information can be used to supplement data on input prices. In any event, it is important enough as an approximation that it is also included in the core commodity list.

B. Hedonic estimation and other price-slope adjustments

1. Hedonic Price estimation

167. Hedonic regressions are appropriate when there is a strong relationship between objective quality characteristics and the market price. Hedonic regressions were originally used within a country for holding constant the quantity of consumer durables over time by isolating the price augmenting effect of additional features of the item in temporal price index construction. These techniques have a natural application across countries where it is hard to match identical items but where price-determining characteristics of the good are identical. Once the key price-determining characteristics of an appliance or a vehicle have been identified and their empirical relation to price determined, estimates of price in different countries for given characteristics of, say, a rental dwelling can be easily made. These techniques have been used for a number of producer durables, automobiles and some appliances, as well as house rents, for which some detail is given below. In general, hedonic techniques allow price comparisons across countries for specifications for which regression estimates can be made of the price, even though the price for the exact specification is not observed in the country.

168. Household rents are a significant percentage of consumer expenditures in most countries, and appropriate quantity comparisons across countries, or even between regions of a country, are difficult. There are direct quantity comparisons between countries that look at persons per room or per unit area of housing. But variation in housing quality within and between countries is so large that such a comparison on the basis of housing census data would not be comparing like with like. The way the ICP has dealt with this problem is partly through hedonic regression equation methods. In the case of housing, hedonic techniques require that there be a rental survey, and typically only a portion of participating countries have such a survey. These hedonic methods based on rental surveys are outlined here and are described more fully in Kravis, Heston and Summers (1982, pp. 54-59).

169. Price-determining characteristics for rental housing include size of dwelling, availability of amenities such as water, electricity, central heating and bathroom facilities, and usually age of dwelling. The ICP has created rent cells for about 60 dwelling types that represent combinations of the above characteristics. Many participating countries have rental surveys running from hundreds to thousands of observations. The monthly rent is regressed against the above amenities, size and age of dwelling, and usually additional survey variables that may be particular to each country. When more information is available in the survey, such as location, whether the dwelling is furnished, whether it is rent-controlled or subsidized, availability of a garage, and air-conditioning, these additional variables are often included in the regression equation of an individual country in order to sharpen the estimates of the coefficients on the rent-determining variables defining the cells across countries.

170. It is quite valuable for countries to estimate hedonic regressions from rent surveys for national purposes. First, such a regression approach will almost certainly improve the constant price estimates of rental services in household consumption. Secondly, hedonic rent regressions provide a basis for estimates of the value of housing stock to be included in capital stock. Thirdly, rental surveys typically

permit estimation of dwelling rents for the same specifications in different regions of a country, which may be useful in determining housing allowances and/or construction priorities.

171. For ICP purposes, the task of the country is to provide rental estimates for a variety of dwelling sizes and associated amenities that adequately represent the housing stock of the country. Countries, whether or not they use the hedonic approach, will provide estimates for a number of ICP rent cells that are important for the country. Important cells are determined by examining housing census information to ascertain which of the 60 dwelling types will be important enough, say, 3 per cent of the dwelling stock, in a particular country to warrant providing a rent estimate for that cell.

172. The actual rent estimate for a cell may be constructed separately for rental and owner-occupied dwellings or all together. If it is all dwellings in a country, then it is important to give appropriate weight to both groups of dwelling. For countries using hedonic regressions, the coefficients in the regression equation will be weighted by housing census proportions, for example, if there are rent coefficients by rural versus urban, then the weight to each coefficient will be the proportion of dwellings in rural and urban areas of both rental and owner-occupied dwellings. For those characteristics defining the cell, say, area of 30 square metres, age of building 20 years, indoor plumbing, electricity and water, these values would be plugged into the regression equation. Values for any additional variables in the regression equation would be set to match the specification so as to produce estimates of national average rents. 14/

173. Comparisons of rents, whether estimated from hedonic regressions or otherwise, must also take into account different methods of subsidizing housing space. The housing "price" may depend upon whether it is the renter or the property that is subsidized. If the renter is subsidized, then house rents paid will reflect market rents, and the national accounts should embody such rents in their estimate of house rents and the imputed rental value of owner-occupied dwellings. When dwellings are subsidized, this may show up as a government expenditure for maintenance and capital cost of the subsidized units, or, for older buildings owned by government but fully depreciated, it may not show up in government at all. In the latter case, the national accounts do not reflect the market value of these dwellings and some decision has to be made as to whether to take this into account. As discussed in chapter II, rental services consumed, not rental expenditures of households, is the relevant concept for the ICP; any expenditures of government for housing should be transferred to household consumption.

174. If there is partial rent control, then the national accounts should embody part of the rental dwellings at market prices and part at controlled prices. Further, in order to get the appropriate rent for owner-occupied dwellings, it is necessary to know what is done in the national accounts. The SNA recommendation is that market rents should be used for owner-occupied dwellings, though, in some countries, controlled rental prices have been used. In any case, the principle should be that the rent for any cell should be based on the proportion of dwellings in that cell at market and controlled rents.

175. The whole question of the treatment of imputed rents in the national accounts can be usefully discussed in regional meetings. The experience of neighbouring countries is likely to better inform national accounts statisticians in all of the countries. Such discussions should improve and make more comparable the national accounts treatment of this difficult area, quite independent of the ICP.

176. To summarize, countries provide rents of dwellings for a number of different housing types based upon rental or housing surveys that in a number of countries have been analysed using hedonic regression techniques. What is crucial is that rent estimates be provided for dwelling types that are important for the country and that the estimate of rental price reflect the same valuation used in the national accounts for both rental and owner-occupied dwellings. Finally, since quantities are known from housing censuses for most countries, these weights should also be provided. As will be discussed in chapter V, such weights are used for several other basic headings to obtain the parities at the basic heading level.

177. Hedonic price estimation has been carried out for automobiles and appliances such as refrigerators. The methods used for automobiles are very similar to those for house rents. Generally, a grid of horsepower and weight cells defines a number of automobile models, and within each cell from

one to four actual models are described. Countries then provide prices for those models based on their importance, using sales in the benchmark year. The prices may be based on hedonic regression equations or on other survey data. As in the case of house rents, there are weights associated with each automobile price that are taken into account in building up the basic heading parity. Passenger automobiles are purchased as final product and as intermediate product by firms, so it is important that the auto comparison be done carefully. Because there are discounts from list price in some countries, these must be taken into account when estimating the national average price.

178. It has been found for most appliances that usually one or two factors are enough to explain price, such as total litres and freezer size in the case of refrigerators. So, in practice, the ICP has used a number of other procedures, which are termed price-slope adjustments, to modify actual prices to meet a specification.

2. Price-slope adjustments

179. The character of the remaining problems usually concern situations where it is not possible to match items exactly, but there is information available that makes it possible to relate the differences in the match to differences in price. These procedures have been grouped into two types, those arising from size of package or purchase, and those arising from the technical capacity of the item.

a. Size of Purchase and Package

180. For most items, the price per unit of weight declines with the size of purchase because packaging and retailing charges do not rise proportionally with size of purchase. Basic items such as rice can often be purchased in boxes of under a kilogram, as well as in bags of over 10 kg, within the same country, and even in the same outlet. The premium in price per kg paid on small-sized purchase quantities can be considered as the price paid by the consumer for more distributive services. Most ICP specifications include weight or volume as a part of the specification, so that, in effect, a 0.5-kg box of rice is a different item from a 5-kg bag of rice.

181. Often, a specification will give a range of weight, for example, a 0.3 to 0.5-kg tin of peas. If in one country the commonly purchased tomato sauce is in a 0.33-kg tin and in another country a 0.45-kg tin, then each country would convert it to a price per kg on a proportional basis. In other words, the relationship of weight to price is assumed linear within small ranges, as in this example.

182. Often, choosing the correct unit of comparison for an item is in effect a price-slope adjustment that puts a wide variety of items into a standard frame. Household textiles and floor coverings are an example. It turns out that one can hold constant many of the price-determining characteristics by specifying price per square metre for a given material of a given weight. For example, cotton towels come in a bewildering variety of sizes and weights, but the main element in price is the amount of material. This can be standardized by suggesting an approximate range of towel sizes of a given weight per square metre and converting the collected price to a price per square metre. This applies to many types of floor coverings, curtain materials, suiting material and the like.

183. Differences in packaging for the same unit of purchase of the same commodity often do not affect relative prices across countries. Frequently, wage rates, recycling legislation or relative costs of paper will lead one country to adopt one form of packaging as less expensive, while another form of packaging may be cheaper in another country. If volume sellers use different packaging in the two countries, it is a difference that can usually be ignored.

184. However, ICP specifications commonly do distinguish between an item sold in bulk and an item that is pre-packaged and treat them as different items. This is because purchases in bulk often involve less service to the consumer and higher unit prices.

b. Consumer durables and machinery and equipment

185. For many home appliances and for a variety of capital equipment items, one dimension of the product may be price determining. For example, an electric motor specification may be for a three-quarter horsepower unit but in a particular country the unit available is one horsepower. So long as there is information on the relationship between price and horsepower in a range bounding these motor sizes, it is reasonable to adjust the one-horsepower price to the three-quarter price. Use of such price-slope adjustment factors is frequent because it permits the use of already collected consumer, wholesale and import prices, with the consequent savings in resources needed for additional collection.

186. In consumer goods, these types of adjustment are frequently used for refrigerators, air-conditioners, heating appliances, fans and the like. Where countries can easily find the same brand and model widely sold, simple identity of item is to be preferred. But where regions are heterogeneous, or import restrictions limit brand representation on local markets, pricing identical items may not be possible. To illustrate, most information about room air-conditioners is contained in the number of BTUs of capacity. This is a case where it may not be necessary to compare exactly the same size of air-conditioner across countries, because the relationship of price to BTUs provides a gradient that allows for the adjustment of actual prices to a normalized price for a slightly different size. Refrigerators present a slightly more complicated case because both litre of freezer space and total litres affect the price. However, where exact matches of freezer and total size are not possible, it is usually straightforward to convert a price for a slightly different size to that of the specification. A summary of the experience in pricing capital equipment in Africa treats a number of these questions. 15/

187. Price-slope adjustments are frequently necessary and are fairly easy to apply in the case of machinery and equipment. Representative profiles of a wide range of equipment goods have been drawn up (and are continually being revised to take account of changing and improving technologies) for ICP machinery pricing. Identification and matching of these items depends on a precise and well-defined description of the technical characteristics of each product, for which there is typically a specification sheet, with technical descriptions and usually illustrations. The technical characteristics listed for each item include all features relating to size, power, performance (output, speed, capacity etc.) and weight, and these are usually arranged in some order of relative importance. The ICP list provides these details and also contains an illustrative guide, together with some suggested models and brand names in certain cases, to aid the process of product identification and pricing. One advantage for most developing countries is that a single price quotation from the main franchise or importing agency is usually all that is necessary. The problem for many countries is that they will not be able to supply prices for the exact specification.

188. One reason for this is that when Governments directly encourage and protect their country's capital goods industry, then it is difficult to find exactly the same item in every country. Matching also proves to be especially difficult where, for reasons of statistical confidentiality, it is impossible to identify any specific models and brand names. The process of comparing equivalent equipment goods in these situations is carried out on the basis of matching, as closely as possible, pre-defined physical specifications and output characteristics. When this method of matching is followed, it is important that any comparison is made primarily on the basis of the most essential characteristics. Price-slope adjustments will often be needed because of small differences in capacity of, say, a pump, in different countries. These adjustments are typically done by the regional organization with consultation with the country when necessary. The main responsibility of the country is to provide along with the price as much technical information as is available about the particular capital good.

189. Some of the important factors that affect actual purchase prices of machinery are installation costs, delivery charges, after-sales services, contractual maintenance, accessories, discounts for quantities purchased, financing arrangements, tax charges and other terms of sale. For consistent pricing in all countries, only normal sales conditions should be taken into account and specially negotiated terms of payment and variable quantity purchase should be excluded.

190. The problem of identifying and matching investment purchases of machinery and equipment in many developing countries is, in fact, often less complex than in advanced industrialized countries. For a significant number of items, the goods will have been originally produced in Japan, Europe or the United

States of America and will have been imported into the country. They are likely to be items already in the ICP specifications. There are likely to be only a few distributors, usually in the major cities, so outlets are easy to identify. Further, since many of the items are imported, price information may already (or should) be collected as part of import price index construction. While experience of statistical offices in pricing machinery and equipment is often modest, this is an ICP pricing area that in practice is fairly straightforward for countries to meet the needs of the ICP and also expand their own pricing base. Most of the problems of comparability can be handled at the regional level by careful matching, use of some price-slope adjustments, and consultations with countries.

191. In general, the price of a piece of capital equipment should include all taxes but not optional service charges. Manufacturers often provide some type of guarantee on part or all of their equipment for a limited period of time, with the cost included in the selling price. Dealers also offer service contracts along with the equipment. Whenever there is an additional charge for the service contract, that charge should not be included in the price. Any finance charges associated with the purchase of the equipment should also not be included in the price.

C. Construction

192. In the ICP, direct price or cost information are usually not used for comparisons for construction items. There are four main reasons for this. First, many kinds of construction projects are not carried out every year in all countries, so actual prices or construction costs of equivalent building and construction projects are simply not available. Secondly, actual construction projects are unique, often differing in shape, size, technical characteristics or materials used, and so they are hard to match across countries.

193. Thirdly, construction costs for the same type of project in the same country with the same input prices tend to have a high variance because of random factors, including weather. Therefore, the actual cost of a particular construction project may be substantially above or below what would be typical for that type of construction in the country. Fourthly, and operationally most important, is that there is an alternative approach that appears to produce very reasonable results.

194. This approach employs a series of standard building models, which are costed in all countries using a common bills-of-quantities approach. These model construction products, which may never actually be built in a country, can be broken down into a variety of common components and activities. These components include initial ground clearance and excavation, foundations, walls and roofing, which in turn can be disaggregated into uniform bills-of-quantities, such as a running metre of masonry of given height and width or a cubic metre of excavation. These well specified bills-of-quantities permit matching of items based on a range of identical materials and quantities used as basic inputs that can be priced in many countries.

195. In this approach, a given construction project is modelled as some weighted sum of the bills-of-quantities involved. These models have been developed by architects or quantity surveyors in a number of countries and represent a variety of building types. The bills-of-quantities approach was pioneered by EUROSTAT and was developed for use in many Latin American comparisons. However, there is much geographical diversity in construction practice, so it has been important to develop and adapt models that are particular to regions, such as has been done in Africa and Asia.

196. While the detailed specifications closely resemble actual buildings or construction activities in terms of their shape, dimensions, methods of construction etc. they are, in fact, standard models or prototypes. Once the details have been fully specified, the process of costing can be undertaken by both government and professional quantity surveyors, architects or engineers. Often, public works departments and other government agencies will regularly maintain files with costs of bills-of-quantities that are the building blocks in the many infrastructural development activities and contractual building projects in which Governments are involved. In the core commodity list, a number of the basic building models have been included for which countries would build up cost estimates from the detailed bills-of-quantities contained in the construction specification manual.

197. As construction methods respond to changes in types and relative costs of materials available, to real wage changes, and to new techniques and improvements in construction machinery, the prototype construction projects used by the ICP are also updated. These changes may show up in the relative weights or the number and technical descriptions of the bills-of-quantities.

198. The advantage to participating countries of the bills-of-quantities approach is that it lends itself to methods of national deflation of construction costs over time that take account of productivity changes. Most national construction indexes are based on movements in the prices of inputs, with or without some fairly arbitrary adjustment for productivity improvements. A time-to-time price index based on the bills-of-quantities approach by its nature takes into account productivity changes.

D. Some miscellaneous pricing issues

199. There are many problems that come up in price comparisons for particular basic headings, such as fish, which present problems because of the use of the same names for different fish, and different names for the same fish, not just between countries, but often in different parts of the same country. In this particular case, the ICP has used several common names in addition to Latin names, which any marine expert in a country can identify. Most of these pricing issues become clear in the specifications or in consultations and will not be treated here. However, two general questions are taken up in this section, equivalence in use and identity of products.

1. Equivalence in use

200. Different countries consume cereal products in different proportions, some consuming mainly rice and others mainly corn. For this reason, there are those that have advocated converting a kg of each type of cereal into, say, wheat equivalents, and comparing that price across countries. In general, the ICP has not adopted equivalence in use as a basis for comparison, so that comparison of like with like has been the guiding rule.

201. Some examples may illustrate instances where this rule has sometimes been violated. Consider the case of wheat flour, where both whole wheat and white flour are the specifications. Usually, there is a small premium for whole wheat flour over white flour in countries like the United States, because of the much larger volume of white flour that is consumed. But, in some countries, whole wheat flour is more common, especially where grinding is done locally and many breads are prepared at home, and it sells at a lower price than enriched white flour. Where countries have both items, both can be priced. However, this is a case where it is useful if countries can give an indication of relative importance of the items, as in the asterisked (*) item method, as discussed in the following chapter. This is also a case that could be treated as equivalence in use and where simply the average price of white and whole wheat flour were compared across countries, as was done in phase I of the ICP in developing binary comparisons.

202. Another example occurs for countries where no distinction is made in the market between goat and lamb. In fact, the ICP has specifications for both, but in practice, if a country does not distinguish between the two, one price may be all that can be supplied. What should be done? To some extent, this problem solves itself because usually countries that would distinguish the two also have systems of meat grading that include a general carcass weight specification. Usually, carcass weight comparisons produce matching between countries and little is lost by equating goat with lamb for countries that make no distinction.

203. There are also several other areas where equivalence in use seems more sensible than pursuing exact like with like. For example, most countries have several forms of squash or pumpkin that may look very different but for all practical purposes serve a common function and sell for the same unit price. The same is true for leafy greens. The ICP specification in such cases is generic and countries must judge whether their local item is a variety of a common item. A similar case is ketchup, which in some countries has a tomato base, in some countries bananas, and in still others, pumpkin, or some mixture. In some regions, these are treated as identical.

204. Another case that is fairly important is cooking oil. In addition to comparisons for specific oils, such as sunflower or sesame oil, there is also an ICP specification for a general purpose cooking oil. Typically, the common vegetable oil is a blend of available oils, the blend varying both within and between countries, depending on the relative price of the usual oils used in the blend, for example, corn, groundnut and the like. In this case, all blends are considered equivalent in use, even if not identical.

205. A final illustration is provided by clothing. Usually the ICP offers a number of specifications of clothing materials, with technical specifications as to whether it is wool, a blend, dacron or other synthetic, or a cotton, the thread count where relevant, its weight per square metre, if price determining, type of weave, such as corduroy, and finish. For many countries, purchase of materials is a first step in clothing purchase, the second step being tailoring, which may be in the home or by a tailor. As part of the price collection in these categories, tailoring charges for a variety of tasks are specified. For some clothing items, such as a dress or a pair of pants, it may be less expensive for a consumer to buy material and pay tailoring charges than to buy them ready-made in a store. In such cases, it is the final consumption of the dress by the consumer, not the manner of its production, that is being treated as equivalent.

2. Identity of Product

206. In this section, we return to an issue discussed in chapter III, namely, how close should countries try to stick to identity of brand in pricing items. One general procedure used in the OECD countries is to try to provide prices for identical brands but to mark with an asterisk (*) items that are important. As will be discussed in chapter V, this means that if a particular brand is priced in a country that is not important in consumption and is not given an asterisk (*), it will get less weight in determining the parity for the basic heading. The system of using asterisks for certain items appears to have promise, but like all comparisons, it is much easier where countries are homogeneous.

207. Consider beverages and tobacco comparisons across all of Asia. The list of items will include a number of international brands, often selling at premium prices because of tariffs or bans on imports, plus a large number of local brands. Usually, the local brands are the volume sellers, so that there will be a specification for a bottle or can of beer that may say "local volume selling beer", where identity of brand is not required. Countries may also provide prices for internationally known brands if they are commonly consumed, which is likely to be the case with cigarettes, where both national and international brands share the market. Whenever countries feel they can match a brand but do not regard the item as characteristic of their consumption, they should indicate this when supplying the price, or choose to simply not price that brand.

208. Sometimes, countries use identical names for goods and services that are not identical. In purchased transport, for example, there are many problems of international comparability, mostly associated with holding quality constant. It is easy enough to stratify by types of urban transport, cycle rickshaws, three- and four-wheel taxis, jitney buses, regular buses, deluxe buses, trolleys and subways. Suppose that in one country, on bus trips a person can expect only standing room, a wait for the bus of 30 minutes or more, and that the bus itself will have few amenities, while the opposite is true in another country; should the bus trips in the two countries be treated as like to like? Is the comparison only for purchase of transport from A to B by road, or do we want to hold constant the quality of the ride and the time input of consumers? The answer is that some compromise must be reached because we enter a very uncertain world if we try to take account of time in queues. Probably, the best that can be done is to not simply equate first class train in one country to first class train in another, but to inquire exactly what amenities the consumer is buying. In fact, second class in Europe has been equated with first class in some South Asian countries. However, for many urban commuting trips, crowding and delays are common in rich and poor countries, and it is not easy to stratify adequately to take account of many quality differences.

209. The first choice for countries is to price identical goods and services. However, countries must remain prepared to question the obvious identity of brand with brand or a first class ticket in one country with a first class ticket in another. These questions should be raised with regional coordinators or in meetings with pricing counterparts in neighbouring countries. It is important to know exactly what service

is being provided and just how important particular brands are in local markets, and here the knowledge of the staff of national statistical offices combined with the experience of ICP coordinators can often come up with an appropriate solution.

13/ A general reference for the issues discussed in this section is Kravis, Heston and Summers (1982), chap. 5.

14/ For example, if some dwellings were furnished in the survey, the coefficient on the dummy variable indicating a dwelling was furnished would be dropped since the ICP rent cells are for unfurnished dwellings. If the survey distinguished regions of a country, the coefficients on the dummy variable for each region would be weighted by the proportion of housing stock in each region.

15/ See EUROSTAT (1985).

V. PROCESSING OF THE BASIC DATA

210. This chapter briefly sketches the methods of processing the price and expenditure data provided by countries to the ICP coordinators. Section A takes up the calculation of parities at the basic heading level. The discussion in this section is fairly technical because it is felt that a good understanding of estimation of the detailed heading parities should make it possible for country statistical offices to better appreciate the type of price information required by the ICP. Considerable space is therefore given to the basic heading parities with the view that this will help improve the overall quality of the comparisons. Section B concerns aggregation from the basic heading level to GDP. Many of the technical aspects of the methods are discussed in Annex II. Section C of this chapter briefly discusses the question of extrapolating benchmark estimates to years other than the benchmark reference year, a task that country statistical offices may be called upon to perform.

211. By way of contrast, less space is devoted to aggregations above the basic heading level. This is partly because these index number problems have been the subject of a number of expert group meetings over the past several years, and so there is ample material available discussing the issues. Further, there is no unanimity about how the aggregations should be made to build up either regional or world comparisons, so the Handbook will simply sketch some of the issues and methods employed. One general question is whether there should be symmetry in the methods employed to obtain parities at the basic heading level and those used to aggregate the basic headings. This issue was discussed in the expert group meetings, but no consensus was reached; in the Handbook, the methods of obtaining basic heading parities are treated independently from aggregations of the basic headings.

A. Purchasing-power Parities for basic headings

212. The parity at the basic heading level is an average of the individual item price ratios of the specifications belonging to a given basic heading. This section discusses two principal approaches to estimating these basic heading parities, namely, the *Éltető-Köves-Szulc* (EKS) and the country-product-dummy (CPD) methods. The principal differences in the estimates generated by these two methods arise at the level of the basic heading; as one moves to aggregations of the basic headings, the overall results are unlikely to be affected by which method is chosen. Both methods are described here because both have been extensively used in ICP work.

213. For purposes of illustration of how parities are obtained for basic headings, a price tableau for a basic heading for four countries for eight specifications will be used. In this illustration, no item weights are provided but the countries have been able to indicate whether items are important in their consumption by an asterisk (*). In this example, country A will be taken as the numeraire, and price ratios between all pairs of countries are given in rows (5) to (10), with those with respect to country A given first. The six price ratios given will be termed direct price ratios because they are formed directly by taking the prices of the two countries, as in (B/A). An indirect price ratio derived from two direct ratios, as the product of $[(B/A) \times (C/B)]$, will be denoted $(C/A)^{\wedge}$.

Tableau of Prices and Price Ratios

	<u>Items</u>							
	1	2	3	4	5	6	7	8
<u>Countries</u>	<u>Prices</u>							
(1) A	2*	6*	--	--	10	--	1*	4
(2) B	12	35	3*	5	40*	--	--	18

(3) C	25	50	7	12*	--	10*	--	--
(4) D	150*	400*	--	100	--	70*	80	--
<u>Country/Country</u>				<u>Price ratios</u>				
(5) B/A	6	5.83	--	--	4	--	--	4.50
(6) C/A	12.5	8.33	--	--	--	--	--	--
(7) D/A	75	66.67	--	--	--	--	8.0	--
(8) C/B	2.083	1.429	2.333	2.40	--	--	--	--
(9) D/B	12.5	11.429	--	20.0	--	--	--	--
(10) D/C	6.0	8.0	--	8.333	--	7.0	--	--

214. Binary comparisons at the basic heading level are quite straightforward. Consider countries A and B in the example above. The parity between A and B for the category is taken as the geometric mean of the price ratios for the matching items 1, 2, 5, and 8, which, in the example, is $5.01 = (6 \times 5.83 \times 4 \times 4.5)^{1/4}$. As noted, no item weights are given. However, where the asterisked item system is used, importance of items is taken into account in the following way: whenever items are marked with an asterisk in one of the two countries, they are included in the calculation of the parities. In the example above, only items 1, 2 and 5 would be included in the comparison of A and B because these items have an asterisk (*) in at least one of the two countries. The parity between A and B estimated on the basis of asterisked items would be $5.19 = (6 \times 5.83 \times 4)^{1/3}$.

215. The price tableau in the illustration has a number of items for which countries have not provided prices, which is the usual situation. Suppose, however, that we consider a complete tableau of only items (1) and (2), where each country has provided prices for both items. In this case, the binary comparisons between each pair of countries is transitive so that $(C/A)^A = (C/A)$, that is, the direct parity between C/A would be equal to the product of the parities B/A and C/B. This can be seen below, where the price ratios are repeated for items (1) and (2) from the price tableau above, and the geometric mean of the price comparison is given for all possible binary comparisons:

	B/A	C/A	D/A	C/B	D/B	D/C
Item 1	6.00	12.50	75.00	2.083	12.50	6.00
Item 2	5.833	8.333	66.67	1.428	11.43	8.00
Geometric mean	5.916	10.206	70.71	1.725	11.95	6.93

The geometric mean of B/A is equal to $(C/A)/(C/B)$, that is, $5.916 = 10.206/1.725$, and so forth for any other direct and indirect binary comparisons. Also, use of geometric averages produces end results that remain base country invariant, i.e. they are not influenced by which country played the role of numerator and which of denominator. (With arithmetic averages, this would not be the case, since the unweighted arithmetic average of the A/B ratios is not the reciprocal of the unweighted arithmetic average of the B/A ratios.)

216. In chapter III a desirable property of the geometric mean was mentioned in connection with time-to-time indexes. The property is that the ratio of the geometric mean of two series is equal to the geometric mean of the product of the ratios of the two series. In the above example, using only items 1 and 2, we may note that the geometric mean of prices in B $(12 \times 35)^{1/2}$, divided by A $(2 \times 6)^{1/2}$ is $5.916 =$

20.494/3.464. This leads us to a discussion of the Éltető-Köves-Szulc (EKS) method, which allows estimation of transitive multilateral parities based on all possible binary comparisons.

1. The EKS method

217. When the price tableau is complete, we have noted that the direct binary parity between B and A is equal to the indirect binary derived through third countries such as C or D. However, this is not the case when the price tableau is incomplete, as can be seen from the geometric mean given below based on the full price tableau:

	B/A	C/A	D/A	C/B	D/B	D/C
Geometric mean	5.01	10.206	73.681	2.021	12.132	7.274
Geometric mean*	5.19	10.206	73.681	2.366	11.953	7.274

The first row above gives the geometric mean of the price ratios between each possible pair of countries, using all the prices in the price tableau, while the second row only uses price ratios where the item has an asterisk (*) in at least one of the countries. Considering (B/A), the direct ratio, it can be seen that it does not equal the indirect ratio, (B/A) = (C/A)/(C/B) in either row. Or, put another way, transitivity is lost.

218. The EKS method permits transitivity to be restored by taking into account the indirect and direct comparisons by the formula in the following equation:

(1)

$$PP_{jk} = \sum_{i=1}^n (PP_{ji}/PP_{ki})^{1/n} = PP_{jk}^2 \sum (PP_{ji}/PP_{ki})^{1/n}, \text{ where } PP_{ii} = 1$$

The term "PP" is used to denote a parity at the basic heading level. In EKS, the direct parities (PP_{ji}, where i = j) and (PP_{ki}, where i = k), are each counted, while each indirect parity is counted once. In the above example with four countries, the EKS calculation of the (C/A) parity from the geometric mean for the asterisk (*) approach is:

$$C/A = [(C/A) \times (C/A) \times (C/D) \times (D/A) \times \{(C/B) \times (B/A)\}]^{1/4}, \text{ or}$$

$$C/A = (10.206 \times 10.206 \times 10.130 \times 12.280)^{1/4} = 10.670.$$

219. All the EKS estimates, using all prices, and the asterisk approach are given below:

	B/A	C/A	D/A	C/B	D/B	D/C
EKS	5.267	10.167	70.352	1.930	13.357	6.920
EKS*	5.173	10.670	70.710	2.063	13.669	6.627

220. An advantage of the EKS method is that it produces transitivity and makes use of all the price information available, including both direct price comparisons between each pair of countries, and all indirect price relationships between each pair of countries and the remaining countries. The EKS method is derived from a minimization procedure that was basically mathematical in formulation, though it can also be derived in a weighted form from some general considerations of consumer behaviour. The CPD method that follows is derived from an explicit model of how the price tableau is generated. 18/

2. The CPD approach

221. An alternative way of dealing with an incomplete matrix of prices is the country-product-dummy (CPD) procedure developed by Robert Summers (see Summers, 1973). It has been employed in the ICP calculations for the initial studies, although in recent years most regions have preferred to adopt the EKS method. CPD is a multilateral method in which regression analysis is used to obtain transitive parities for each basic heading. The prices are regressed against two sets of dummy-variables: one set contains a dummy for each specification and the second set a dummy for each country other than the numeraire country. The transitive parities are derived from the coefficients of the country dummies. The estimating equation is as follows:

$$(2) \ln P_{j/k} = b_1X_1 + b_2X_2 + \dots + b_{n-1}X_{n-1} + Z_1Y_1 + Z_2Y_2 + \dots + Z_mY_m + u,$$

where n = number of countries, m = number of items in a basic heading, $j = 1, 2, \dots, n-1$; $k = 1, 2, \dots, m$, and where $\ln P$ is the natural logarithm of the price of an item k in country j . Each of the $n-1$ countries being compared, other than the numeraire country, is represented by an X dummy variable, and each of the m items in the heading is represented by a Y dummy variable. The country coefficients, the b s, are the natural logarithm of the estimated country parity for the heading, and the item coefficients, the z s, are the natural logarithms of the estimates of the item prices in the currency of the numeraire country.

222. The CPD estimates given below are based on the price tableau, using all the observations in paragraph 213. The very high correlation is spurious since it basically results from explaining the variance in the initial observations owing to different currency units. Similarly, the size of the t statistics on the item coefficients is of only limited application. However, the country and item coefficients are of interest, particularly in column (3), where they are given in their exponentiated form. The coefficients for each country are pps in terms of currency unit of the country compared to the numeraire country A, and the item prices are the estimated average price of each item expressed in the currency unit of country A.

CPD regression example

<u>Variable</u>	<u>Coefficient</u>	<u>t statistic</u>	<u>PPP and item price estimates</u>
Country B	1.574	17.55	4.83
Country C	2.315	22.44	10.12
Country D	4.296	43.88	73.44
Item 1	0.805	8.77	2.24
Item 2	1.766	19.24	5.85
Item 3	-0.422	-3.26	0.66
Item 4	0.171	1.51	1.19
Item 5	2.208	20.60	9.10
Item 6	-0.030	-0.23	0.97
Item 7	0.043	0.39	1.04

Item 8	1.351	12.60	3.86
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adj $R^2 = 0.998$ $n = 21$ $df = 11$ where $n =$ number of price observations
and $df =$ the degrees of freedom

223. Turning first to the country estimates, the value of country A is 1.0, since it is the numeraire. If these coefficients are compared to the EKS estimates in paragraph 219, the largest difference is for B, about 9 per cent. As was mentioned earlier, if there are no holes in the price matrix, then the CPD and EKS estimates are identical and all direct and indirect binary parities between countries are transitive. The more prices missing from a given price matrix, the less reliable are either the EKS or the CPD estimates compared to a direct country-to-country comparison using the geometric average of price ratios; and the more prices missing, the larger will be the differences between the EKS and the CPD estimates. It is not possible to say which method is closer to the truth; both are approximations.

224. The CPD method estimates a common item price in the currency unit of the numeraire country that, together with the heading parity, in effect produces a full price matrix. The item prices given above are a part of the estimation procedure of the CPD that are of considerable interest in themselves since they are an estimate of the average price for each specification in the currency of the numeraire country across the group of countries. In regional comparisons, for example, a by-product of application of the CPD method in the ESCAP region in 1985 was a set of Asian item prices. These CPD prices provide a basis of comparison for any country in a region of their specification prices with the average. They also have applications where it may be desired to link a country that did not participate in the benchmark comparison to an existing ICP study. For example, for a country whose prices were available at a later date than the initial CPD for a region, it is possible to link the country to a regional or world comparison in the following way: first, the item prices within a basic heading for such a country would be divided by the CPD estimates of the same item prices in a numeraire currency; then the geometric mean of these price ratios would be calculated to provide the basic heading parity that would allow the country to be linked to the regional and world comparison. This exercise was carried out as a non-official research exercise for Taiwan Province of China, based on the CPD average ESCAP prices for 1985.

225. The EKS and CPD systems can also be used with weights for the individual items, or by use of the asterisk (*) system. In phase IV, for example, the CPD system was used for 20 core countries that were used to link the various world regions. Some core countries had items marked with an asterisk (*) and these were given larger weight than non-asterisk items within any basic heading.

226. The Handbook considers the CPD and the EKS as two alternative methods for the multilateral parity calculations at the basic heading level, without trying to give a clear preference to one or the other. The actual conditions in a given region as well as the preferences of regional experts and organizers should determine which of the two methods is applied.

B. Aggregation of the basic heading Parities up to the level of GDP

227. Once parities are obtained for each basic heading the aggregated results have to satisfy the basic requirements of international comparisons, commensurably. Expenditure data must be converted by these parities from national currency to the currency of the numeraire country or to an international currency unit. When expenditure data are converted by parities into a common currency and unit of account at the basic heading level, they are then comparable across countries. Thus, by dividing the expenditure of country A by the expenditure of country B in the same currency, interspatial quantity indexes can be obtained for each basic heading. At the basic heading level the quantity estimates vary in reliability and the volume of data is large so they usually are not published. However, the basic heading data are the building blocks necessary to obtain the converted aggregates for both the summary categories and GDP.

1. The G-K and EKS methods in brief

228. To aggregate the basic heading parities and expenditures, a method adopted from the suggestion of Geary has usually been employed in comparisons at the regional as well as the world level. 19/ This method is known as the Geary-Khamis or G-K method and produces transitive comparisons between all countries. The EKS and other methods proposed for aggregation also produce transitive results at the level of GDP.

229. A principal advantage of the G-K method is that it produces additive results that have the property of matrix consistency, where the results can be compared down the basic headings and across countries for any basic heading or aggregation. There are strong arguments that gross domestic product should retain this property even after conversion to another currency since it is in accord with standard national accounting practice. Such additive consistency is advantageous not only because it permits an easier analysis of the structure of the aggregates (e.g., it enables the calculation of distribution percentages), but also because it allows comparison across countries.

230. Not all index formulas provide additive results. Neither the Fisher ideal formula (the geometric mean of the Laspeyres and Paasche formulas), nor any method based on the Fisher formula (such as the EKS) will meet the additivity requirement. Nor do chain indexes, where different weights are used in the different defined composite elements (in the various bilateral comparisons), meet this requirement.

231. Any method of aggregation uses some implicit or explicit set of weights for the importance of each country in the comparison. In the usual G-K application, countries are accorded the weight of their own total GDP in the aggregation. 20/ This accords with standard national accounts methodology, where prices embedded in national accounts are an average weighted by the quantities produced in each region.

232. Most other methods of aggregation use a weighting system that accords the same importance to each country. For example, the implicit weighting system of EKS type systems gives the same importance to, say, Luxembourg, as to France, even though France's economy is over 50 times larger than that of Luxembourg. As a consequence, the different aggregation methods produce different results at the aggregate level. These questions are discussed in more detail in annex II, but as an empirical generalization it can be said that systems such as EKS tend to produce somewhat larger differences between per capita incomes between rich and poor countries than the G-K method. All of the aggregation systems proposed produce results much closer to one another than to the nominal results obtained by converting by exchange rates.

233. While aggregation methods such as the EKS and G-K systems move us towards better measures or real output between countries, there is not yet agreement on criteria that would allow one to say that one system was to be always used. To summarize, the main claim for the G-K method is that it follows the conventions of national income accounting and produces additive results. As discussed in annex II, the EKS system may have more basis in consumer theory than the G-K. In G-K, the quantity of each item of a country is the weight, while in EKS each country is given equal weight. There remain differences among the experts on which system should be adopted, and in phase VI it is likely that the results of both methods will be presented. 21/

2. Linking of regional results and the fixity question

234. There is one more problem that arises when passing from the regional comparisons to the world comparison. If the G-K or another aggregation system is applied at the regional level, results will be expressed at regional average prices, which vary from region to region. How should the results of the world comparison be expressed? If world average prices are used as weights, the results obtained in the world comparison between any two countries belonging to the same region may be different from those obtained originally in the regional comparison.

235. Many users and producers of ICP results would like to avoid having two different relationships between, say, France and Italy, depending on whether the result was obtained from an EC comparison or a world comparison where different international prices prevail. This view is especially strong in those

regions where ICP results are also used for administrative purposes, as in the European Community. It explains why, in phases IV and V, the ICP organizers accepted the so-called "fixity principle", which requires that results obtained in a regional comparison remain unchanged in a comparison covering a larger number of countries.

236. The price to be paid for complying with the fixity requirement is relatively high. Essentially the matrix consistency of the G-K method must be given up at the world level if the fixity principle is applied. 22/ However, this limitation is only observed in official publications. For purposes of research concerned with the structure of the world economy across regions, individual researchers or research organizations may aggregate the basic heading data in other ways that may be more suitable for the analysis of the economic structure of countries.

C. Extrapolation of benchmark estimates to other years

237. Typically, benchmark estimates are obtained every five years. However, since benchmark estimates are not available until at least two or three years after the benchmark year, this means that the latest available benchmark estimate for a participating country may be from two to eight years prior to the current year. This is one reason why countries often need to approximate estimates between benchmarks. In the case of the OECD countries, these extrapolations are regularly published with estimates of real GDP and the implicit PPPs moved backwards and forwards from the latest benchmark estimate. The European Community has gone further in this direction, moving towards annual benchmarks. For EC, this partly reflects the fact that operational uses of real output numbers often require very current estimates. 23/

238. The general method of extrapolation is quite straightforward. OECD, for example, can take a benchmark GDP estimate of each country for, say, 1985 and extrapolate it forward and backwards by the national growth rate of GDP for each country. The benchmark estimate is in 1985 dollars and the entire series for non-benchmark years will also be in 1985 dollars. One can easily obtain an implicit purchasing power parity from this type of extrapolation. 24/ This discussion has been framed in terms of national growth rates as the basis for extrapolation and it should be noted that one could also have extrapolated PPP for GDP using the implicit deflator.

239. The same method can be used for any sub-aggregate of GDP for which national growth rates (implicit deflators) are available. Further, if one extrapolates, say, the main components of GDP from a benchmark year to a later year, one could simply add up these components to obtain an estimate of GDP. This estimate of GDP would not be the same as that using the national growth rate of GDP. The reason for this is that the national growth rates of components are in one case being weighted by the shares of GDP in international prices and in the other by shares at national prices. The case for extrapolating components at international prices to obtain GDP growth is that it most closely replicates what a new benchmark estimate will produce. The case for using the national growth rate of GDP, and perhaps distributing components so as to preserve additivity, is that it does preserve the national growth rate. At present, there is not a recommended practice, and the method used is likely to depend on the specific purpose for which the extrapolation is being carried out.

16/ Meetings were held at EUROSTAT in June 1989 and at OECD in June 1990. These expert group meetings were jointly sponsored by EUROSTAT, OECD and the Statistical Office of the United Nations Secretariat. Reports of the meetings are available from any of the secretariats.

17/ That is, the direct value of (B/A) in the first row is 5.01, while $(B/A)A$ is 10.206 $(C/A)/2.021$ $(C/B) = 5.05$; in the second row the direct value is 5.19 and the indirect is 4.31.

18/ In the EKS method, the importance assigned to individual price observations is variable and is not self-evident. Even when the asterisk system is used, the importance assigned to individual prices will depend on the number of observations and on whether they are marked with an asterisk (*). Further, the

weight given to indirect price ratios will normally not depend on the number of price observations involved unless explicit weighting is employed. This last problem is also present in the CPD method, where it has been explicitly treated by assigning the same weight to each country so that each price for a country will receive a weight inversely related to the total number of prices for a basic heading for the country. While this could be done in EKS, in applications of EKS it has not been carried out.

19/ Citations to Geary and early phases of the ICP are provided in a volume reviewing aggregation methods (Hill, 1982).

20/ Other systems of weighting are discussed in annex II.

21/ In the phase I-III reports, the results of seven different aggregation methods are reported at the GDP level. These results allow one to gain an impression of how sensitive the results are to the method of aggregation used. See, for example, Kravis, Heston and Summers (1982), pp. 96-97.

22/ If countries within a region retain their relationship at the GDP level obtained from a regional aggregation, then when they are linked to the world comparison some compromise must be adopted. There are several ways to carry out such a linking, two of which are discussed in United Nations, Economic Commission for Europe (1985) and United Nations and EUROSTAT (1986).

23/ Another reason that EC is moving towards annual estimates is because successive benchmark estimates do not necessarily give results that are consistent with the deflated growth estimates of the countries. In effect, by moving to annual estimates, EC will be generating purchasing-power parity estimates that are more consistent with the national deflation practices of the countries.

24/ There are several ways one could do this. One method would be to take the extrapolated value of GDP for a country in a particular year, say Italy in 1990, as a ratio to the value for the United States, the OECD numeraire. Similarly, calculate the same ratio converting Italy's lira GDP in 1990 in current prices at exchange rates relative to current United States GDP. The ratio of the GDPs at exchange rates to the ratio at real 1985 dollars for 1990 gives an estimate of the comparative price level of Italy for 1990, which when multiplied by the exchange rate yields the estimated PPP of Italy for 1990.

Annex I

HISTORY AND ORGANIZATION OF THE ICP

A. Antecedents of the ICP

1. Systematic international comparisons based on purchasing-power parities that are antecedents of the ICP consist of:

a. Comparisons carried out in the 1950s under the auspices of the Organisation for Economic Co-operation and Development (OECD) (then the Organisation for European Economic Co-operation (OEEC)); a/

b. Comparisons carried out since 1959 within the framework of the Council for Mutual Economic Assistance (CMEA); b/

c. Comparisons carried out in the early 1960s in the Latin American region; c/

d. Comparisons between centrally planned and market economies, carried out in the 1960s under the auspices of the Conference of European Statisticians. d/

These earlier studies helped contribute to the methodology of ICP work and to demonstrate the feasibility of international comparisons based on purchasing-power parities. The study of Paige and Bombach (1959) on the production side pointed out the very large data requirements if a full-scale approach is to be adopted.

2. The idea of moving from these limited comparisons to regular and more extensive comparisons, perhaps at the world level, first emerged at the thirteenth session of the United Nations Statistical Commission, held in 1965. The Commission recommended, as a first step, that a study be made of available experience and data in the field at the international, regional and national levels, with a view to formulating more specific proposals for this work.

3. The recommended study was undertaken in 1967, and a report entitled "International comparison of production, income and expenditure aggregates" (E/CN.3/364) was submitted to the Statistical Commission at its fifteenth session, in 1968. The purpose of the report was to outline a project, to carry out comparisons for a selected number of countries for the years 1968 to 1971 and to develop, test and describe suitable techniques for more comprehensive comparisons to be carried out later. Because of the limited resources available in the United Nations budget for statistical purposes, members of the Commission considered that the project might be organized on the basis of participation by additional international organizations and with considerable assistance from Member States.

B. Recent history of the ICP

4. The United Nations International Comparison Project, which began its activities in 1968, indeed became a cooperative undertaking. The central project staff were organized into two units, one located at United Nations Headquarters and the other at the University of Pennsylvania, in Philadelphia. To enable the creation of the latter unit, the Ford Foundation made a major contribution in the form of a grant to the University. The World Bank provided substantial financial aid, and the statistical offices of the participating countries made substantial contributions in real terms. The first project director was Professor Irving B. Kravis of the University of Pennsylvania.

5. The first report on the ICP was published in 1975. e/ This publication contains a detailed description and discussion of the methods applied and presents the results of the comparison for 10 countries (Colombia, France, the Federal Republic of Germany, Hungary, India, Italy, Japan, Kenya, the United Kingdom of Great Britain and Northern Ireland and the United States of America) for both 1967 and 1970.

This phase I report is far from being a world comparison; nevertheless, countries from almost all continents, at many levels of development and with different economic systems were represented in this small sample. Further, this pilot study implemented a methodology for multilateral comparisons that worked within a framework that provided for expanding the number of participating countries on a systematic basis.

6. The first phase was followed shortly by a second one, in which results for the reference years 1970 and 1973 were presented for 16 countries. Beginning with phase III, the ICP was planned as a regular exercise, to be conducted at five-year intervals, with 34 countries in 1975 (phase III), f/ 60 countries in 1980 (phase IV) g/ and 64 countries in 1985 (phase V). At the twenty-fifth session of the Statistical Commission, in 1989, the ICP was renamed. The letter "P" in the abbreviation now stands for Programme, not for Project, as before.

7. In addition to the impressive increase in the number of participating countries, several other important changes took place between phase I and phase IV of the ICP. After phase III, the role of the University of Pennsylvania, which had until then been the main engine of the ICP, was gradually transformed into that of adviser on methodological issues. Another notable change in ICP responsibility was the increasing role of the Statistical Office of the European Communities (EUROSTAT). EUROSTAT, in fact, became not only the organizer of the European Community comparison, but also, with its experienced staff, it has provided substantial technical assistance to a number of regional comparisons and to the work on establishing links among the various regions.

8. The most important change that took place between phase III and phase IV was the regionalization of the ICP. In the first three phases, some results were presented by region, but the valuation of each country's quantities was carried out at average prices of all participating countries. In phase IV and onward, countries participated through regions or country groups; first regional (e.g., African, OECD etc.) comparisons were carried out and then the world comparison was built up by linking across these groups.

9. Regionalization came into effect for several reasons. One very important reason has already been mentioned, namely, the strong support for regional comparisons by the European Communities, and other sponsors. A related reason was that the growing number of participating countries presented obstacles to maintaining a highly centralized organization scheme and, at the time, no international organization was in a position to take on the task of a direct world comparison of all countries.

10. For the most part, participating countries have provided domestic resources for the data collection for ICP, while the Statistical Division of the Department of Economic and Social Development of the United Nations Secretariat, EUROSTAT, OECD and the Austrian Central Statistical Office, in its capacity as organizer of the Eastern European comparison, have units concerned with ICP-type work. Early sponsors of the ICP, such as the Ford Foundation and a consortium of contributing countries organized by the World Bank, provided resources that allowed coordination of the benchmark comparisons, particularly among developing countries. In phases IV and V, EUROSTAT became the financial supporter of the African and Caribbean comparisons. In phase IV, the Inter-American Development Bank (IADB) provided a major contribution to the Latin American regional comparison; however, this effort was organized through a group of experts visiting countries and little experience was gained by country statistical offices, so that when IADB support was unavailable in phase V, no Latin American regional comparisons took place. The ESCAP regional comparison in phase V was assisted by the Government of Japan, the United Nations Development Programme (UNDP), the World Bank, and the Asian Development Bank.

11. The table below gives an overview of the participation by various countries in the first five phases of the ICP, presented by geographical distribution of the countries. The composition of ICP regions, however, does not necessarily correspond to geographically contiguous areas.

Participation in the phases of the ICP

Country/area	Phases				
	I	II	III	IV	V
	Benchmark year				
	1970 aa/	1973 bb/	1975	1980	1985
<u>Africa</u>					
Benin					X
Botswana				X	X
Cameroon				X	X
Congo					X
Cote d'Ivoire				X	X
Egypt					X
Ethiopia				X	X
Kenya	X	X	X	X	X
Madagascar				X	X
Malawi			X	X	X
Mali				X	X
Mauritius					X
Morocco				X	X
Nigeria				X	X
Rwanda					X
Senegal				X	X
Sierra Leone					X
Swaziland					X
Tunisia				X	X
United Republic of Tanzania				X	X
Zambia			X	X	X
Zimbabwe				X	X
<u>Asia and Oceania</u>					
Bangladesh					X
Hong Kong				X	X
India	X	X	X	X	X
Indonesia				X	
Iran, Islamic Republic of		X	X		X
Israel				X	
Japan	X	X	X	X	X
Malaysia		X	X		
Nepal					X
Pakistan			X	X	X
Philippines		X	X	X	X
Republic of Korea		X	X	X	X
Sri Lanka			X	X	X
Syrian Arab Republic			X		
Thailand			X		X
Australia					X
New Zealand					X
<u>Canada and United States of America</u>					

Canada				X	X
United States of America	X	X	X	X	X

Central and South America

Argentina				X	
Bahamas					X
Barbados					X
Bolivia				X	
Brazil			X	X	
Chile				X	
Colombia	X	X	X	X	
Costa Rica				X	
Dominican Republic				X	
Ecuador				X	
El Salvador				X	
Grenada					X
Guatemala				X	
Honduras				X	
Jamaica			X		X
Mexico			X		
Panama				X	
Paraguay				X	
Peru				X	
Saint Lucia					X
Suriname					X
Trinidad and Tobago					X
Uruguay			X	X	
Venezuela				X	

Europe

Austria			X	X	X
Belgium		X	X	X	X
Denmark			X	X	X
Finland				X	X
France	X	X	X	X	X
Germany, Federal Republic of	X	X	X	X	X
Greece				X	X
Hungary	X	X	X	X	X
Ireland			X	X	X
Italy	X	X	X	X	X
Luxembourg			X	X	X
Netherlands		X	X	X	X
Norway				X	X
Poland			X	X	X
Portugal				X	X
Romania			X		
Spain			X	X	X
Sweden					X
Turkey					X
United Kingdom of	X	X	X	X	X

Great Britain and
Northern Ireland
Yugoslavia

x x x

C. Present organization of the ICP

12. Since regionalization is the basic approach to obtaining internationally comparable results, the ICP is built up of individual regional comparisons which are, at the same time, components of the global comparison covering all participating countries. Consequently, related operational tasks and responsibility for carrying out ICP work is shared between the world centre of ICP and a number of regional organizing centres.

13. It is not the role of this Handbook to go into evolving details of organization of ICP work, which may be subject to change from phase to phase owing to changing circumstances. In the following paragraphs, a few broad indications of the approach to organization are provided, as so far envisaged, to guide forthcoming ICP activities.

14. Serving as the world centre of the ICP, the Statistical Division of the Department of Economic and Social Development of the United Nations Secretariat promotes central coordination in the implementation of the global ICP programme. The major task of the world centre is to foster the required degree of consistency among regional comparisons and the integrity of the global comparison so that regional results can ultimately be linked to generate as reliable, timely and useful world comparisons as possible. This activity also involves coordination of efforts by groups of countries, international organizations associated with them and prospective sponsors so that it can lead to methodologically sound regional comparisons on a timely basis. The central unit maintains close contact with the organizers of the regional comparisons and is only indirectly related to participating countries.

15. The world centre focuses attention on the development of the general methodological framework of ICP. Activities carried out by the centre include, in particular, the following:

- (a) Ensuring that the basic principles, concepts and definitions applied are the same in all comparisons;
- (b) Preparing the central breakdown of GDP expenditures and promoting the harmonization of regional expenditure classifications;
- (c) Requiring that the methods used by the regions are compatible and produce consistent results;
- (d) Coordinating methodological work to establish links among the regional comparisons;
- (e) Developing and maintaining descriptions of core commodities and promoting their inclusion into regional lists of specifications;
- (f) Facilitating the dissemination of technical knowledge on ICP and serving as a centre for exchanging technical information; making available to interested participants, for reference purposes, documents used in previous phases or materials prepared in a different region. For this reason it is essential that the world centre be informed about all regional operations concerning ICP.

16. Countries interested in participating in ICP join one (or, if they wish, parallelly more than one) of the regional comparisons. Regional organizers usually contact and invite countries to participate in the next benchmark comparison. However, information on the country composition of regions and agencies acting as regional coordinators can be obtained from the world centre.

17. Country participation in ICP is performed through interaction and cooperation with a designated regional centre. ICP inputs, mainly basic price and expenditure data, are submitted by the countries to the regional centre according to rules and an organizational framework set by the region itself. For better orientation of work at the country level, regional coordinators distribute technical instructions, worksheets, questionnaires, a timetable with detailed schedules of operations etc. They may invite countries to comment on the methodology and to participate in eventual workshops or consultations. At any rate, active involvement of countries in the methodological work, and in checking and evaluating results is desirable.

18. It rests with the regional organizers to define procedures for organizational as well as methodological arrangements at the regional level. Typical activities carried out by the regional centres include the following:

- a. Adopting a regional expenditure classification, taking into account the central classification considered as the minimum required breakdown. Regions may apply more detailed categories provided they permit arriving at the breakdown of the central classification;
- b. Developing a regional list of specifications in collaboration with the countries, drawing on their national practices to the extent possible. The list has to cover the core commodities that are common in all regions;
- c. Processing basic data collected from the countries. Methods used in generating regional results need not be uniform across regions, as long as they remain compatible with the world comparison methodology;
- d. Preparing the report on the regional comparison.

19. Once regional comparisons are completed, the same data that countries had provided for regional comparison purposes are used in the global comparison. Thus, the Statistical Division makes arrangements for generating world comparison results and prepares the report of the global comparison.

a/ See Gilbert and Kravis (1954) and M. Gilbert and others, *Comparative National Products and Price Levels* (Paris, 1958). Some earlier studies are also cited in Kravis (1984).

b/ For a description of this programme, see Gyorgy Szilagyi, "An intercountry comparison of the national income of planned economies", *The Review of Income and Wealth*, No. 2 (1962), pp. 169-173.

c/ See "The measurement of Latin American real income in US dollars", *Economic Bulletin for Latin America* vol. XII (October 1967). In addition, a major comparison was undertaken for Latin America in 1968; see Jorge Salazar-Carrillo, "Latin American real product comparisons", *Economic Journal* (December 1977).

d/ See Conference of European Statisticians, *Comparison of Levels of Consumption in Austria and Poland* (New York, 1968).

e/ Kravis, Kenessey, Heston and Summers (1975).

f/ Kravis, Heston and Summers (1982).

g/ The phase IV report *World Comparisons of Purchasing Power and Real Product for 1980*, was published jointly by the United Nations and the Statistical Office of the European Communities (EUROSTAT), in 1986 (part I) and 1987 (part II).

aa/ In phase I, there were six countries, which also provided benchmark data for 1967.

bb/ In phase II, six additional countries provided benchmark data for 1970, which was combined with revised data for the original 10 benchmark countries; in addition, all estimates were also made for 1973 based on some original and some updated price data.

Annex II

METHODS OF AGGREGATION

1. The present annex begins with the Geary-Khamis method of aggregation, explaining some of its advantages and disadvantages. It then compares the G-K results with several other methods of aggregation to illustrate some of the differences.

A. The Geary system

2. The valuation of a country's output in international prices can be written as:

(1)

$$rgdp_j = \sum_{i=1}^m \pi_i q_{ij}, \text{ where } i = 1, m \text{ basic headings, } j = 1, n \text{ countries}$$

and where the π_i s are the international prices for each of the basic headings and $rgdp_j$ is GDP of country j valued at those prices. The particular contribution of Geary was to define the international prices in such a way that they would produce an overall PPP for a country that was consistent with the prices. The definition of the PPP in the ICP is:

$$PPP_j = gdp_j / rgdp_j, \text{ where } gdp_j = \sum_{i=1}^m E_{ij}$$

(2)

where E_{ij} is the expenditure in national currency on basic heading i by country j . That is, the purchasing-power parity over GDP is the ratio of the GDP of a country in national currency to its GDP in international prices.

3. For Geary there were actual quantities and prices associated with the agricultural output that he was concerned with valuing across countries. The international prices would be in a numeraire currency, such as the dollar, and the international prices would be so many dollars per unit quantity, say, ton of rice. In the ICP, there are basic heading parities, PP_{ij} s, that have been generated by EKS or CPD. These basic heading parities have the dimension of units of currency of country j to the numeraire currency for the basic heading.

4. This means that the interpretation of quantity and price at the basic heading level are not tons and rupees per ton. Rather, the quantity in the G-K technique as used in the ICP is what is termed a notional quantity. It is defined as:

(3)

$$q_{ij} = E_{ij} / PP_{ij}$$

Each country's expenditure for a basic heading is converted to the currency of the numeraire country; it is termed a notional quantity because it serves the function of a quantity with its values at numeraire country prices.

5. One might ask why one cannot simply add up the notional quantities for each basic heading for a country to get a GDP in a common currency. The answer is that the result would use the relative prices

between each basic heading that prevailed in the numeraire country. This means that the total would depend on which country was chosen as numeraire, and the result would not be base country invariant.

6. In the G-K system, the international price for heading i is defined as:

(4)

$$\pi_i = \frac{\sum_{j=1}^n [(PP_{ij} / PPP_j) * q_{ij}]}{\sum_{j=1}^n q_{ij}}$$

Equation (4) has been written as a weighted sum of the ratios of the heading parities to the aggregate PPP. The weights used to obtain the international prices typically are the notional quantities. Usually, the expenditures (E_{ij} s) entering into equation (3) are the total expenditures of a country, though alternative weights have been used. a/ For each country this is a ratio that will centre on 1.0 because in the Geary system the PPP_j is a weighted average of the basic heading parities, where the weights are the notional quantities.

7. An important feature of the G-K system is illustrated in equation (5), where the denominator of equation (4) is brought to the left-hand side:

(5)

$$\sum_{i=1}^n \pi_i * q_{ij} = \sum_{j=1}^n [(pp_{ij} / PPP_j) * q_{ij}]$$

Each side of equation (5) is a measure of the contribution of output of a basic heading to regional or world GDP. It is only in the G-K system that the valuation of quantities at international prices is consistent with their basic heading parities and expenditures, as well as the overall purchasing-power parity of each country.

8. Equations (1) and (4) represent the complete G-K system when PPP_j and q_{ij} are defined as in equations (2) and (3). When m is over 150 and n is over 60, this appears to be a large system to solve. However, it turns out that the easiest way to solve the system is by iteration; and it also turns out that the iterative procedure is itself instructive, as the following discussion is intended to show.

0. The basic data are the expenditures (E_{ij} s) and parities (pp_{ij} s) at the basic heading levels, and from these the q_{ij} s can be derived. Consider an iteration that begins by initially setting each PPP_j equal to the exchange rate. For example, if the United States were the base country, then its initial PPP would be 1.0 and the initial PPPs for the other countries would be their exchange rate relative to the dollar. Then a set of international prices can be estimated using equation (4). These π_i s can then be plugged into equation (1) and then equation (2) to estimate a set of PPP_j s. The process can then be repeated beginning with the new PPP_j s. The iteration will be complete when the difference between the initial set of PPP_j s and the end set is very small. Typically, in eight iterations the differences will only be observed at the fourth decimal place. It is unlikely that when the last iteration is complete the new PPP for the United States will equal 1.0. The system is then normalized so that each new PPP is adjusted so that the United States value will be 1.0, and the π_i s appropriately scaled so that, for the United States, gdp and $rgdp$ as obtained from equation (1) are equal.

10. While one can begin the iteration with any set of values, there is another way to begin that is also instructive. Consider setting each of the initial international prices (π_i s) equal to 1.0. The same loop can

then be followed, estimating the PPPjs when the π_i s are all 1.0, and work back through the system to obtain a new set of international prices, and a new set of PPPs and so on. A normalization as described in paragraph 9 would also be carried out to make the PPP of the base country 1.0. Beginning with all international prices equal to 1.0 is equivalent to using the relative price structure of the numeraire country. The fact that the final set of international prices will differ substantially from 1.0, no matter which country is numeraire, again illustrates why one cannot simply sum up the notional quantities given in equation (3).

11. This discussion should also make clear that the international prices of the ICP centre around 1.0 and are used to value a quantity that has no natural dimension, such as a kilogram, but has a notional character depending on the numeraire currency. b/ The iteration procedure also illustrates how the Geary system achieves additivity across countries and basic headings to achieve matrix consistency.

12. As discussed in the text the major advantage of the Geary system is that the international prices are analogous to the prices used to generate the national accounts of an individual country. In the Geary formulation, large rich countries receive more weight in determining international prices used to value quantities in each country. This means that the structure of international prices will tend to be closer to those of rich countries. There is also usually an inverse relationship between price and quantity across countries, so that items that are expensive in poor countries, for example, will be consumed in relatively small quantities and vice versa. The G-K price structure will tend to value the large quantities of relatively inexpensive items in poor countries, such as services, at higher prices. Conversely, those items that are relatively cheap in rich countries, such as transport equipment, will be valued at international prices closer to their national value. This effect is present in all of the aggregation systems since it is part of the world economic structure that the ICP is attempting to represent.

13. However, the international price systems that are explicit or implicit in other systems are usually closer to middle-income countries because the weights used are not in proportion to country GDP. As a consequence, the G-K system tends to lower the income of rich countries relative to poor countries more than the other aggregation methods. Some regard this as a desired result stemming from the national accounts basis of the G-K system, while others regard it as a drawback. c/

B. Other aggregation methods

1. Additive systems

14. One type of aggregation system, devised by D. Gerardi, that was used by EUROSTAT was based on international prices used to evaluate notional quantities, as in equation (1) above. The Gerardi system was compared with the G-K system by Hill (1982, pp. 51-59), and that discussion will not be repeated here. The objective of both the Gerardi system and other international price systems with which EUROSTAT has experimented has been to retain an additive system that does not use international prices close to those of larger countries. Another way of putting this is to say that there are those who want matrix-consistent comparisons, but do not want to use a set of prices that are quantity weighted as in national accounts. Gerardi's international prices, for example, were initially based on equal weights to the pyqs of each country.

15. Another motivating factor for those seeking alternatives to the G-K system that are inherently additive is that G-K is a simultaneous system that requires all information from all countries before it can be calculated. A price change in one basic heading can, in principle, change the estimates of other basic headings. d/ Also, results of the G-K system can change as the number of countries included in the aggregation changes, though this is also true for most other aggregation systems.

2. EKS and related systems

16. Erwin Diewert has made an extensive review of indexes that might be used in international comparisons, and has come up with a class of what he terms superlative indexes (Diewert, 1978). What he finds is that indexes built up from Fisher-type comparisons between two countries have a number of

desirable properties that flow from the theory of consumer choice. From this it follows that a multilateral index based on Fisher binary indexes, such as the EKS system, appears to have more theoretical rationale than the G-K system.

17. While Diewert's arguments provide some support for EKS, the issue is not so easily resolved. First, 30 to 40 per cent of expenditures on GDP are typically not chosen on the basis of relative prices. That is, most government expenditures and much of investment is not allocated on the basis of the principles underlying consumer choice. It is not claimed that EKS, G-K or any other system is necessarily better for comparing these expenditures, but that the theory of consumer choice is applicable to a portion of GDP only.

18. The second point relates to additivity. There are several systems that have been used that, like EKS, produce an overall comparison for all the basic headings entering the aggregation. One of these systems, the van Yzeren system, was proposed for the European Coal and Steel Community and another, the Walsh or expenditure weight system, has been used in Latin American comparisons. e/ The EKS system, as well as the Walsh and van Yzeren systems, provide a PPP over GDP or whatever aggregate for which they have been computed. However, they do not have an implicit system of international prices, so there is no explicit allocation of the expenditures within the aggregate and no inherent additivity. It is simple enough to impose additivity by, say, distributing the expenditures on GDP obtained by EKS across the categories according to the distribution of those expenditures in national currencies. The disadvantage of this is that the method is arbitrary and no information about the price structure in other countries is used in comparing the structure of expenditures in one country with those in another.

19. One further point is that for some purposes the only number sought is for an aggregate such as consumption. One might, for example, want to use the PPP for consumption to compare real wages across countries. In this case, an EKS aggregation may be preferred to the G-K method for two reasons. First, since additivity is not needed in this example, one drawback to using EKS is removed. Secondly, the implicit weighting involved in EKS is equal among countries so that for converting wages across countries it may make more sense to think of using a PPP that assigns the same importance to the market basket of each country. (The latter weighting system can also be achieved by G-K.)

20. To give some impression of what differences are involved in the various methods, results are given below from the phase III report for six countries, spanning the range of per capita incomes in the world. The entries give the per capita income of each country relative to the United States as 100 for each country.

Country per capita GDP, 1975
(US = 100)

<u>Method</u>	<u>India</u>	<u>Kenya</u>	<u>Colombia</u>	<u>Republic of Korea</u>	<u>Japan</u>	<u>France</u>
1. Binary-Fisher	6.0	5.8	19.7	17.2	67.5	80.2
2. Geary-Khamis	6.6	6.5	22.6	19.9	68.6	81.9
3. EKS	5.7	5.4	19.9	17.8	65.3	81.1
4. Walsh	6.4	4.8	19.5	17.6	66.1	80.0
5. Van Yzeren	5.7	5.4	19.9	17.7	65.3	81.0
6. Gerardi	5.7	5.8	20.4	18.5	66.6	77.8
7. Exchange rate	2.0	3.4	7.9	8.1	62.3	89.6

Source: Kravis, Heston and Summers, 1982, pp. 96-97.

21. The differences between the first six rows for any one country are less than 5 per cent for Japan and France, and less than 15 per cent for the remaining countries. A seventh row is also provided for the exchange rate conversions, indicating that all of the other methods are much closer to one another than to use of the exchange rate, and for Japan and France, the deviations are over 10 per cent and in

opposite directions. Thus, while results of the different methods can vary from one another, their general orders of magnitude for each country and variation across countries tell a fairly consistent story.

22. It would be nice if there were a simple conclusion to be drawn from this discussion, but that would imply that somehow the ICP had solved the index number problem, which it assuredly has not. One longs for one measure because that would be simple to explain to users, especially users providing resources for the work. It is also tidier to have only one result. However, because there are a variety of uses for which the ICP results are desired, for the present, more than one result will be produced, though in official publications the differences will be minimized.

C. Some loose ends

23. Some expenditure categories can be negative, such as change in stocks or the net foreign balance. These categories do not make much sense in any method using international prices because the Geary system, for example, is based on positive quantities and prices. Therefore, in the G-K system, the actual solution is carried out over the non-negative basic headings. The parities assigned to the net foreign balance and the net expenditures of residents abroad is the exchange rate. (A different treatment is made for countries with a large amount of tourist expenditures, such as Austria, where net expenditures of residents abroad may be distributed among the important headings, and no expenditure is retained in that heading.) In phases I to III of the ICP, the international price for these two headings was defined as in equation (4), but has since been assumed to be 1.0.

24. For change in stocks, a parity is calculated from the G-K result based on those basic headings that are commodities. That parity is assigned to the change in stocks. The international price for the category is then calculated from equation (4) above. Any normalization to make the PPP of the base country 1.0 is then carried out involving the international prices of all basic headings. In the comparisons of methods given above, the actual comparison is over the non-negative categories, since this appeared to put all methods on the most comparable basis.

a/ For the world comparisons in phases I-IV, countries were assigned additional weight to reflect the importance of countries not included in the benchmark comparisons. The total expenditures of a country were termed its supercountry weight, and the sum of all supercountry expenditures would be world GDP. One reason for using supercountry weights was to estimate the international prices that were implicit in world GDP. Since the G-K result does depend on the number of countries in the calculation, the use of supercountry weights was designed to approximate the international prices if all countries in the world were participating in the ICP. This in turn should, in principle, make the results from earlier benchmark ICP comparisons, when relatively few countries participated, better approximate later comparisons involving more benchmark countries.

In the Geary system, it is also possible to use per capita expenditure weights or other weighting systems. For example, one could assign equal weights to each country over all expenditures and in effect use the percentage expenditure for each basic heading as the country weight. The discussion in this annex assumes that the overall weight for each country is their GDP, or supercountry GDP.

b/ The international prices will depend on the numeraire country chosen. This point is discussed in Kravis, Heston and Summers (1982, pp. 94-95). Two other technical points may be noted. First, some regions have chosen to use a numeraire currency outside the region, as, for example, Africa. In the African comparisons, all prices and expenditures are initially converted into United States dollars at exchange rates. In the African study, no single country is used as the base, but rather the average of all countries is used. While the results of the African study are presented in dollars, this does not make them comparable with other countries, such as the United States, because dollar conversions have only been carried out at exchange rates.

A second point is that when an average of a group of countries is used, as in Africa or the European

Communities, there will still be a set of international prices implicit in the calculation. In the African case, the system would be normalized to make the sum of expenditures of all headings and all countries converted at exchange rates equal to the sum of all notional quantities valued at international prices. For any particular basic heading, this equality would not hold, and the ratio of the sum across all countries of the basic heading notional quantities valued at international prices to their value at exchange rates would be the international price for that basic heading.

c/ Usually, the G-K results are criticized because they depart from Fisher binary results, being closer to the Laspeyres than the Paasche estimate for poor countries. However, the binary comparisons being used as a reference weight each country the same. The EKS system, which is an indirect least squares type of estimate from the binaries, naturally comes closer to the Fisher result than does G-K. However, Prasada Rao has shown that, if a binary is done using the GDP weights of the G-K system, then the multilateral G-K is a direct least squares estimate based on the binaries and, of course, comes much closer to the G-K binaries than does EKS. The point, then, is that it is really the weighting system that produces more difference between methods than other factors (see Prasada Rao (1972)).

d/ This can readily be seen by examining equation (5). A price change affects a PP_{ij} and that may affect the PPP_{jS} and work itself through the entire system. Any other system that was matrix consistent would also be affected. Systems like EKS would be affected in the aggregate but because there is no explicit estimates of basic heading quantities in EKS, there is no visible effect at the detailed level.

e/ These systems are discussed in Kravis, Kenessey, Heston and Summers (1975), pp. 66-68.

Annex III

ICP EXPENDITURE CLASSIFICATION AT DETAILED HEADING LEVEL

Code	Category
1	HOUSEHOLD CONSUMPTION
1.1	<u>FOOD, BEVERAGES, TOBACCO</u>
1.1.1	FOOD
1.1.1.01	BREAD AND CEREALS
1.1.1.01.1	Rice
1.1.1.01.2	Flour and other cereals
1.1.1.01.3	Bread
1.1.1.01.4	Other bakery products
1.1.1.01.5	Pasta products
1.1.1.01.6	Other cereal products
1.1.1.02	MEAT
1.1.1.02.1	Beef
1.1.1.02.2	Veal
1.1.1.02.3	Port
1.1.1.02.4	Lamb, mutton and goat
1.1.1.02.5	Poultry
1.1.1.02.8	Other meats and edible offal
1.1.1.02.9	Meat preparations
1.1.1.03	FISH
1.1.1.03.1	Fresh, or frozen fish
1.1.1.03.3	Fresh, or frozen seafood
1.1.1.03.5	Dried, preserved or processed fish and seafood
1.1.1.04	MILK, CHEESE AND EGGS
1.1.1.04.1	Fresh milk
1.1.1.04.2	Preserved milk
1.1.1.04.3	Other milk products
1.1.1.04.4	Cheese
1.1.1.04.5	Eggs
1.1.1.05	OILS and FATS
1.1.1.05.1	Butter
1.1.1.05.5	Margarine and other edible oils and fats
1.1.1.06	FRUIT AND VEGETABLES
1.1.1.06.1	Fresh fruit
1.1.1.06.2	Dried fruit and nuts
1.1.1.06.3	Frozen and preserved fruit and fruit juices
1.1.1.06.4	Fresh vegetables
1.1.1.06.8	Dried, frozen, preserved vegetables

1.1.1.07	POTATOES AND TUBERS
1.1.1.07.1	Potatoes and other tubers
1.1.1.07.2	Potato products
1.1.1.08	SUGAR
1.1.1.08.1	Raw and refined sugar
1.1.1.09	COFFEE, TEA ID COCOA
1.1.1.09.1	Coffee
1.1.1.09.2	Tea
1.1.1.09.3	Cocoa
1.1.1.10	OTHER FOODS
1.1.1.10.1	Jams, jellies, honey and syrups
1.1.1.10.5	Salt, spices, condiments and food n.e.c.
1.1.1.10.6	Chocolate, confectionery and ice cream
1.1.2	NON-ALCOHOLIC BEVERAGES
1.1.2.01.1	Mineral water
1.1.2.01.2	Soft drinks
1.1.3	ALCOHOLIC BEVERAGES
1.1.3.01.1	Spirits and liqueurs
1.1.3.01.3	Beer
1.1.3.01.5	Wine and other alcoholic beverages
1.1.4	TOBACCO
1.1.4.01.1	Cigarettes
1.1.4.01.2	Other tobacco products
1.2	<u>CLOTHING AND FOOTWEAR</u>
1.2.1	CLOTHING
1.2.1.01.1	Men's clothing
1.2.1.01.2	Ladies' clothing
1.2.1.01.5	Clothing materials and accessories
1.2.1.01.6	Children's and infants' clothing
1.2.1.02.1	Repair and maintenance of clothing
1.2.2	FOOTWEAR
1.2.2.01.1	Men's footwear
1.2.2.01.2	Ladies' footwear
1.2.2.01.3	Children's and infants' footwear
1.2.2.02.1	Repairs to footwear

1.3	<u>RENTS, FUEL AND POWER</u>
1.3.1	GROSS RENTS AND WATER CHARGES
1.3.1.01.0	Gross rents, incl. repair and maintenance
1.3.1.02.0	Water charges
1.3.2	FUEL AND POWER
1.3.2.01.1	Electricity
1.3.2.02.1	Gas
1.3.2.03.1	Liquid fuels for heating and lighting
1.3.2.04.1	Coal, firewood and other fuels
1.4	<u>FURNITURE, HOUSEHOLD EQUIPMENT AND OPERATION</u>
1.4.1	FURNITURE, FLOOR COVERINGS, INCL. REPAIRS
1.4.1.01.1	Furniture and fixtures
1.4.1.01.2	Floor coverings
1.4.1.02.1	Repairs to furniture and floor coverings
1.4.2	HOUSEHOLD TEXTILES, INCL. REPAIRS
1.4.2.01.1	Household textiles and other furnishings
1.4.2.02.1	Repairs to household textiles
1.4.3	MAJOR HOUSEHOLD APPLIANCES, INCL. REPAIRS
1.4.3.01.1	Refrigerators, freezers
1.4.3.01.2	Washing machines, driers, dishwashers
1.4.3.01.3	Cooking appliances
1.4.3.01.4	Heaters and air-conditioners
1.4.3.01.5	Vacuum cleaners, polishers etc.
1.4.3.01.6	Other major household appliances
1.4.3.02.1	Repairs to major household appliances
1.4.4	GLASSWARE, TABLEWARE AND UTENSILS, INCL. REPAIRS
1.4.4.01.0	Glassware, tableware and household utensils
1.4.4.02.1	Repairs to glassware, tableware and household utensils
1.4.5	HOUSEHOLD OPERATION
1.4.5.01.1	Household cleaning and maintenance products
1.4.5.01.2	Paper products and other non-durable household goods
1.4.5.02.0	Laundry and other household services
1.4.6	DOMESTIC SERVICES
1.4.6.01.1	Domestic services
1.5	<u>MEDICAL CARE AND HEALTH SERVICES</u>
1.5.1	MEDICAL CARE AND PHARMACEUTICAL PRODUCTS

1.5.1.01.1	Drugs and medical preparations
1.5.1.02.1	Other medical supplies
1.5.2	THERAPEUTIC APPLIANCES AND EQUIPMENT
1.5.2.00.0	Therapeutic appliances and equipment
1.5.3	MEDICAL SERVICES OUTSIDE HOSPITALS
1.5.3.03.1	Services of dentists
1.5.3.04.1	Services of nurses
1.5.3.07.0	Services of physicians
1.5.3.08.0	Other medical services and analyses
1.5.4	HOSPITAL CARE
1.5.4.00.0	Hospital care
1.6	<u>TRANSPORT AND COMMUNICATION</u>
1.6.1	PERSONAL TRANSPORT EQUIPMENT
1.6.1.01.1	Passenger vehicles
1.6.1.02.1	Motor cycles and bicycles
1.6.2	OPERATION OF TRANSPORT EQUIPMENT
1.6.2.01.1	Tyres, parts and accessories
1.6.2.01.2	Maintenance and repair services
1.6.2.02.1	Motor fuels and oils
1.6.2.03.1	Other expenses related to personal transport
1.6.3	PURCHASED TRANSPORT SERVICES
1.6.3.01.1	Local transport
1.6.3.02.1	Long-distance transport by road and rail
1.6.3.02.2	Long-distance transport by air and sea
1.6.3.03.1	Other purchased transport services
1.6.4	COMMUNICATION
1.6.4.01.1	Postal services
1.6.4.02.1	Telephone, telegraph and telex services
1.7	<u>RECREATION, ENTERTAINMENT AND EDUCATION</u>
1.7.1	RECREATIONAL EQUIPMENT AND ACCESSORIES
1.7.1.01.0	Radio, UV and audio equipment
1.7.1.02.1	Photographic equipment
1.7.1.02.2	Other durable recreational goods
1.7.1.03.0	Other recreational goods
1.7.1.04.1	Parts and repairs to recreational goods
1.7.2	ENTERTAINMENT, RECREATIONAL AND CULTURAL SERVICES

1.7.2.01.1	Cinemas, sports stadiums, museums, zoos etc.
1.7.2.02.0	Recreational and sporting activities, rental and subscription
1.7.3	BOOKSF NEWSPAPERS AND OTHER PRINTED MATTER
1.7.3.01.0	Books, newspapers and other printed matter
1.7.4	EDUCATION SERVICES
1.7.4.00.0	Education services
1.8	<u>MISCELLANEOUS GOODS AND SERVICES</u>
1.8.1	PERSONAL CARE AND EFFECTS
1.8.1.01.1	Services of hairdressers and beauty shops
1.8.1.02.0	Toilet articles
1.8.2	GOODS NOT ELSEWHERE CLASSIFIED
1.8.2.01.1	Jewellery, watches and their repair
1.8.2.02.0	Personal accessories n.e.c.
1.8.2.03.1	Writing and drawing supplies
1.8.3	RESTAURANTS AND HOTELS
1.8.3.01.0	Restaurants, cafes and staff canteens
1.8.3.02.1	Hotels and other lodging places
1.8.4	WELFARE SERVICES
1.8.4.00.0	Welfare services
1.8.5	FINANCIAL SERVICES
1.8.5.01.1	Charges for financial services n.e.c.
1.8.6	SERVICES N.E.C.
1.8.6.01.1	Fees for other services n.e.c.
1.9	<u>NET PURCHASES ABROAD BY RESIDENTS</u>
1.9.1.01.1	Net purchases abroad by residents
2	CONSUMPTION OF NON-PROFIT INSTITUTIONS
2.1.1.01.1	Consumption of non-profit institutions n.e.c.
3	GOVERNMENT CONSUMPTION
3.1.1.01.1	Compensation of employees
3.1.2.01.1	Intermediate consumption
3.1.3.01.1	Consumption of fixed capital
4	GROSS FIXED CAPITAL FORMATIOON

4.1	<u>MACHINERY AND EQUIPMENT</u>
4.1.1	MACHINERY AND NON-ELECTRICAL EQUIPMENT
4.1.1.03.1	Agricultural machinery
4.1.1.05.0	Equipment for mining and building, incl. metal structures
4.1.1.06.0	Machinery for textile, food, chemical, paper etc. industries
4.1.1.08.1	Office equipment
4.1.1.09.0	Precision and optical instruments
4.1.1.10.1	Other machinery
4.1.2	ELECTRICAL EQUIPMENT and APPLIANCES
4.1.2.01.1	Electrical equipment, including lamps
4.1.2.02.0	Telecommunication, electronic and electrical equipment n.e.c.
4.1.3	TRANSPORT EQUIPMENT
4.1.3.01.1	Motor vehicles and engines
4.1.3.02.1	Ships and boats
4.1.3.02.2	Locomotives, wagons
4.1.3.02.3	Aircraft
4.1.3.02.4	Other transport equipment
4.2	CONSTRUCTION
4.2.1	RESIDENTIAL BUILDINGS
4.2.1.03.1	Residential buildings
4.2.2	NON-RESIDENTIAL BUILDINGS
4.2.2.05.1	Non-residential buildings
4.2.3	CIVIL ENGINEERING WORKS
4.2.3.04.1	Civil engineering works
4.3	OTHER PRODUCTS
4.3.1	OTHER PRODUCTS
4.3.1.01.1	Land improvement, development of plantations and breeding stock
5	CHANGE IN STOCKS
5.0.0.00.0	Change in stocks
6	NET EXPORTS OF GOODS AND SERVICES
6.0.0.00.0	Net exports of goods and services

DETAILED DESCRIPTION OF CATEGORIES

Code	Category	Description
1	HOUSEHOLD CONSUMPTION	
1.1	<u>FOOD, BEVERAGES, TOBACCO</u>	
1.1.1	FOOD	
1.1.1.01	BREAD AND CEREALS	
1.1.1.01.1	Rice	Rice in the husk or husked (semi-milled or wholly milled, whether or not polished or glazed, including parboiled and broken rice). (Does not include rice prepared with meat or with fish or with seafood, plain rice cooked ready for consumption.)
1.1.1.01.2	Flour and other cereals	All cereals, including maize, in the form of grain or flour or meal.
1.1.1.01.3	Bread	Bread and rolls. (Does not include bread and rolls stuffed with meat or with fish or with seafood.)
1.1.1.01.4	Other bakery products	Biscuits, cakes and other bakery products, whether freshly cooked or not; tarts and pies; other farinaceous products. (Does not include bakery products stuffed with meat or with fish or with seafood, tarts and pies and other farinaceous products stuffed with meat or with fish or with seafood.)
1.1.1.01.5	Pasta products	Macaroni, spaghetti, noodles, vermicelli, tortellini and similar stuffed and unstuffed paste products, whether fresh or dried, whether cooked ready for consumption or not.
1.1.1.01.6	Other cereal products	Malt, malt flour, malt extract; potato starch, sago, tapioca, other starches; cereal preparations; preparations of flour, starch or malt extract used as babyfood or for dietetic or culinary purposes; plain rice cooked ready for consumption. (Does not include preparations containing meat or fish or seafood, sweetcorn.)
1.1.1.02	MEAT	
1.1.1.02.1	Beef	Fresh, frozen and chilled meat of bovine animal of one year or more. (Does not include edible offal.)
1.1.1.02.2	Veal	Fresh, frozen and chilled meat of bovine animal under one year old. (Does not include edible offal.)
1.1.1.02.3	Pork	Fresh, frozen and chilled meat of porcine animals. (Does not include edible offal.)

1.1.1.02.4	Lamb, mutton and goat	Fresh, frozen and chilled meat of lamb, mutton and goat. (Does not include edible offal.)
1.1.1.02.5	Poultry	Fresh, frozen and chilled meat of poultry, including edible offal. (Does not include game.)
1.1.1.02.8	Other meats and edible offal	Fresh, frozen and chilled meat of horse, game, frog, marine mammals such as seals walruses and whales. Includes edible offal of these animals and of bovine, ovine and porcine animals. (Does not include edible offal of poultry.)
1.1.1.02.9	Meat preparations	Dried, salted or smoked meat; sausages, salami, bacon, ham, pates; other dried, salted or smoked meat offal. Meat preparations whether exclusively with meat or with other non-meat products; meat extracts, meat juices; meat pies; meat soups in liquid, solid or powder form, whether or not containing vegetable, spaghetti, rice or the like. (Does not include stuffed macaroni products listed under 1.1.1.01.5.) Excludes lard and other edible animal fats.
1.1.1.03	FISH	
1.1.1.03.1	Fresh, or frozen fish	Fresh, frozen or deep-frozen fish.
1.1.1.03.3	Fresh, or frozen seafood	Crustacea, molluscs, shell fish, fresh, frozen or deep-frozen. Includes snails.
1.1.1.03.5	Dried, preserved or processed fish and seafood	Dried, smoked or salted fish and seafood. Preparations of fish and seafood, powdered, solid; fish pies and the like; fish, seafood and products thereof in cans; canned fish soup. (Does not include macaroni products containing fish or seafood listed under 1.1.1.01.5.)
1.1.1.04	MILK, CHEESE AND EGGS	
1.1.1.04.1	Fresh milk	Full cream or skimmed milk; pasteurized sterilized milk; includes recombined or reconstituted milk.
1.1.1.04.2	Preserved milk	Condensed and powdered milk used as babyfood or for dietetic purposes; other condensed evaporated and powdered milk.
1.1.1.04.3	Other milk products	Cream, yoghurt and other similar milk products. Includes yoghurts containing sugar, cocoa, fruit or flavouring. Excludes cheese, butter and ice cream.
1.1.1.04.4	Cheese	Processed and unprocessed cheese; cheese-based preparations.
1.1.1.04.5	Eggs	Eggs, treated eggs, egg products made wholly with eggs such as egg powder etc.

1.1.1.05	OILS and FATS	
1.1.1.05.1	Butter	Fresh or tinned butter, including salted butters; butter products such as butter oil, ghee and the like.
1.1.1.05.5	Margarine and other edible oils and fats	Margarine, including "diet" margarine. Edible oils such as olive oil, corn germ oil, sunflower oil etc. Lard, other edible animal fats; vegetable fats, including peanut butter. (Does not include cod or halibut liver oil.)
1.1.1.06	FRUIT AND VEGETABLES	
1.1.1.06.1	Fresh fruit	Tropical and sub-tropical fruits such as oranges, tangerines, lemons, limes, grapefruits, bananas, mangoes, avocados, papayas, plantains and the like. Other fresh fruits such as apples, pears, cherries, grapes, melons, plums, strawberries and the like.
1.1.1.06.2	Dried fruit and nuts	Dried fruits, fruit peel, nuts, edible seeds.
1.1.1.06.3	Frozen and preserved fruit and fruit juices	Frozen and preserved fruit and fruit juices, including babyfood or dietary preparations based exclusively on fruit. (Does not include jams and the like.)
1.1.1.06.4	Fresh vegetables	Beans, cabbages, carrots, cauliflowers, cucumbers, eggplants, sweetcorn, onions, peas, pumpkins, squash, spinach, lettuces, tomatoes, herbs, pulses, mushrooms, rhubarb, truffles and the like. (Does not include potatoes, other tubers; edible seeds, lentils; whole chili peppers, fresh ginger, garlic and the like.)
1.1.1.06.8	Dried, frozen, preserved vegetables	Dried, frozen, preserved vegetables, pulses; juices; vegetable soups without meat or meat extracts (or with only traces); babyfood, dietary preparations based exclusively on vegetables. Includes seaweeds. (Does not include pickles, spices.)
1.1.1.07	POTATOES AND TUBERS	
1.1.1.07.1	Potatoes and other tubers	Fresh potatoes; manioc, arrowroot, cassava, sweet potatoes, other starchy roots.
1.1.1.07.2	Potato products	Potato products such as meal, flour, puree, flakes, chips, crisps, and frozen potato products. (Does not include potato starch.)
1.1.1.08	SUGAR	
1.1.1.08.1	Raw and refined sugar	Edible raw sugar in solid form obtained from cane,

beet or other sucrose sugars; refined sucrose sugar in solid form obtained from cane or beet sugar and processed to white crystalline substance marketed in various degrees of fineness or in the forms of small cubes, loaves, slabs, sticks etc. (Does not include honey and syrups.)

1.1.1.09	COFFEE, TEA ID COCOA	
1.1.1.09.1	Coffee	Coffee, instant coffee, coffee substitutes.
1.1.1.09.2	Tea	Tea, maté, tea substitutes, herb tea, other plant products for infusions.
1.1.1.09.3	Cocoa	Cocoa, unsweetened; excluding preparations containing cocoa, milk, malt, sugar etc.
1.1.1.10	OTHER FOODS	
1.1.1.10.1	Jams, jellies, honey and syrups	Jams preserves, compotes, marmalades, table jellies; honey and syrups. (Does not include syrups for making soft drinks.)
1.1.1.10.5	Salt, spices, condiments and food n.e.c.	Salt; spices; prepared baking powders; sauces, mayonnaise, mixed condiments; mixed seasoning; vinegar; yeast. Includes whole chili peppers, fresh ginger, garlic, pickles and the like. (Does not include herbs.)
1.1.1.10.6	Chocolate, confectionery and ice cream	Chocolate, preparations containing cocoa, milk, malt, sugar etc. Chewing gum, candies caramels, pralines, pastilles, sweets, toffees, other sugar confectionery products and ice cream.
1.1.2	NON-ALCOHOLIC BEVERAGES	
1.1.2.01.1	Mineral water	All kinds of bottled, canned etc. waters, sparkling or not, mineral or not.
1.1.2.01.2	Soft drinks	Soft drinks, preparations for making soft drinks (powders, syrups or other). (Does not include coffee, coffee substitutes, tea, tea substitutes, cocoa, cocoa substitutes, and cocoa preparations for drinking.)
1.1.3	ALCOHOLIC BEVERAGES	
1.1.3.01.1	Spirits and liqueurs	Brandy, gin, rum, vodka, liqueurs and the like. (Does not include vermouth, port, sherry and the like; sake and the like.)
1.1.3.01.3	Beer	All kinds of beer even with low alcoholic content.
1.1.3.01.5	Wine and other alcoholic beverages	Wine from grape or other fruit. Cider, even with low alcoholic content; vermouth, port, sherry and

the like; champagne and other sparkling wines; sake and the like.

1.1.4 TOBACCO

1.1.4.01.1 Cigarettes Cigarettes paper for cigarettes.

1.1.4.02.1 Other tobacco products Cigars, cheroots, smoking tobacco, chewing tobacco, snuff. Betel, betel nut, cola nut and the like.

1.2 CLOTHING AND FOOTWEAR

1.2.1 CLOTHING

1.2.1.01.1 Men's clothing For ages 14 years and over; coats, suits, jackets, trousers, shirts, sweaters and the like; of all types, including leather and fur clothes; hosiery, underwear and nightwear; ready made or custom tailored.

1.2.1.01.2 Ladies' clothing For ages 14 years and over; coats, suits, jackets, trousers, shirts, blouses, skirts, dresses, sweaters and the like; of all types, including leather and fur clothes; hosiery, underwear and nightwear; ready made or custom tailored.

1.2.1.01.5 Clothing materials and accessories Clothing materials made of wool, cotton, silk, flax, hemp and the like; mixtures of cotton, wool and synthetic materials; synthetic clothing materials. Haberdashery, ties, millinery, aprons, smocks, bibs, belts, gloves and mittens; handkerchiefs; muffs, sleeve protectors, bathing suits; boxing gloves, crash helmets, life jackets, suspenders; accessories for making clothes, such as buckles, buttons, fasteners, patterns, zippers and the like. (Does not include haberdashery, millinery, aprons, smocks, bibs, belts and gloves etc. made of rubber; paper handkerchiefs; protective headgear for sport; watches, jewels, cufflinks; walking sticks, canes, umbrellas, fans; pins, needles and the like.)

1.2.1.01.6 Children's and infants' clothing Children's and infants' clothing for ages under 14 years; coats, suits, jackets, trousers, shirts, blouses, skirts, dresses, sweaters and the like; of all types, including leather and fur clothes; hosiery, underwear and nightwear; ready made or custom tailored. Includes babies' napkins made of fabric.

1.2.1.02.1 Repair and maintenance of clothing Hire of clothing; repairs, alterations to clothing; maintenance of clothing. Includes the dyeing, dry-cleaning, and laundering of clothing.

1.2.2 FOOTWEAR

1.2.2.01.1	Men's footwear	For age's 14 years and over; all kinds of footwear, including rubber and sport shoes; includes leggings and similar articles, accessories for footwear such as shoetrees. (Does not include footwear with ice or roller-skates attached, shin-guards and other protective apparel for sport.)
1.2.2.01.2	Ladies' footwear	For ages 14 and over; all kinds of footwear, including rubber and sport shoes; includes leggings and similar articles, accessories for footwear such as shoetrees. (Does not include footwear with ice- or roller-skates attached, shin-guards and other protective apparel for sport.)
1.2.2.01.3	Children's and infants' footwear	For ages under 14 years; all kinds of footwear, including rubber and sport shoes; includes leggings and similar articles, accessories for footwear such as shoe trees. (Does not include footwear with ice- or roller-skates attached, shin-guards and other protective apparel for sport.)
1.2.2.02.1	Repairs to footwear	Repairs to footwear; includes shoe cleaning, hire of footwear.
1.3	<u>RENTS, FUEL AND POWER</u>	
1.3.1	GROSS RENTS AND WATER CHARGES	
1.3.1.01.0	Gross rents, incl. repair and maintenance	All gross rents in respect of dwellings, actual or imputed, in the case of owner-occupied, free-rented or reduced rent housing units, including ground rent and taxes on the property. In general, rent will be space rent, covering heating and plumbing facilities, lighting fixtures, fixed stoves, wash basins and similar equipment that customarily is installed in the dwelling before selling or letting. Rents paid for rooms in boarding houses are included. Includes also rents, actual or imputed, of secondary dwellings (whether temporarily or permanently paid or owned) such as summer cottages, mountain chalets and the like. Includes sanitary services such as garbage and sewage disposal, water charges if covered by the rent. Includes supply of hot water and steam if covered by rent. (Does not include rents paid for rooms in hotels.) Labour charges for indoor repair, painting, wallpapering, decorating, plumbing, electricity and the like; materials for indoor repair and upkeep such as paint, varnishes, wallpaper, cement, putty, window panes, paint brushes, rollers and the like. Includes the replacement of small plumbing items (pipes, joints etc.) and surfacing materials (floor boards, ceramic tiles etc.). (Does not include domestic services;

		payments for services for cleaning such as chimney cleaning, window cleaning, snow removal, exterminating, disinfecting, fumigating and the like; floor coverings; art supplies; hand tools; nails and the like; electrical materials; brooms, other brushes; cleaning products.)
1.3.1.02.0	Water charges	Water charges and related expenditures if not covered by the rent.
1.3.2	FUEL AND POWER	
1.3.2.01.1	Electricity	Expenses on electricity for domestic uses. Includes expenditures for meters and other related expenditures.
1.3.2.02.1	Gas	Natural and manufactured gas. Includes expenditures for meters and other related expenditures Liquefied petroleum gases such as butane and propane.
1.3.2.03.1	Liquid fuels for heating and lighting	Heating and lighting oils such as heating and lighting gas oil paraffin (kerosene).
1.3.2.04.1	Coal, firewood and other fuels	Coal, coke briquettes, firewood, other fuels charcoal, peat; includes purchased hot water and steam not covered by rent, ice used for refrigeration purposes.
1.4	<u>FURNITURE, HOUSEHOLD EQUIPMENT AND OPERATION</u>	
1.4.1	FURNITURE, FLOOR COVERINGS, INCL. REPAIRS	
1.4.1.01.1	Furniture and fixtures	Beds, base-mattresses, couches, sofas, tables, chairs, cupboards, chests of drawers, bookshelves; cribs, high chairs, playpens; doors, dividing screens; sculptures, carvings, figurines, paintings, drawings, engravings, other art objects; venetian blinds, fireplace equipment; other furniture and fixtures; includes camping and garden furniture. (Does not include small accessories such as wastepaper baskets, mirrors, safes, clocks; installation; repairs.)
1.4.1.01.2	Floor coverings	Loose carpets, fitted carpets, large mats, linoleum, and other floor coverings. (Does not include installation, repairs.)
1.4.1.02.1	Repairs to furniture and floor coverings	Repairs to furniture, fixtures, and floor coverings carpet mats and other floor coverings; includes lying of floor coverings, installation of furniture.
1.4.2	HOUSEHOLD TEXTILES, INCL. REPAIRS	

1.4.2.01.1	Household textiles and other furnishings	Curtains, tapestries, bed linen, table linen, bathroom linen, top mattresses, bedding, of all materials; furnishings such as ashtrays, candle sticks, mirrors; awnings, flags, garden umbrellas garment and shoe bags, laundry hampers and bags, shoe racks;; mosquito netting, steamer and travelling rugs; wastepaper baskets; flower and plant boxes and pots.
1.4.2.02.1	Repairs to household textiles	Repairs to household textiles and textiles other furnishings.
1.4.3	MAJOR HOUSEHOLD APPLIANCES, INCL. REPAIRS	
1.4.3.01.1	Refrigerators, freezers	Household-type refrigerators and freezers, whether electric or not; other similar appliances for preserving or cooling food such as ice boxes. (Does not include repairs.)
1.4.3.01.2	Washing machines, driers, dishwashers	Household-type clothes washing, machines, clothes drying machines, dishwashing machines. (Does not include repairs.)
1.4.3.01.3	Cooking appliances	Household-type electric or dual-operation cookers, spit-roasters, hobs, ranges, ovens, microwave ovens. Includes similar appliances of the gas-, kerosene-, oil-, coal- and wood-burning types. (Does not include repairs.)
1.4.3.01.4	Heaters and air-conditioners	Household-type room climate control equipment, air-conditioning machines of the window and wall type for changing temperature and humidity of the air; electric humidifiers, space heaters, water heaters and similar appliances other than electric; ventilators, fans and blowers whether or not integrated with other machines. (Does not include repairs.)
1.4.3.01.5	Vacuum cleaners, polishers etc.	Household-type electric cleaning appliances such as vacuum cleaners, floor scrubbing machines, floor waxing machines, floor polishing machines. (Does not include repairs.)
1.4.3.01.6	Other major household appliances	Other major household electric appliances such as toasters, coffee-makers, coffee mills, food mixers, juice extractors, plate warmers, irons, kettles, deep fryers, water softening machines, sewing-machines, knitting machines, extractor cooker hoods, electric hand tools, garden tools.
1.4.3.02.1	Repairs to major household appliances	Repairs to refrigerators and freezers, washing and cleaning appliances, cooking and food warming appliances, room climate control equipment and other major household appliances. Includes the

installation of major household appliances.

1.4.4 GLASSWARE, TABLEWARE AND UTENSILS, INCL. REPAIRS

1.4.4.01.0 Glassware, tableware and household utensils

Glassware and crystalware for household, office and decoration; tableware of porcelain, ceramic, stoneware, china and terracotta. Cutlery and silverware. Non-electric hand tools; all types of kitchen utensils; portable toilet and sanitary utensils for indoor use; non-electric heating pads, plate and dish warming appliances; saucepans, frying pans, pressure cookers, casseroles; non-electric coffee-makers, coffee-mills; portable money boxes, strong boxes; household scales; ladders; locksmith's wares; other semi-durable household utensils of similar kind. Motorless garden tools, watering-cans, wheelbarrows, gardenhoses, sprinkling devices, small garden appliances. Electric bulbs, points, wires, cables, plugs, switches, batteries etc. (Does not include mirrors, non-durable household and toilet articles, power-driven garden tools and appliances.)

1.4.4.02.1 Repairs to glassware, tableware and household utensils

Repairs to glassware, tableware, cutlery, silverware, motorless tableware and household kitchen and domestic utensils, motorless garden appliances. utensils

1.4.5 HOUSEHOLD OPERATION

1.4.5.01.1 Household cleaning and maintenance products

Soaps, detergents, washing powders, scouring powders, disinfectant bleaches, conditioners, waxes, polishes, window-cleaning products; brooms, brushes; dyes, unblocking agents, disinfectants, insecticides, fungicides. (Does not include products and articles for personal care.)

1.4.5.01.2 Paper products and other non-durable household goods

Matches, candles, lamp wicks, clothes hangers, clothes pegs, rope, string, goods twine, nails, nuts, bolts, screws, tacks, hooks, washers, knobs, needles, pins, tea towels, floor cloths, sponges, scourers, steel wool, kitchen paper, vacuum cleaner bags, aluminium foil, plastic wraps, bin liners, waxpaper and the like; rubber gloves, paper towels, napkins. (Does not include wallpaper.)

1.4.5.02.0 Laundry and other household services

Cleaning, dyeing, laundering services. Services such as hire of furniture, furnishings, household equipment, including payment by sub-tenants for the use of furniture; payments for services such as chimney cleaning, window cleaning, snow removal, exterminating, disinfecting, fumigating and the like. (Does not include repairs to glassware, tableware, other household utensils;

labour charges for indoor repair and upkeep, domestic services; service charges for insurance of household property against fire, theft and other eventualities.)

1.4.6 DOMESTIC SERVICES

1.4.6.01.1 Domestic services

Total compensation (wages plus contributions paid by the employer to social security etc.), including payments in kind, to domestics, cleaners, cooks, chauffeurs, gardeners, governesses, tutors, secretaries and the like. Includes payments in cash and in kind to babysitters.

1.5 MEDICAL CARE AND HEALTH SERVICES

Includes both privately financed and government-financed expenditures, whether separated or not (fees paid by households, expenditures of general government and private non-profit organizations on the provision of medical services). Expenditures on public health services (disease detection, prevention, immunization etc.) are excluded from code 1.5, but should be included in government consumption (code 3). Drugs, medical supplies and therapeutical appliances intended for use or consumption by a single individual or household outside a health institution are included in 1.5.1.01.1, 1.5.1.02.1 and 1.5.2.00.0; if supplied by an institution or practitioner in the course of treatment, are included under 1.5.3.08.0 and 1.5.4, respectively.

1.5.1 MEDICAL CARE AND PHARMACEUTICAL PRODUCTS

1.5.1.01.1 Drugs and medical preparations

Drugs, medicines; vitamins, vitamin preparations; serums, vaccines; cod preparations liver oil, halibut liver oil. (Does not include veterinary products, fees paid for medical consultations or treatment.)

1.5.1.02.1 Other medical supplies

Clinical thermometers; hot-water bottles, ice bags; adhesive and non-adhesive bandage materials; hypodermic syringes; first-aid kits; medical hosiery item; contraceptives; and similar goods. (Does not include fees paid for medical consultations or treatment.)

1.5.2 THERAPEUTIC APPLIANCES AND EQUIPMENT

1.5.2.00.0 Therapeutic appliances and equipment

Corrective eyeglasses, contact lenses; hearing aids; glass eyes; artificial limbs, other prosthetic devices; orthopaedic braces and supports; surgical belts, trusses, supports other than athletic, neck braces; medical massage equipment, health lamps; wheelchairs, invalid

carriages, whether motorized or not; includes dentures but not the fitting costs; orthopaedic footwear. (Does not include sunglasses, except when medically prescribed, protective goggles for sport, fees paid for medical consultations or treatment.)

1.5.3 **MEDICAL SERVICES OUTSIDE HOSPITALS**

1.5.3.03.1 Services of dentists Fees paid for consultations with and treatment by dental practitioners and technicians; includes the fitting costs of dentures, dental X-rays. (Does not include fees paid for dental services requiring hospital in-patient care.)

1.5.3.04.1 Services of nurses Fees paid for services of nurses and midwives in non-consulting rooms, in patients' homes or other non-medical institutions. (Does not include fees paid for nursing services related to hospital in-patient care.)

1.5.3.07.0 Services of physicians Fees paid for the services of general practitioners and specialists; includes fees paid for consultations in physicians' consulting rooms, surgeries, clinics, hospital out-patient clinics, home visits etc. (Does not include fees paid for services of physicians related to hospital in-patient care.)

1.5.3.08.0 Other medical services and analyses Fees paid for services of other and analyse medical practitioners; includes physiotherapy, occupational therapy, speech therapy, optometry, chiropody, and practitioners of traditional medicine. Fees paid for X-rays, blood tests, and other forms of medical analyses. (Does not include fees paid for such services provided in association with hospital in-patient care.)

1.5.4 **HOSPITAL CARE**

1.5.4.00.0 Hospital care Fees for medical treatment requiring hospital in-patient care; includes fees for medical treatment, dental treatment, therapy, analysis, nursing, medication given in conjunction with in-patient care, food and drink, accommodation. Using information on hospital operating costs, expenditures are to be broken down into the following categories: compensation of employees (medical and non-medical staff), intermediate consumption (food, drugs, utilities, transport etc.) and consumption of fixed capital.

1.6 **TRANSPORT AND COMMUNICATION**

1.6.1	PERSONAL TRANSPORT EQUIPMENT	
1.6.1.01.1	Passenger vehicles	Motor cars, camper vans, trailer caravans.
1.6.1.02.1	Motor cycles and bicycles	Motor cycles, moped scooters, bicycles and the like.
1.6.2	OPERATION OF TRANSPORT EQUIPMENT	
1.6.2.01.1	Tyres, parts and accessories	Tyres, tubes, sparkplugs, batteries, shock absorbers, filters, pumps, other parts and accessories for personal transport equipment; includes paints, chrome cleaners, sealing compounds, bodywork polishes, and such special products. (Does not include charges for fitting of parts and accessories, automobile radios, radio-telephones.)
1.6.2.01.2	Maintenance and repair services	Charges for maintenance and repair of services personal transport equipment, including fitting of parts and accessories, wheel balancing, technical inspection, breakdown services, oil changes, greasing, washing, waxing. (Does not include the supply of parts and accessories.)
1.6.2.02.1	Motor fuels and oils	All types of fuels used in operating personal transport equipment; includes lubricants, transmission fluids, brake fluids, coolants.
1.6.2.03.1	Other expenses related to personal transport	Payment for parking, garaging; to bridge, tunnel, ferry, road tolls; driving lessons; hire of personal transport equipment; service charges on insurance of personal transport equipment. (Does not include hire of car with driver.)
1.6.3	PURCHASED TRANSPORT SERVICES	
1.6.3.01.1	Local transport	All forms of urban and suburban public transport by bus, train, subway, tram, boat, cable-car and taxi including hire of car with driver.
1.6.3.02.1	Long-distance transport by road and rail	Fares on rail transportation other than local and suburban; fares on interurban buses and coaches, fares on interurban taxis.
1.6.3.02.2	Long-distance transport by air and sea	Fares for long-distance air transport. Fares on ships, ferries.
1.6.3.03.1	Other purchased transport services	Moving and storage of household goods; transport of private vehicles by train, ferry; services of porters, left luggage offices, luggage forwarding offices; excess baggage charges, travel insurance, luggage insurance.

1.6.4	COMMUNICATION	
1.6.4.01.1	Postal services	Letters, postcards, parcels; includes all purchases of new postage stamps, pre-franked postcards and aerogrammes. (Does not include expenditures on used stamps, charges for money orders, charges for other financial services provided by the postal administration or telegraph services.)
1.6.4.02.1	Telephone, telegraph and telex services	Local and long-distance telephone and calls from private and public lines; installation costs, subscription costs of personal telephone equipment; telegraph services; telex services.
1.7	<u>RECREATION, ENTERTAINMENT AND EDUCATION</u>	
1.7.1	RECREATIONAL EQUIPMENT AND ACCESSORIES	
1.7.1.01.0	Radio, UV and audio equipment	Radios, automobile radios, clock radios, two-way radios, amateur radio receivers and transmitters. Television sets and video recorders, including TV antennas and video cameras. Gramophones, record-players, tape recorders, cassette recorders; turntables, tuners, amplifiers, speakers; microphones, earphones, other accessories.
1.7.1.02.1	Photographic equipment	Cameras; projection equipment; binoculars, microscopes, telescopes; compasses; accessories such as screens, viewers, lenses, flash attachments, filters, exposure meters. Includes sound-recording cameras but not video recorders.
1.7.1.02.2	Other durable recreational goods	Aeroplanes, microlight aircraft, deltaplanes; pleasure boats, outboard motors; canoes, kayaks, windsurfers; body-building apparatus, sea-diving equipment; billiard tables, ping-pong tables typewriters, word processors; microcomputers, visual display; pinball machines, gaming machines; pianos, organs, violins, cornets, other major musical instruments; units, printers, software, and such accessories; calculators, pocket calculators; power-driven hand tools for woodworking, metal working and the like; power-driven gardening tools and appliances; horses, ponies, golf carts (both motorized and non-motorized); swimming pools that are not permanent fixtures.
1.7.1.03.0	Other recreational goods	Records; pre-recorded tapes, cassettes, video cassettes, diskettes; unrecorded tapes, cassettes, video cassettes, diskettes for tape recorders, cassette recorders, video recorders and

microcomputers. Gymnastic, physical education and sport equipment such as balls, rackets, bats, skis, ice-skates, roller-skates, poles, discuses, javelins, weights, exercise apparatus such as chest expanders; firearms and ammunition for hunting and sports; fishing rods, other equipment for fishing; equipment for beach and open-air games such as bowls, croquet, frisbee; inflatable swimming pools, boats, rafts; camping equipment such as tents and accessories, sleeping-bags, backpacks, air mattresses and inflating pumps. Includes footwear fitted with ice- or roller-skates; shin-guards and other protective gear for sport such as gloves, helmets, goggles, belts. Card games, parlour games such as scrabble, monopoly, dolls, soft toys, toy cars, toy trains, toy construction sets, puzzles, plasticine, educational games, electronic games; masks, disguises, jokes, novelties, fireworks, Christmas tree decorations; used postage stamps, stamp-collecting requisites, other items for collections (minerology, zoology, botany). Includes small musical instruments such as flutes, harmonicas; music boxes; video game cassettes. Unexposed film, cartridges and disks for photographic and cinematographic use; other photographic supplies such as paper, flash bulbs. Plants, shrubs, bulbs, tubers, seeds; natural or artificial flowers, foliage, Christmas trees; fertilizers, composts, specially treated soils; pets other than horses; foodstuffs, grooming products, pharmaceutical products for pets; collars, leashes, kennels, birdcages, fish tanks, cat litter etc. (Does not include camping and garden furniture, collectors' items falling into the category of works of art or antiques.)

1.7.1.04.1	Parts and repairs to recreational goods	Parts and accessories for, and repairs to, major recreational durables.
1.7.2	ENTERTAINMENT, RECREATIONAL AND CULTURAL SERVICES	
1.7.2.01.1	Cinemas, sports stadiums, museums, zoos etc.	Services provided by cinemas, theatres, opera-houses, concert halls or music halls; sports stadiums, cycle tracks, horse-racing tracks etc.; museums, libraries, art galleries, exhibitions; historic monuments, national parks, zoological and botanical gardens; "son et lumiere" displays; circuses, fairs, amusement parks; roundabouts, see-saws, other playground facilities for children; pinball machines, other games for adults other than games of chance.
1.7.2.02.0	Recreational and sporting activities, rental and subscription	Hire of equipment and accessories for sport, leisure and culture activities, rental and such as

subscription aeroplanes, boats, horses, skiing or camping equipment; fees for ski-lifts and slopes, entrance fees to swimming pools, hire of tennis and squash courts, bowling alleys; out-of-school individual or group lessons in bridge, dancing, skiing, swimming or other pastimes; services of musicians, clowns, performers for private entertainments; lotteries, bets, wagers, gambling establishments, gaming machines; religious activities; fees paid to mountain, ski, tourist and other guides; entrance fees and annual fees paid to sports and other entertainment, cultural or religious clubs. Hire of radio, television sets, video recorders; radio and television licences; subscriptions to private television. Services furnished by photographers such as portraits, film developing, print processing, enlarging; veterinary and other services for pets.

1.7.3 BOOKSF NEWSPAPERS AND OTHER PRINTED MATTER

1.7.3.01.0 Books, newspapers and other printed matter

Books, including atlases, dictionaries, encyclopaedias and complete works. Includes expenditures on textbooks by household. Newspapers, magazines, other periodicals; other printed matter such as guidebooks, maps, globes, plain or picture postcards, greeting cards, writing cards, message cards, calendars, catalogues, posters.

1.7.4 EDUCATION SERVICES

1.7.4.00.0 Education services

Fees paid for primary school education, secondary school education, tertiary education. Includes fees paid for vocational training, adult education and the like. Includes fees paid by households, expenditures of general government and private non-profit organizations on the provision of school education. Using information on operating costs, expenditures are to be broken down into the following categories: compensation of employees (non-teaching staff and teaching staff at various levels of education), intermediate consumption (food, rents, transport, books etc.) and consumption of fixed capital.

1.8 MISCELLANEOUS GOODS AND SERVICES

1.8.1 PERSONAL CARE AND EFFECTS

1.8.1.01.1 Services of hairdressers and beauty shops

Services of hairdressers, barbers, beauty shops etc.; includes and beauty shops etc.; includes baths, saunas, non-medical massages.

1.8.1.02.0	Toilet articles	Shaving equipment, whether electric or not; electric hair driers; hair clippers, electric or not; permanent wave sets for home use; sun-lamps, vibrators; electrical appliances for dental hygiene; personal weighing machines, baby scales; scissors, nails clippers, nail files; combs, shaving-brushes, hairbrushes, nail-brushes, toothbrushes; repair to toilet articles. Toilet soap, shaving soap, perfume, toilet water, deodorant, toothpaste, lipstick, nail varnish, other make-up products, sunbathing products, hair remover, toilet paper, paper handkerchiefs, sanitary towels, cotton wool, cotton tops, babies' napkins made of cotton wool.
1.8.2	GOODS NOT ELSEWHERE CLASSIFIED	
1.8.2.01.1	Jewellery, watches and their repair	Jewellery, watches, rings, precious stones; repairs to these articles.
1.8.2.02.0	Personal accessories n.e.c.	Suitcases, trunks, travel bags, handbags, wallets, purses and the like; repairs to these articles. Includes travel alarm clocks. Umbrellas, walking-sticks, canes, fans; pipes, lighters, tobacco pouches, cigarette cases; pocket knives, sunglasses, clocks; baby carriages, pushchairs, carry-cots, car seats, back-carriers, harnesses, feeding bottles; caskets, funeral urns, tombstones; repairs to these articles.
1.8.2.03.1	Writing and drawing supplies	Writing-pads, envelopes, account books, notebooks, diaries etc.; pens, pencils, fountain-pens, ball-point pens, felt-tip pens; inks, rubbers, ink erasers, paper-clips, staples; pencil-sharpeners, staplers, paper punches; stencils, carbon paper, typewriter ribbons, inking pads; correcting fluids; paper cutters, paper scissors, office glues and adhesives; drawing and painting materials; paper, cards, clips, paints, brushes etc. Includes expenditure on educational materials by households.
1.8.3	RESTAURANTS AND HOTELS	
1.8.3.01.0	Restaurants, cafes and staff canteens	Expenditures on food and beverages bought away from home; staff canteens includes expenditures on food and beverages included in the full-board or semi-board of hotels and on packaged tours inside the country. Expenditures on food and beverages incurred in cafeterias located within or on the premises of work.
	1.8.3.02.1 Hotels and other lodging places	
1.8.4	WELFARE SERVICES	
1.8.4.00.0	Welfare services	Expenditures on hotels, camping sites, other lodging places; includes expenditures on hotels

etc. included in package tours inside the country; includes also payment for services provide by travel agencies for packaged tours. (Does not include food and beverages provided in hotels etc.)

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| 1.8.5 | FINANCIAL SERVICES | Expenditure of general government and private non-profit organizations on provision of welfare services; included are expenditure on child welfare services and institutions, homes for, and care of, the aged, disabled, blind etc., family welfare agencies and services, legal aid societies, Red Cross and similar organizations, agencies for the collection and allocation of charities and other welfare services. Expenditures are to be broken down into the following categories: compensation of employees, intermediate consumption and consumption of fixed capital. |
| 1.8.5.01.1 | Charges for financial services n.e.c. | Service charges for life insurance, death benefit assurance, services n.e.c. education assurance, accident and health insurance, fire and theft insurance, insurance against civil responsibility for injuries to other persons or other persons' property not arising from the operation of personal transport equipment; actual charges for bank services; fees and service charges for brokerage, investment counselling, finance company loans and services of similar financial institutions; charges for money orders and other financial services provided by post offices; fees to tax consultants; administrative charges of private pension schemes. |
| 1.8.6 | SERVICES N.E.C. | |
| 1.8.6.01.1 | Fees for other services n.e.c. | Fees for legal services, employment agencies; dues for membership of professional associations; charges for undertaking, other funeral services; services of property managers, agents, operators of salesrooms, other various intermediaries; photocopies, other reproductions of documents; non-postal services for the forwarding of correspondence or parcels; fees for the issue of birth, marriage or death certificates; payment for newspaper notices, advertisements; services of graphologists, astrologers, private detectives, matrimonial agencies, marriage guidance counsellors; miscellaneous concessions (seats, toilets, cloakrooms); etc. |
| 1.9 | <u>NET PURCHASES ABROAD BY RESIDENTS</u> | |
| 1.9.1.01.1 | Net purchases abroad by residents | Expenditure incurred with rest of the world by residents of a residents country (such as tourists, |

travelling businessmen and government officials, crews, border and seasonal workers and diplomatic and military personnel stationed abroad), 1111 expenditure in the domestic territory of the same country by non-residents.

2 CONSUMPTION OF NON-PROFIT INSTITUTIONS

2.1.1.01.1 Consumption of non-profit institutions n.e.c. Expenditure on goods and services by private non-profit institutions providing households with social and community services n.e.c.

3 GOVERNMENT CONSUMPTION Final consumption of general government. The sum of major COFOG groups 01 (General public services), 02 (Defense affairs and services), 03 (Public order and safety affairs), 07 (Housing and community amenity affairs and services), 09 (Fuel and energy affairs and services), 10 (Agriculture, forestry and hunting affairs and services), 11 (Mining and mineral resource affairs and services, other than fuels; manufacturing affairs and services; construction affairs and services), 12 (Transportation and communication affairs and services), 13 (Other economic affairs and services), 14 (Expenditures not classified by major group). It does not include general government final consumption expenditure on Education (04). Health (05). Welfare (06), Recreation and culture (08) (except general administration, regulation and research). Expenditures are to be

3.1.1.01.1 Compensation of employees
 3.1.2.01.1 Intermediate consumption
 3.1.3.01.1 Consumption of fixed capital

4 GROSS FIXED CAPITAL FORMATION

4.1 MACHINERY AND EQUIPMENT

4.1.1 MACHINERY AND NON-ELECTRICAL EQUIPMENT

4.1.1.03.1 Agricultural machinery Machinery and equipment, including hand tools, for use in the preparation and maintenance of the soil; in planting and harvesting of the crop; in preparing crops for market on the farm, or in dairy farming and livestock raising, for use in performing other farm operations and processes, such as planting, seeding, fertilizing, cultivating, harvesting, threshing or mowing, for cleaning or grading, for loading, lifting or conveying, for milking; pressers, for the extraction of fruit juices; fruit and vegetable slicers, meat grinders. Machinery for poultry keeping and bee keeping.

		All farm-type tractors powered by diesel, gasoline or steam engines, including parts for the tractors, except engine parts.
4.1.1.05.0	Equipment for mining and building, incl. metal structures	Machinery and equipment for mines and mining; earth excavation and digging; brick-making machinery and other machinery for the preparation of building materials; machinery and equipment for construction and civil engineering; mechanical lifting and handling equipment. Railway and tramway track construction material of iron or steel; structures and parts of structures of iron, steel or aluminium.
4.1.1.06.0	Machinery for textile, food, chemical, paper etc. industries	Machinery for the processing of natural or man-made textile fibres; etc. industries machinery for spinning, twisting, doubling, throwing, reeling, weaving and knitting of textiles; machinery for the printing, bleaching, dyeing and drying of textiles; machinery for the folding, reeling and cutting of fabrics; sewing-machines; electrical hand tools for working textile materials; accessories for textile machinery. Machinery and equipment for the processing of food, drink and tobacco; machinery and equipment for the processing of chemicals; machinery for bottling, packaging and wrapping; machinery and mechanical appliances for the working of rubber and artificial plastics. Machine tools for working wood and other hard carving materials, presses and other machines for working wood; machinery for making, finishing or cutting of pulp, paper or paperboard, type-founding or type-setting machines, machinery (including cameras) for preparing printing blocks, plates or cylinders, book-binding machinery, other printing machinery; machines for the washing, drying, dry-cleaning, ironing and pressing of clothes etc.
4.1.1.08.1	Office equipment	Typewriters; cheque-writing machines; calculating machines, cash registers, postage-franking machines, ticket-issuing machines; automatic data-processing machines; thermo-copying apparatus; other office machines (such as stencil duplicating machines, addressing machines, coin-sorting machines, coin-counting and wrapping machines).
4.1.1.09.0	Precision and optical instruments	Gas meters, water meters and other liquid supply meters instruments (including petrol pump meters); measuring, checking or automatically controlling instruments and apparatus; surveying, navigational, hydrological, geophysical and meteorological instruments; drawing and mathematical calculating instruments; precision measuring, weighing and control instruments; laboratory apparatus and teaching equipment;

		<p>medical apparatus for diagnostic work; medical, dental, surgical and veterinary instruments, appliances and furniture; clocks and watches. Equipment for use by opticians; optical precision instruments; photographic and cinematographic equipment.</p>
4.1.1.10.1	Other machinery	<p>Machine tools for working metal or metal carbides; accessories and parts for such machine tools; presses and other machines and mechanical appliances for treating metals. Large boilers, tanks, reservoirs; components and accessories for similar containers. Metal casks, drums, and boxes for the conveyance or packing of goods; non-electric domestic heating and cooking appliances and apparatus of metal; non-electric water heaters and refrigerating equipment of metal; metal furniture, including safes; metal sanitary ware and other domestic articles. Engines except those for road vehicles and aircraft; water-wheels and water and heat turbines and other mechanical energy-producing machinery; compressors, pumps and equipment for operating machinery by hydraulic or pneumatic means; space-heating, ventilating and air-conditioning equipment; refrigerating machinery; non-electric industrial furnaces and ovens; non-electric welding equipment; taps, cocks, valves and similar appliances; automatic vending machines; weighing apparatus; fire-fighting equipment; machinery and equipment n.e.c.</p>
4.1.2	ELECTRICAL EQUIPMENT and APPLIANCES	
4.1.2.01.1	Electrical equipment, including lamps	<p>Electrical machinery (comprising electric motors, electricity generators, transformers, switches, switch gear and other basic electrical plant); electrical equipment for industrial use (such as industrial electric furnaces, electrical tools, electric trucks, electrical welding apparatus, electroplating equipment); electric traffic control equipment for railways, roads, inland waterways, ports and airfields; batteries and accumulators; electric lighting equipment, including lamps and tubes.</p>
4.1.2.02.0	Telecommunication, electronic and electrical equipment n.e.c.	<p>Radio and television receivers, sound reproducing and recording electronic and electrical equipment, electronic equipment and apparatus. Radio-telegraphic, radio-telephonic and radio-broadcasting transmission and reception apparatus and equipment; television transmission and reception apparatus and equipment; radio navigational aid apparatus, radar apparatus and radio remote-control apparatus; electrical measuring, checking, analysing or automatically</p>

controlling instruments and apparatus; electro-medical equipment, including X-ray apparatus and associated parts, accessories and furniture.

4.1.3 TRANSPORT EQUIPMENT

4.1.3.01.1 Motor vehicles and engines

Passenger cars, commercial cars and taxi-cabs; buses and engines coaches; motor lorries and trucks, truck trailers, universal carriers; ambulances and fire trucks, trailer and pick-up coaches, vehicle-drawn caravans, motorized sleighs and other special purpose vehicles; and their specialized parts, accessories and engines.

4.1.3.02.1 Ships and boats

All types of self-propelled cargo, passenger and fishing vessels, including fish factories; barges and lighters; powerboats, sailboats and other boats; tugboats and pushcraft; ice-breakers, cable ships, research ships and other non-trading ships (excluding naval ships); floating docks, floating dredges and other floating structures; oil rigs; specialized ship parts other than engines; and all vessels that have undergone extensive reconstruction and conversion.

4.1.3.02.2 Locomotives, wagons

All locomotives intended for railway service and for service in mining and industrial operations; mechanically propelled railway cars, tramway cars and trolley buses; non-mechanically propelled coaches, luggage vans and other coaches coupled to passenger trains; goods vans, wagons and trucks and other rolling stock; and their specialized parts other than engines.

4.1.3.02.3 Aircraft

Aeroplanes, gliders, helicopters and other aircraft; space vehicles; hovercraft; and their specialized parts and engines.

4.1.3.02.4 Other transport equipment

Motor cycles, scooters, bicycles, tricycles, pedicabs and transport equipment n.e.c.; and their specialized parts.

4.2 CONSTRUCTION

4.2.1 RESIDENTIAL BUILDINGS

4.2.1.03.1 Residential buildings

One-family and multi-family dwellings, detached, semi-detached and terraced houses; includes farmhouses; apartment houses with three or more dwelling units; including dormitories.

4.2.2 NON-RESIDENTIAL BUILDINGS

4.2.2.05.1 Non-residential buildings

All non-residential farm buildings, such as stables, barns, granaries, grain bins, tower silos, machine sheds. All buildings used to house production, assembly and warehousing activities of industrial

establishments such as factories, plants, workshops; includes special buildings for utility industries such as power, communication and transportation. Office buildings and all buildings used primarily in wholesale, retail and service trades; includes banks, hotels, motels, restaurants, shops, stores, warehouses, public garages etc. Office buildings of central and local administration, office buildings of private non-profit institutions, buildings for health, educational, cultural and religious purposes; includes hospitals, medical clinics, infirmaries, nursing homes, sanitoriums, day nurseries, schools, colleges, universities, laboratories, libraries, museums, art galleries, auditoriums, community centres, churches, swimming pools, gymnasiums, stadiums, cinemas, theatres etc.

4.2.3 CIVIL ENGINEERING WORKS

4.2.3.04.1 Civil engineering works

Roads, streets and highways, including road bridges, viaducts, tunnels and parking lots. Railroads, railway stations, bridges, viaducts, subways and tunnels other than for roads; harbours, piers and other harbour facilities; airports and other airport facilities; canals and waterways; pipelines for gas, water and sewer systems; telephone and telegraph lines; electricity transmission lines etc. Oil wells, gas wells, mine shafts; dams and dikes that are not part of flood control or irrigation projects; aqueducts, drainage and sanitation projects; athletic fields etc.

4.3 OTHER PRODUCTS

4.3.1 OTHER PRODUCTS

4.3.1.01.1 Land improvement, development of plantations and breeding stock

Land improvement, including dams and dikes that are part of development of flood control and irrigation projects; plantation, orchard and vineyard development; value of additions to, less disposals of breeding stock, draught animals, dairy cattle and animals raised for wool clipping.

5 CHANGE IN STOCKS

5.0.0.00.0 Change in stocks

Value of physical change in stocks of raw materials and supplies, work-in-progress, livestock raised for slaughter and finished goods held by producers.

6 NET EXPORTS OF GOODS AND SERVICES

6.0.0.00.0 Net exports of goods and services

The value (f.o.b.) of exports of services goods and services less the value (c.i.f.) of imports of goods

and services.

GLOSSARY

Aggregates of basic headings. Any aggregation of groups of basic headings, such as bread and cereals, up to GDP. Also known as summary or analytical categories.

Asterisked (*) items. The practice of assigning or not assigning an asterisk (*) to items according to whether the particular good or service is important or not important in the country in that basic heading. Items marked with an asterisk are considered important in the basic heading; the use of this procedure is outlined in chapter V.

Base-country invariance. The index-number property that involves the symmetrical treatment of all countries, with the result that the relative index-number standings of the countries are not affected by the choice of the reference (numeraire) country.

Basic headings. The subdivisions of final expenditure that correspond to the first aggregation of price (or quantity) ratios for individual specifications or items. (For the list of basic headings, see annex III of the Handbook.) Basic headings are sometimes referred to as detailed categories.

Bills-of-quantity approach. The method used to build up the costs of construction projects from the individual modules of activity involved (see chap. IV).

Binary comparison. A price or quantity comparison between two countries that draws upon data only for those two countries. Also known as bilateral comparisons.

Bridge-country binary comparison. A price or quantity comparison between a pair of countries derived from the comparison of each country with a third country. For example, given I_A and I_L , the bridge-country method of obtaining I_A is to divide I_A by I_L , where I is a price or quantity index and j , k and l are countries. This is a common way of linking through an asterisked country, as in the case of the Eastern European countries known as the Group II countries, in which Austria served as the bridge country.

CEP (consumption expenditures of the population). The ICP concept of "consumption" that includes both household expenditures and expenditures of government on such categories as health and education.

Characteristicity. The property whereby the sample of prices or quantities and the weights used in an international comparison conform closely to a representative sample of items and to the weights of each of the countries included in the comparison.

Circularity or transitivity. The property of indexes when the price or quantity relationship among any two of three countries is the same, whether derived from an original-country comparison between them or from the comparison of each country with any third country. In the case of three countries, where I is a price or quantity index and j , k and l are countries, the circularity test is satisfied if $I_{j/k} = I_{j/l}/I_{k/l}$. When this test is satisfied, there is a unique cardinal scaling of countries with respect to relative quantities and prices.

Comparative Price level. A comparative price level is defined as the purchasing-power parity divided by the exchange rate. (See Purchasing-power parity.) Expressed another way, the comparative price level for a bundle of goods is its cost in one country as a percentage of the cost of the same bundle in another country, when prices in both countries are expressed in a common currency, with the official exchange rate being used for currency conversions,

Core commodity. A good or service that is widely available throughout the world so that a substantial number of countries in each region can provide prices for these items. Core commodities can serve as the basis for linking the countries of the world to obtain transitive parities at the basic heading level.

Core country. An alternative or supplement to the core commodity approach. Core countries agree to price a common basket that allows linking of all areas of the world at the basic heading level; or certain

pairs of core countries make binary comparisons that allow there to be links at the basic heading level between all groups of countries participating in the comparison.

Country-product-dummy (CPD) method. A generalized bridge-country method in which regression analysis is used to obtain transitive price comparisons for each basic heading. The basic data for a given category consist of all the prices available for the various specifications for the entire collection of countries. The basic assumption is that within a given basic heading for a given country, the price of an item depends in a multiplicative way on a country factor and a price factor to be estimated from the sample of item-country prices in each heading. It follows from this that the logarithms of the prices are regressed against two sets of dummy variables; one set contains a dummy for each specification; the second set, a dummy for each country other than the numeraire country. The transitive price comparisons are derived from the coefficients of the country dummies (see chap. V).

Country-reversal test. This test is satisfied if, when country j is taken as the base country, the price or quantity index for countries j and k is the reciprocal of the index when country k is the base country. For example, $I_{j/k} * I_{k/j} = 1$. where I is a price or quantity index.

Direct Price or quantity comparison. Made by comparing for two or more countries the prices or quantities for a representative sample of equivalent commodities. (See also Indirect price or quantity comparison.)

ECP (European Comparison Programme). The set of ICP comparisons for Europe carried out under the auspices of the Economic Commission for Europe. In the 1980 and 1985 comparisons, the ECP was built on the EC and OECD comparisons and a group for which Austria served as the centre for a set of binary comparisons.

EKS method. A multilateral method developed by G. Tóth, P. Kóves and B. Szulc [Schultz] that computes the n th root of the product of all possible Fisher indexes between n countries. It has been used at the detailed heading level to obtain heading parities, and also at the GDP level. EKS has the properties of base-country invariance and transitivity (see chap. V and annex II).

Factor-reversal test. The condition that, for any given item, category or aggregate and for any given pair of countries, the product of the price ratio (or index) and the quantity ratio (or index) shall be equal to the expenditure ratio.

Final Products. Products purchased for own use and not for resale or for embodiment in a product for resale; those purchased by households, by government or by business on capital account.
Fisher, or "ideal", index. The geometric mean of two indexes: one, the harmonic mean of price (or quantity) relatives weighted by the numerator country's expenditures; the other, the arithmetic mean weighted by the denominator country's expenditures. (The more usual definition is the geometric mean of the own-weighted and base-country-weighted indexes.)

Fixity. The practice of fixing the results of an ICP aggregation for a country group when the country group is compared with a larger group. For example, the relation of France and Italy as given by Geary-Khamis or EKS for the 12 EC countries would be fixed so that within OECD, the France-Italy relationship would be preserved.

GCF (gross capital formation). The ICP concept of gross capital formation includes fixed capital formation, change in stocks, and net exports. Definitions of these three components correspond to SNA concepts, although the SNA does not include net exports in its definition of GCF.

GDP. Gross domestic product.

Geary-Khamis method. An aggregation method in which category "international prices" (reflecting relative category values) and country PPPs (depicting relative country price levels) are estimated simultaneously from a system of linear equations. Has the property of base-country invariance, matrix consistency and transitivity (see chap. V and annex II).

GFCE (government final consumption expenditure). The SNA concept of "government" that includes public expenditures on education, health and similar categories.

Hedonic methods. Use of regression equations to estimate price as a function of various characteristics of products. The resulting equation can be used to then estimate prices in different countries for the identical values of the characteristics and to thereby permit price comparisons.

ICP. International Comparison Project or International Comparison Programme.

"Ideal" index. See Fisher. or "ideal", index.

Identity. Specifications where the items compared in different countries are as close to identical as possible, as for the same brand name and model.

Importance of an item. In choosing items within a basic heading to be priced, the importance of the item in terms of wide availability and use should be a leading criterion.

Imputed Parities. The use of parities for one or several basic headings as estimates of the parities for other basic headings where similar items are purchased, e.g., parities for books purchased by educational institutions imputed from book purchases by consumers.

Indirect Price or quantity comparison. A comparison made by dividing the price or quantity ratio into the expenditure ratio. That is, the indirect quantity comparison between country j and country k for commodity i, q_{ij}/q_{ik} , is obtained from $(p_{ij}q_{ij}/p_{ik}q_{ik}) / (p_{ij}/p_{ik}) = q_{ij}/q_{ik}$, where the p's are the commodity prices. See also Direct price or quantity comparison.

International dollars (IS). Dollars with the same purchasing power over total United States GDP as the United States dollar in a given year, but with a purchasing power over subaggregates and over detailed categories determined by average international prices rather than by United States relative prices. Regional comparisons often use other numeraire currencies, such as the Austrian schilling in the ECP, or a composite, such as the ECU in the European Communities.

International Price (I\$). The international price of basic heading i is defined as a quantity-weighted average of the purchasing-power-adjusted parities at the basic heading level across the n countries (see annex II).

Matrix consistency. The property that makes it possible to have correct country-to-country quantity relationships for each detailed category and, at the same time, to obtain the correct country-to-country quantity relationships for any desired aggregation of categories simply by summing the quantities for the included categories. This requires that the quantities be stated in value terms so that (a) the values for any category are directly comparable between countries and (b) the values for any country are directly comparable between categories.

Multilateral comparison. A price or quantity comparison of more than two countries simultaneously that produces consistent relations among all pairs; that is, one that satisfies the circular test or the transitivity requirement.

Net foreign balance. Difference between exports and imports of goods and services. Also referred to as net exports, or balance of imports and exports.

Nominal expenditures. Expenditures in national currencies converted to a common currency at exchange rates.

Numeraire. Usually, the currency unit of one country is chosen as numeraire for expressing real expenditures and PPPS. The CPD, EKS, and Geary-Khamis procedures are all invariant as to which

country is the numeraire or base. The numeraire may also be the average of a group, as has been the case in the EC and African comparisons.

Own weights. The weights of the numerator country; that is, the weights of country j in the index I_{jk} . The term is used, for example, to refer to the weights of the country, other than the United States, in a binary comparison in which the United States is the base country, k .

PLS (Paasche-Laspeyres-spread). The ratio of an index using own-country weights in a binary comparison to an index using base-country weights.

PFC (public final consumption expenditure). The ICP concept of "government" that excludes public expenditures for education, health and similar categories.

PFCE (private final consumption expenditure). The SNA concept of "consumption" that excludes public expenditures on education, health and similar categories.

PPP. See Purchasing-power Parity.

Price-slope adjustments. Adjustment of prices to a common specification on the basis of the price determining effects of the key characteristics of the item. Similar to hedonic price estimation, except that adjustment factors are based on technical information, not on parameters estimated from a regression equation using sample price information.

Price tableau. A matrix of prices for a detailed category in which the rows represent different items and the columns the various countries.

Purchasing-power parity (PPP). The number of currency units required to buy goods equivalent to what can be bought with one unit of the currency of the base country; or with one unit of the common currency of a group of countries. Also referred to as a purchasing power standard. The PPP may be calculated over all of GDP, but also at levels of aggregation, such as capital formation.

Quality adjustment. A term used to refer to adjustment of prices of items so that they represent a common quality. See Price-slope adjustments.

Quantity index. The quantity per capita of a category or aggregate of goods in one country expressed as a percentage of the quantity per capita in another country.

Quantity ratio. The quantity of a particular commodity in one country as a proportion of the quantity of the same commodity in another country.

Real Product or real quantity. The final product or quantity in two or more countries that is valued at common prices and, therefore, valued in comparable terms internationally.

Regionalization. The practice of building up world ICP comparisons on the basis of comparisons carried out in various country groupings such as EC or ESCAP.

Representativeness. A term used to describe how characteristic a particular item is of the types of goods and services included in a basic heading.

SNA. The United Nations System of National Accounts.

Specification. A description of an item for which a price comparison is to be made. The description is designed to ensure that goods of equivalent quality are compared. In the Handbook, the terms "item" and "specification" are used interchangeably.

Transaction equality. The index number property that makes the relative importance of each transaction involving the purchase of a final product dependent solely on its magnitude and not on the size of the country in which it occurred.

Transitivity requirements. See Circularity or transitivity.

Unique items. Items that are important in only one country within a region and consequently are not suitable for price comparisons.

Unit value. When the expenditures or value of production of an item is divided by the quantity, the result is known as a unit value. The more narrowly defined the quantity, the closer is a unit value to the price of a specification.

REFERENCES

- Khmad, Sultan (1980). Approaches to purchasing power parity and real product comparisons using shortcuts and reduced information. World Bank Staff Working Paper, No. 418.
- Blades, D., and D. Roberts (1987). A note on the new OECD benchmark purchasing power parities for 1985. OECD Economic Studies, No. 9 (autumn).
- Diewert, W. E. (1978). Superlative index numbers and consistency in aggregation. *Econometrica*.
- Drechsler, Laszlo (1973). Weighting of index numbers in multilateral international comparisons. *Review of Income and Wealth*, series 19, No. 1 (March).
- Drechsler, Laszlo and Eugenia Krzeczowska (1982). Purchasing power parities in international comparisons: quantity vs. price changes. *Review of Income and Wealth*, series 28, No. 3 (September).
- EUROSTAT (1977). Comparison in real values of the aggregates of ESA, 1975. Luxembourg: Statistical Office of the European Communities.
- _____ (1983). Comparison in real values of the aggregates of ESA, 1980. Luxembourg: Statistical Office of the European Communities.
- _____ (1985). Comparison of price levels and economic aggregates, 1980: the results for 15 African countries. Luxembourg: Statistical Office of the European Communities.
- _____ (1987). Purchasing power parities and real GDP. Results 1985. Luxembourg: Statistical Office of the European Communities.
- _____ (1989). Comparison of price levels and economic aggregates, 1985: the results for 22 African countries. Luxembourg: Statistical Office of the European Communities.
- Franz, A. (1985). The solution of problems in international comparisons of GDP through price adjustments. What to learn from ICP 1980? *Statistical Journal of the United Nations Economic Commission for Europe*, No. 1.
- Gerardi, D. (1982). Selected problems of inter-country comparisons on the basis of the experience of the EEC. *Review of Income and Wealth*, series 28, No. 4 (December).
- Gilbert, M., and I. Kravis (1954). An International Comparison of National Products and Purchasing Power of Currencies. Paris: OEEC.
- Hill, T. P. (1982). Multilateral Measurements of Purchasing Power and Real GNP. Luxembourg: Statistical Office of the European Communities.
- _____ (1986). International price levels and purchasing power parities. OECD Economic Studies, No. 6 (spring).
- ILO (1989). Consumer Price Indices: an ILO Manual. Geneva: International Labour Office.
- Khamis, S. (1972). A new system of index numbers for national and international purposes. *Journal of the Royal Statistical Society*, series A, vol. 135.
- _____ (1984). Application of index numbers in international comparisons and related concepts. *Review of Income and Wealth*, series 30, No. 1 (March).

- Kravis, I. B. (1984). Comparative studies of national income and prices. *Journal of Economic Literature*, vol. XXII (March).
- Kravis, I. B., A. W. Heston and R. Summers (1978). *International Comparisons of Real Product and Purchasing Power*. Baltimore: The Johns Hopkins University Press.
- _____ (1982). *World Product and Income. International Comparisons of Real Gross Product*. Baltimore: The Johns Hopkins University Press.
- Kravis, I. B., Z. Kenessey, A. W. Heston and R. Summers (1975). *A System of International Comparisons of Gross Product and Purchasing Power*. Baltimore: The Johns Hopkins University Press.
- Kravis, I. B. and R. E. Lipsey (1982). Towards an explanation of national price levels. Special Conference on PPPs of the International Association for Research in Income and Wealth. Luxembourg (September).
- Krijnse-Locker, H. (1984). On the estimation of purchasing power parities on the basic heading level. *Review of Income and Wealth*, series 30, No. 2 (June).
- Krijnse-Locker, H. and H. D. Faerber (1984). Space and time comparisons of purchasing power parities and real values." *Review of Income and Wealth* series 30, No. 1 (March).
- Maddison, A., and B. van Ark (1989). International comparisons of purchasing power, real output and labour productivity: a case study of Brazilian, Mexican, and U.S. manufacturing, 1975. *Review of Income and Wealth*, series 35, No. 1 (March).
- OECD (1987). *Purchasing Power Parities and Real Expenditures, 1985*, Paris.
- _____ (1991). *National Accounts (195Q-1989)*, vol. 1. Main Aggregates. Paris.
- Paige, D., and G. Bombach (1959). *A Comparison of National Output and Productivity of the United Kingdom and the United States*. Paris: OEEC.
- Prasada Rao, D. S. (1972). Contributions to methodology of construction of consistent index numbers. Ph.D. dissertation. Calcutta: Indian Statistical Institute.
- Salazar-Carrillo, J. (1978). *Prices and Purchasing Power Parities in Latin America: 1960-1972*, Washington, D.C.: Organization of American States.
- Salazar-Carrillo, J. and D. S. Prasada Rao, eds. (1988). *World Comparisons of Income. Prices and Product*, New York: North Holland Press.
- Summers, R. (1973). International comparisons based upon incomplete data. *Review of Income and Wealth*, series 19, No. 1 (March).
- Summers, R., and A. Heston (1988). A new set of international comparisons of real product and price level estimates for 130 countries, 1950-1985. *Review of Income and Wealth*, series 34, No. 1 (March).
- Szilagyi, G. (1984). International comparisons - types and methods. *Statistical Journal of the United Nations Economic Commission for Europe*, No. 2.

_____ (1986). Procedures for linking international comparisons. Statistical Journal of the United Nations Economic Commission for Europe, No. 4.

United Nations, Economic Commission for Europe (1985). International comparison of gross domestic product in Europe, 1980. Conference of European Statisticians. Statistical Standards and Studies, No. 37. Sales No. E.85.II.E.18.

_____ (1988). International comparison of gross domestic product in Europe 1985. Conference of European Statisticians. Statistical Standards and Studies, No. 41. Sales No. E.88.II.E.28.

United Nations and EUROSTAT (1986). World Comparisons of Purchasing Power and Real Product for 1980. Part One: Summary Results for 60 Countries, ST/ESA/STAT/SER.F/42 (Part I). Sales No. 86.XVII.9.

_____ (1987). World Comparisons of Purchasing Power and Real Product for 1980. Part two: Detailed Results for 60 Countries ST/ESA/STAT/SER.F/42 (Part II). Sales No. 86.XVII.10.

United Nations Development Programme (1991). Human Development Report 1991. New York and Oxford: Oxford University Press,

Ward, M. (1985). Purchasing Power Parities and Real Expenditures in the OECD. Paris: OECD.

92-37807 3381-82h (E)