

Proposals For A Draft Resolution Concerning Consumer Price Indices¹

International Labour Office, Bureau of Statistics

ILO, Geneva

1. Preamble

Recalling the resolution adopted by the Fourteenth International Conference of Labour Statisticians concerning consumer price indices and recognizing the continuing validity of the basic principles recommended therein and, in particular, the fact that the consumer price index (CPI) is designed primarily to measure the changes over time in the general level of prices of goods and services that a reference population acquires, uses or pays for,

Recognizing the need to modify and broaden the existing standards in the light of recent methodological and computational developments to enhance the usefulness of the international standards in the provision of technical guidelines to all countries and particularly those with less advanced statistical infrastructure,

Recognizing the usefulness of such standards in enhancing the international comparability of the statistics,

Recognising that the consumer price index is used for a wide variety of purposes, governments should be encouraged to identify the (priority) purposes a CPI is to serve, to provide adequate resources for its compilation, and to guarantee the professional independence of its compilers, Recognising that the (priority) objectives and uses of CPI differ among countries and that, therefore, a single standard could not be applied universally,

Recognizing that the CPI needs to be credible to observers and users, both national and international, and that better understanding of the principles and procedures used to compile the index will enhance the users' confidence in the index,

Agrees that the principles and methods used in constructing a CPI should be based on the guidelines and methods that are generally accepted as constituting good statistical practices

Adopts, this ... day of ..., the following resolution which replaces the previous one adopted in 1987.

¹ In Report III, Seventeen International Conference of Labour Statisticians (Geneva, 2003).

2. The nature and meaning of a consumer price index (CPI)

1. The CPI is a current economic indicator that is constructed to measure changes over time in the general level of prices of consumer goods and services that households acquire, use or pay for consumption.
2. The objective of the index may be to measure the change over time in the cost of purchasing a fixed basket of consumer goods and services of constant quality and characteristics, with the items in the basket being selected to be representative of households' expenditure during a year or other period. Such an index is called a fixed basket price index and may be calculated by using the Laspeyres-type index number formula. This is the type of index most commonly produced by national statistical agencies.
3. The objective of the index may also be to measure the effects of price changes on the cost of achieving a standard of living (i.e.: utility or welfare) corresponding to that achieved during a year or other specified period. Such an index is called a cost-of-living index (COLI). Operationally, a COLI cannot be directly calculated but may be approximated.

3. The uses of a consumer price index

4. The consumer price index is used for a wide variety of purposes, the two most common ones being (i) to adjust wages and government and social security benefits to compensate, partly or completely, for changes in the cost of living or in consumer prices, and (ii) to provide an average measure of price inflation for the household sector as a whole. CPI sub-indices are also used to deflate components of household final consumption expenditure in the national accounts and the value of retail sales to obtain estimates of changes in their volume.
5. CPIs are also used for purposes less directly linked to the price experiences of households. These include monitoring the overall rate of price inflation for all sectors of the economy, the adjustment of government fees and charges, and the adjustment of payments in commercial contracts. In these types of cases, the CPI is used as more appropriate measures simply do not exist, or because other characteristics of the CPI (e.g. high profile, wide acceptance, predictable publication schedule, etc) are seen to outweigh any conceptual or technical deficiencies.
6. Given that the CPI may be used for many purposes, it is unlikely to perform equally satisfactorily in all applications. It may therefore be appropriate to construct a number of alternative price indices for specific purposes, if the requirements of the users justify the extra expense. Each index should be properly named to avoid confusion and a "headline" CPI measure should be explicitly identified.
7. Where only one index is produced, it is the main use that should determine the type of index produced (fixed basket price index or COLI), the range of goods and services covered, its geographic coverage, the households it relates to, as well as to the concept of price and the formula used. If there are several major uses, it is likely that compromises may have to be made with regard to how the CPI is constructed. Users should be informed of the compromises made and of the limitations of such an index.

4. Scope of the index

8. The scope of the index depends on the main use for which it is intended, and should be defined in terms of the type of households, geographic areas, and the types of consumer goods and services acquired, used or paid for by the reference population.
9. If the primary use of the CPI is for adjusting money incomes, a relevant group of households, such as wage and salary earners, may be the appropriate target population. For this use, all consumption expenditures by these households, at home and abroad, should be covered. If the primary use of the CPI is to measure domestically-sourced inflation, it may be appropriate to cover consumption expenditures made within the country, rather than the expenditures of households resident within the country.
10. In general, the reference population for a national index should be defined very widely (to cover consumption expenditure of households resident in the country or consumption expenditure that take place within the county.) If any income groups, types of households or particular geographic areas are excluded, for example, for reasons of practicality or costs, then this should be explicitly stated.
11. The geographic scope refers to the geographic coverage of price collection and of consumption expenditures of the reference population and both should be defined as widely as possible, and preferably consistently. If price collection is restricted to particular areas due to resource constraints, then this should be specified. The geographic coverage of the consumption expenditure may be defined either as covering consumption expenditure of the resident population (resident consumption) or consumption expenditure within the country (domestic consumption).
12. Significant differences in the expenditure patterns and/or price movements between specific identifiable population groups or regions may exist. In such cases, separate indexes for these population groups or regions may be computed if there is sufficient demand to justify the additional cost.
13. The CPI should relate to all types of consumer goods and services of significance to the reference households, without any omission of those that may be regarded as non-essential or undesirable. Goods and services not legally available should also be included if and when possible, and if the expenditures on such items can be expected to be significant. Special aggregates may be constructed to assist those users who may wish to exclude certain categories of goods and services for particular applications or for purposes of analysis.
14. Goods and services purchased for business purposes, expenditures on assets such as works of art, financial investment (as distinct from financial services), and payments of income taxes, social security contributions and fines are not considered to be consumer goods or services and should be excluded from the coverage of the index.

5. Acquisition, use or payment

15. In determining the scope of the index, the time of recording and valuation of consumption, it is important to consider whether the purposes for which the index is used are best

satisfied by defining consumption in terms of “acquisition”, “use”, or “payment”². In general, the “acquisition” approach is regarded as the most appropriate for an index intended to be used as macroeconomic indicator while the “payment” approach is the most appropriate for a compensation (an income adjustment) index. For the purposes of an index intended to measure changes in the cost of living, the “use”³ approach may be suitable. The decision regarding the approach to follow (or combination of these approaches) for a particular group of items should be based on the purpose of the index, as well as on the costs and the acceptability of the decision to the users who should be informed of the approach followed for different items.

16. The differences between the three approaches are most pronounced in dealing with items such as owner-occupied housing, durable goods, goods and services produced for own-account consumption, items acquired on credit, remuneration in kind and goods and services provided without charge or at prices subsidized by government and non-profit institutions serving households (NPIs).
17. The most complex and important of the items mentioned above is owner-occupied housing. In most countries, a significant proportion of households are owner-occupiers of their housing, with the housing being characterized by a long useful life and a high purchase outlay (price). Under the “acquisition” approach, the value of the new dwellings acquired in the weights reference period is used for deriving the weight (and the full price of the dwelling is included in the CPI at the time of acquisition, regardless of when the consumption is taking place). Under the “payment” approach, the weights reflect the amounts actually paid out for housing (and the prices enter the CPI in the period(s) when the prices are paid), while under the “use” approach it is the value of the flow of housing services consumed during the weights reference period estimated using an implicit or notional cost (and prices or estimated opportunity costs enter the CPI when the consumption is taking place).
18. Own-account consumption, remuneration in kind and/or goods and services provided without charge or subsidised by governments and NPIs may be important in some countries where the purpose of the index is best satisfied by defining consumption in terms of “use” or “acquisition” (under the payment approach these are out of scope). The inclusion of these items will require special valuation and pricing techniques. One option is to impute their prices and expenditures on the basis of the prices of similar goods and services bought and sold on the market. This requires increasing the weight applied to such market prices to include the value of the corresponding non-market transactions. If market prices are not relevant or cannot be reliably observed, or there is no interest in using hypothetically imputed prices, the expenditures and prices paid for the inputs into the production of these goods and services should be used instead. Users should be informed of the methods followed for the different items.

² Annex 1

³ Because of the practical difficulties in uniformly defining consumption and estimating the flow of services provided by other durable goods in terms of “use”, it may be necessary to adopt a mixed approach – e.g. “use” for owner-occupied housing and “acquisition” or “payments” basis for other consumer durables.

6. Basket and weights

19. Decisions on the composition of the basket and the weights follow directly from the choice of reference population and geographic coverage, as well as from the choice between the “acquisition”, “use” or “payment” approaches.
20. Once defined, the expenditures that fall within the scope of the index should be grouped into similar categories (group of products that have a common purpose (end-use) or are considered substitutes for each other) in a hierarchical classification system (e.g. divisions/groups /classes) to make the index useful for descriptive and analytical purposes. The classification used for the index compilation should be as consistent as possible with that used for household expenditure statistics and should meet the needs of users for special sub-indices. For the purposes of international comparison, the classification should also conform to, or be reconcilable with, the standard international *Classification of Individual Consumption according to Purpose* (COICOP), at least at its division level⁴.
21. In order to facilitate the analysis and interpretation of the results of the index, it may be desirable to classify goods and services according to various supplementary classifications (i.e. source of origin, durability, seasonality, etc). Calculation of the CPI by using various classifications should generate the same overall results as the original index.
22. The classification should also provide a framework for the allocation of expenditure weights. Expenditures at the lowest level of the classification system (class level), expressed as a proportion of the total expenditure, determine the weights to be used at this level. These weights stay fixed from one period of reweighting to the next. When the weights are to remain fixed for several years, the objective should be to adopt weights that are most likely to be representative of the contemporary household behaviour, rather than to precisely reflect the situation of a particular period that may have been abnormal in some way.
23. The two main sources for deriving the weights are the results from Household Expenditure Surveys (HESs) and National Accounts estimates on household consumption expenditure. The results from a household expenditure survey are more appropriate for an index defined to cover the consumption expenditures of reference population groups resident within the country, while national account estimates are likely to be more suitable for an index defined to cover consumption expenditures within the country. The decision about what source or sources to use and how they should be used depends on an analysis of their respective advantages and disadvantages and on the main purpose of the index.
24. The information from the main source (household expenditure surveys or national accounts) should be supplemented with all other available information on the expenditure pattern. Sources of such information that can be used for disaggregating the expenditures are surveys of sales in retail outlets, point-of-purchase survey, surveys of production, export and import data and administrative sources. Based on these data the weights for certain items may be further disaggregated by region and type of outlet. Where the data obtained from different sources relate to different periods, it is important to ensure, before weights are allocated, that expenditure are adjusted so that they have the same reference period.

⁴ Annex 4

25. Where the weight reference period differs from the price reference period, the weights should be price updated to take account of price changes between the weights reference period and price reference period. Where it is likely that price updated weights are less representative of the consumption pattern in the price reference period this procedure may be omitted.
26. Weights should be reviewed and if appropriate revised as often as accurate and reliable data are available for this to be done, preferably once every five years. Periodic revision are important to reduce the impact on the index of item substitutions⁴ Weights at the lowest level of index classification, for at least some categories, may need to be updated more frequently as they are likely to become out of date more quickly than upper level weights.
27. When a new basket (structure and /or weights) replaces the old, a continuous CPI series should be created by linking⁵ together the index numbers based on the new basket of goods and services to those based on the earlier basket. The particular procedure used to link index number series will depend on the particular index compilation technique used. The objective is to ensure that the technique used to introduce a new basket does not, of itself, alter the level of the index.
28. Completely new types of goods and services (i.e. goods and services that cannot be classified to any of the existing expenditure classes) should normally be considered for inclusion only during one of the periodic review and re-weighting exercises. A new model or variety of an existing product that can be fitted within an existing expenditure class should be included at the time it is assessed as having a significant and sustainable market share. If a quality change is detected an appropriate quality adjustment should be made⁶.
29. Some items like seasonal items, insurance, second hand goods, expenditure abroad, interest, own production, expenditures on purchase and construction of dwellings, etc. may need special treatment when constructing their weights. There are many alternatives for dealing with these items and the choice should be determined by national circumstances, the main purpose of the index and whether the acquisition, use and payment approach is used.
30. Seasonal items should be included in the basket. It is possible to use: (i) a fixed weight approach which use the same weight for the seasonal item in all months using an imputed price in the out-of-season months, and (ii) a variable weights approach where a changing weight is attached to the item in various months. The decision on the approach should be based on conditions in each country, but also on whether the focus is on short-term (month-to-month) changes or on the long-term index changes.
31. When second hand goods, including houses, are included in the index, then expenditure weights for these goods should be based on the net trade of such goods of the reference population group with others, e.g. dealers of such goods or households outside the reference population. Where more appropriate acquisitions without netting sales may be used for estimating weights for second hand goods.

⁵ See Annex 1

⁶ See Annex 2

32. When consumption from own production is within the scope of the index, the weights should include the expenditures on quantities purchased plus the value of quantities consumed from own production. Valuation of consumption from own production should be made on basis of prices prevailing on the market, unless there is some reason to conclude that market prices are not appropriate. In this case the expenditures and prices of the inputs of agricultural materials could be used instead. The third option is to value it by using quality adjusted market prices.
33. Expenditure classes are normally too broad to be of direct use in selecting representative products for pricing. A finer level of detail needs to be specified and decisions need to be taken concerning the items for which prices should be observed. The factors that need to be taken into account in this process include the relative significance of each item, its expected price behaviour and the practicality of obtaining prices of items at constant quality. In this selection it is important to include items that may be purchased mainly by or for all main groups in the reference population, e.g. as defined by gender, age or geographic location.

7. Sampling for price collection

34. A CPI is an estimate based on a sample of households to estimate weights, as well as a samples of zones within regions, a sample of outlets, a sample of goods and services, a sample of varieties and a sample of price observations.
35. The sample size and sample selection methods for both outlets and the goods and services for which prices are to be observed should ensure that the prices collected are representative and sufficient to meet the requirements for the accuracy of the index, but also that the collection process is cost-effective. The sample of price observations should reflect the importance of the goods and services available for purchase to consumers in the reference period, the number, types and geographic spread of outlets that are relevant for each good and service, and the dispersion of prices across outlets.
36. Probability sampling is the preferred method as it permits estimation of sampling variation (errors) and enables the sample size to be optimised. However, it is costly to implement and can result in the selection of items that are very difficult to price to constant quality.
37. In cases where appropriate sampling frames are lacking and it is too costly to obtain them, samples of outlets and items have to be obtained by non-probability methods. Statisticians have to use all available information and apply their best judgement to ensure that representative samples are selected. Particular attention should be given to the possibility of applying a cut-off sampling⁷ strategy, especially where the sample size will be small.
38. Efficient sampling, whether random or purposive, requires comprehensive and up to date sampling frames for outlets and products. Statistical business registers, business telephone directories, results from the point-of-purchase surveys or surveys of sales in different types of outlets may be used as sampling frames for selection of outlets. Catalogues or other product lists drawn up by major manufacturers, wholesalers or trade associations, or lists of products that are specific to individual outlets such as large supermarkets might be

⁷ See Annex 1

used as sampling frame for selection of products. Data scanned by bar-code readers at the cashier's desk (electronic databases) can be particularly helpful in the selection of goods and services.

39. The sample of outlets and of goods and services should be reviewed periodically and updated where necessary to maintain its representativeness.

8. Index calculation

40. CPIs are calculated in two steps. In the first step, the elementary aggregate indices are calculated. In the second step, higher level indices are calculated by aggregating the elementary aggregate indices.

9. Elementary aggregates

41. The elementary aggregate is the smallest and relatively homogeneous set of goods or services for which expenditure data are available and established (used) for CPI purposes. It is the only aggregate for which an index number is constructed without any explicit expenditure weights, although other kind of weights might be explicitly or implicitly introduced into the calculation. The set of goods or services covered by an elementary aggregate should be similar in their end-uses (i.e., close substitutes for each other) and are expected to have similar price movements. They may be defined not only in terms of their characteristics but also in terms of the type of location and outlet in which they are sold. The degree of homogeneity achieved in practice will depend on the availability of corresponding expenditure data.
42. An elementary index is a price index for an elementary aggregate. As expenditure weights usually cannot be attached to the prices/price relatives for the sampled items within the elementary aggregate, an elementary aggregate index is calculated as an un-weighted average of the prices/price relatives.
43. There are many different ways in which the prices, or the price relatives, might be averaged. The three most commonly used formulae are the ratio of arithmetic mean prices (RAP), the geometric mean (GM) and the arithmetic mean of price relatives (APR). The choice of formula depends on the need to reflect substitution within the elementary aggregate (especially with respect to COLI), degree of homogeneity, dispersion of prices and price movements, etc. It is possible to use different formulae for different elementary aggregates within the same CPI. It is recommended that the GM formula be used where possible but particularly for those elementary aggregates for which it is reasonable to assume a high degree of substitutability. In cases where consumers have only a limited ability to substitute among products or outlets or where one of the prices may become zero, it is recommended that the elementary aggregate index be constructed by using the RAP formula. For an index intended to measure the "pure" price change, RAP should be used for all elementary aggregates that are homogeneous. The APR formula should be avoided, particularly in its chained form, as it is known to result in biased estimates of the elementary aggregate indices. Wherever possible the elementary aggregate indices should be calculated as weighted averages, where the weights reflect, for example, the sales of particular items, market shares or regional weights.

44. The elementary index may be computed by using either a chained or direct form of the formula chosen. The use of a chained form generally makes the estimation of missing prices and the introduction of replacement items easier.

10. Upper level indices

45. Price indices at the class/group/division/national levels are constructed as weighted averages of elementary aggregate indices. There are many types of formulae that could be used to average the elementary aggregate indices. In order to produce a timely index, the only practical option is to use a formula that relies only on the weights observed for some past period. One such formula is the Laspeyres-type index, the formula used by most national statistical agencies. (Other alternatives would be the weighted geometric mean index and the constant elasticity of substitution (CES) approach. The latter relies on base period weights and on estimating the coefficient of substitution for all the goods in the basket. The Laspeyres and geometric mean indices are special cases of the CES formula, with zero and unitary substitution elasticities, respectively.)
46. For analytical purposes it may be appropriate to calculate the index retrospectively by using one of the index number formulas that employs both base-period weights and current period weights, such as the Fisher or Walsh index. Comparing the difference between the index of this type and the Laspeyres index can give some indication of the combined impact of income change, preference change and substitution effects over the period in question, which may be important information for producers and users of the CPI. The magnitude of the difference is expected to decline with an increase in the frequency at which the weights in the Laspeyres index are updated.
47. The upper level indices may be computed as a direct or two stage indices. The two stage index is calculated by multiplying the index for the previous period (measuring the change between base period and t-1) by the index measuring the change between t-1 and t. The later should be calculated with the price-updated expenditure weights in which the quantities of the base period are valued at the prices of the previous index period (t-1).

11. Price observations

48. The quality of the price information is the crucial determinant of the reliability of the index. Standard methods for collecting and processing price information should be developed and procedures put in place for collecting them systematically and accurately at regular intervals. Price collectors should be well trained and well supervised, and should be provided with a comprehensive manual explaining the procedures they have to follow.

12. Collection

49. An important consideration is whether the index should relate to monthly (or quarterly) average prices or to prices for a specific period of time (e.g. a single day or week in a month). This decision is related to a number of issues, which include the use of an index, the practicalities of carrying out price collection and the pattern of price movements. When the aim is a point-in-time pricing, prices should be collected over a very small number of days each month (or quarter). The interval between price observations should be uniform for each item. Since the length of the month (or quarter) varies, this uniformity needs to be defined carefully. When the aim is monthly (or quarterly) average

prices, prices, especially of the items whose prices are subject to significant variation over the month or quarter, should be collected more than once during the period.

50. Attention should also be paid to the time of the day selected for price observation. In the case of perishable goods, price observations should not be made just before closing time, as stocks may be low, or dumped to minimise wastage. In these particular cases, prices observed may not be representative.
51. Price collection should in principle be undertaken in all regions within the scope of the index, especially where there are significant differences in price movements between areas. Even when it is assessed that prices are unlikely to move differently in different areas, it may still be necessary to collect prices in all areas to maintain confidence in the index, and to monitor whether prices move in parallel. The number of price observations from each area depends on their relative significance to the CPI.
52. Prices should be collected in all types of outlets that are important, including open air markets and informal markets, and in free markets as well as price-controlled markets. Where more than one type of outlet is important for a particular type of item, an appropriately weighted average should be used in the calculation of the index.
53. Specifications should be provided detailing the variety and size of the items for which price information is to be collected. These should be precise enough to identify all the characteristics that are necessary to ensure that, as far as possible, identical goods and services are priced in successive periods in the same outlet. The specifications should include, for example, make, model, size, terms of payment, conditions of delivery, type of guarantees and type of outlet.
54. Prices to be collected are actual transaction prices, including indirect taxes and non-conditional discounts, that would be paid, agreed or costed (accepted) by the reference population. Where prices are not displayed or have to be negotiated, where quantity units are poorly defined or where actual purchase prices may deviate from listed or fixed prices, it may be necessary for the price collectors to purchase items in order to determine the transaction prices. A budget needs to be provided for any such purchases. When this is not possible, consideration should be given to interviewing customers about the prices actually paid. Tips for services, where compulsory, should be treated as part of the price paid.
55. Exceptional prices charged for stale, shop-soiled, damaged or otherwise imperfect goods sold at clearance prices should be excluded, unless the sale of such products is a permanent and widespread phenomenon. Sale prices, discounts, cut prices and special offers should be included when applicable to all customers on the date of the price observation without there being significant limits to the quantities that can be purchased by each customer.
56. In periods of price control or rationing, where limited supplies are available at prices which are held low by measures such as subsidies to the sellers, government procurement, price control, etc., such prices as well as those charged on any significant unrestricted markets should be collected. The different price observations should be combined in a way that uses the best information available with respect to the actual prices paid and the relative importance of the different types of sales.

57. Where centrally regulated or centrally fixed prices are collected from the regulatory authorities, checks should be made to ascertain whether the goods and services in question are actually sold and whether these prices are in fact paid. For goods and services where the prices paid are determined by combinations of subscription fees and piece rates (e.g. for newspapers, journals, public transport, electricity and telecommunications) care must be taken to ensure that a representative range of price offers are observed. Care must also be taken to ensure that price differences between different types of consumers are observed, e.g. those linked to the age of the purchaser or to memberships of particular associations.
58. For each type of item, different alternatives for collecting prices should be carefully investigated, to ensure that the price observations could be made reliably and effectively. Means of collection could include visits to outlets with paper forms or hand-held devices, interviews with customers, computer assisted telephone interviews, mail-out questionnaires, brochures, price lists provided by large or monopoly suppliers of services (including scanner data) and prices posted on the Internet. For each alternative, the possible cost advantages need to be balanced against an assessment of the reliability and timeliness of each of the alternatives.
59. The collected price information should be reviewed for comparability and consistency with previous observations, the presence of replacements, unusual or large price changes and to ensure that price conversions of goods priced in multiple units or varying quantities are properly calculated. Extremely large or unusual price changes should be examined to determine whether they are genuine price changes or are due to changes in quality. Procedures should be put in place for checking the reliability of all price observations. This could include a program of direct pricing and/or selective re-pricing of some items shortly after the initial observation was made.
60. Consistent procedures should be established for dealing with missing price observations because of, e.g., inability to contact the seller, non-response, observation rejected as unreliable or items temporarily unavailable. Prices of the items that are temporarily unavailable should be estimated until they re-appear or are replaced, by using appropriate estimation procedures, e.g. imputation on the basis of price changes of similar non-missing items. Carrying forward the last observed price should be avoided, especially in periods of high inflation. Treatment of the items that have permanently disappeared is discussed in paragraphs 61-63.

13. Replacements

61. Replacement of an item will be necessary when it disappears permanently from the outlet(s) where its price is observed, and may be necessary also when it is no longer available or sold in significant quantities or under normal sale conditions. Replacement should be made within the first three months (quarters) of the item becoming unavailable. Clear and precise rules should be developed for selecting the replacement item. Depending on the frequency of sampling and the potential for accurate quality adjustment, the alternatives are to select: (i) the most popular variety among those that belong to the same elementary aggregate, (ii) the most similar to the replaced variety and (iii) the variety most likely to be available in the future. Precise procedures should be laid down for price adjustments with respect to the difference in characteristics when replacements

are necessary, so that the impact of changes in quality is excluded from the observed price. Responsibility for making such price adjustments should be clearly stated.

62. Replacement of an outlet may be necessary if prices cannot be obtained e.g. because it has closed permanently or temporarily, because of a decline in representativeness or because the outlet no longer co-operates. Clear rules should be established on when to discontinue price observations from a selected outlet, on the criteria for selecting a replacement, as well on the adjustments that may be required to price observations and/or weights. Such rules should be consistent with the objectives of the index and with the way in which the price collection sample has been determined.
63. Deletion of an entire elementary aggregate will be necessary if all items in that elementary aggregate disappear from most or all outlets and it is not possible to locate a sufficient number of price observations to continue to produce a reliable index for this elementary aggregate. In such situations, it is necessary to redistribute the weight assigned to the elementary aggregate among the other elementary aggregates included in the next level of aggregation.

14. Quality changes

64. As far as possible, the same item should be priced in each period. However, in practice, items that can be observed at different time periods may differ with respect to package sizes, weights, volumes, features and terms of sale as well as other characteristics. Thus it is necessary to monitor the relevant characteristics of the items being priced to ensure that the impact of any changes in quality/utility can be excluded from the observed prices and pure price change⁸ can be estimated.
65. Identifying possible changes in quality/utility is relatively more difficult for complex durable goods and services. It is necessary, therefore, to collect a considerable amount of information on the relevant characteristics of the items for which prices are collected. Some of this information can be obtained in the course of collecting prices, but often the most important sources of information on changing characteristics will be producers, importers or wholesalers of the goods included and the study of articles and advertisements in trade publications.
66. When a quality change is detected, an adjustment must be made to the price, so that the index reflects only pure price change. If this is not done, the index will either record a price change that has not taken place or fail to record a price change that did happen. The choice of method for such adjustments will depend on the particular goods and services involved. Great care needs to be exercised because the accuracy of the resulting index depends on the quality of this process. To assume that all price change is a reflection of the change in quality, or, on the other hand, to assume that items with different qualities are essentially equivalent, should be avoided as its could cause bias.

⁸ Annex 1

67. The methods for estimating quality-adjusted price may be:

- *Explicit (or direct) quality adjustment methods* that directly estimate the value of the quality difference between the old and new item and adjust one of the prices accordingly. Pure price change is then implicitly estimated as the difference in the adjusted prices
- *Implicit (or indirect) quality adjustment methods* which estimate the pure price change component of the price difference between the old and new items based on the price changes observed for similar items. The difference between the estimate of pure price change and the observed price change is considered as change due to quality difference.

Whenever possible, it is preferable to use one of the explicit quality adjustment methods as the implicit ones are generally considered to be less reliable and may result in biased estimates. As the explicit methods are more complex, difficult and costly to apply, their application should be directed to items with large weights and characteristics that change in ways that are easily described. For items whose characteristics change in ways that are difficult to describe and/or are not observable, indirect methods might be applied. Publishing estimates of the aggregate effects of any quality adjustments made would enhance the transparency of the compilation process.

15. Accuracy

68. CPI estimates may be subject to both sampling imprecisions and sampling and non-sampling errors⁹ arising from a variety of sources. Compilers of CPIs need to be aware of the possible sources of error, and to take steps during the index construction and compilation processes to minimise their impact.

69. The following are some well-known sources of potential error, either in pricing or in index construction, that over time can lead to significant errors in the overall CPI: incorrect selection of items and incorrect observation and recording of their prices; failure to observe and adjust correctly for quality changes, appearance of new goods and outlets; failure to adjust for item and outlet substitution (in a COLI index) or loss of representativity (in a “pure” price index); the use of inappropriate formula(s) for computing elementary aggregate and upper level indices.

70. In general, regularly updating weights and baskets, employing unbiased elementary aggregate formulae, making appropriate adjustments for quality change, allowing adequately and correctly for new products, and taking proper account of substitution issues (in a COLI index) as well as quality control of the entire production process will minimise the index’s potential for giving a misleading picture.

16. Dissemination

71. The CPI estimate should be computed and publicly released as quickly as possible after the end of the period to which it refers, and according to a pre-announced timetable. It should be made available to all users at the same time, in a convenient form, and should be accompanied by a short methodological explanation. Rules relating to its release should be made publicly available and strictly observed. In particular, they should include

⁹ Annex 3

details of who has pre-release access to the results, why, under what conditions, and how long before the official release time.

72. The index should be produced and released monthly. Where countries do not have the necessary resources and/or there is no strong user demand for a monthly series, the CPI should be prepared and released with quarterly or semi-annual periodicity.
73. The press release presenting CPI results should show the index level from the index reference period. It is also useful to present derived indices, such as the one that shows changes in the major aggregates between (i) the current month and the previous month, (ii) the current month and the same month of the previous year and (iii) the average of the latest 12 months and the average of the previous 12 months. The indices should be presented in both seasonally adjusted and unadjusted terms, if seasonally adjusted data are available.
74. Sub-indices should also be produced and released. Consideration should be given to producing sub-indices for the divisions and groups of the *UN Classification of Individual Consumption according to Purpose (COICOP)*¹⁰. Sub-indices for different regions or socio-economic groups, and alternative indices designed for analytical purposes, may be produced and publicly released if they are judged to be reliable and their preparation is cost effective.
75. Comments and interpretation of the index should accompany its publication to assist users. An analysis of the contributions of various items or group of items to the overall change and an explanation of any unusual factors affecting the price changes of the major contributors to the overall change should be included.
76. The index reference period should be changed as frequently as necessary to ensure that the index numbers remain easy to present and understand. The index reference period may be chosen to coincide with the latest weights reference period or it could be established to coincide with the base period of other statistical series.
77. Average prices and price ranges for important and reasonably homogeneous items may be estimated and published in order to support the research and analytical needs of users.
78. Retrospective corrections (for example, as a result of an error in the price observations or in the calculations) of the publicly released indices should only be made when the index estimate previously presented was sufficiently distorted to be of concern to users. Corrections should be made as soon as possible after detection and a press release prepared and released to explain the differences.
79. In order to ensure public confidence in the index, a full description of the data collection procedures and the index methodology should be published and made widely available. The documentation should include an explanation of the main objectives of the index, details of the weights, the index number formulas used, and a discussion of the precision of the index estimates, even if this is based only on subjective assessments. The precise identities of the outlets and goods and services used for price collection should not be revealed, as this could influence the representativeness of the index.

¹⁰ Annex 4

80. Users should be warned in advance of any changes that are going to be made to the scope, weights or methodology used to estimate the CPI.

17. Consultations and integrity

81. The compiling agency should have the professional independence, competence and resources necessary to produce a high quality CPI. The United Nations “Fundamental Principles of Official Statistics”¹¹ and the ILO “Guidelines concerning dissemination practices for labour statistics”¹² should be respected.

82. The agency responsible for the index should consult representatives of users on issues of importance for the CPI, particularly during preparations for any changes to the methodology used in compiling the CPI. One way of organizing such consultations is through the establishment of advisory committee(s) on which social partners as well as other users and independent experts might be represented.

83. Comparing CPI movements across countries is difficult because of the different measurement approaches used by countries of certain items, particularly housing and financial services. The exclusion of housing (actual rents and either imputed rents or acquisition of new houses, and maintenance and repair of dwelling) and financial services from the all-items index will make the resulting estimates of price change for the remaining items more comparable across countries. Therefore, in addition to the all-items index, countries should, if possible, produce and provide for dissemination to the international community an index that excludes housing and financial services. It should be emphasised, though, that even for the remaining items in scope, there are still be difficulties when making international comparisons of changes in consumer prices.

84. Countries should report national CPI results and methodological information to the International Labour Office in the format and at the frequency requested, and as soon as possible after the national release of the corresponding results.

¹¹ UN Economic and Social Council, 1994

¹² 16th International Conference of Labour Statisticians, 1998

Annex 1: Terminology and definitions

- “Consumer goods” are goods or services that are used by households for the direct satisfaction of individual needs or wants.
- “Consumption expenditures” are expenditure on consumer goods and services and can be defined in terms of “acquisition”, “use”, or “payment”:
 - “acquisition” indicates that it is the total value of the goods and services acquired during a given period that should be taken into account, whether through purchase, own account production or as a social transfer in kind received from government or non-profit institutions, irrespective of whether they were wholly paid for or used during the period; The prices enter the CPI in the period when consumers accept or agree prices, as distinct from the time payment is made.
 - “use” indicates that it is the total value of all goods and services actually consumed during a given period that should be taken into account; for durable goods this approach requires valuing the services provided by these goods during the period; The prices (opportunity costs) enter the CPI in the period of consumption.
 - “payment” indicates that it is the total payment made for goods and services during a given period that should be taken into account, without regard to whether they were delivered or used during the period. The prices enter the CPI in the period or periods when the payment is made.
- “Scope of the index” refers to the population groups, geographic areas, items and outlets for which the index is constructed.
- “Coverage” of the index is the set of goods and services whose prices are observed for inclusion in the index. For practical reasons, coverage may have to be less than what corresponds to the defined scope of the index.
- “Reference population” refers to that specific population group for which the index has been constructed.
- “Weights” are the aggregate consumption expenditures on any set of goods and services expressed as a proportion of the total consumption expenditures on all goods and services within the scope of the index in the weight reference period. They are a set of numbers summing to unity.
- “Price updating of weights” is a procedure that is used to bring the expenditure weights in line with the index or price reference period. The price updated weights are calculated by multiplying the weights from the weight reference period by elementary indices measuring the price changes between weight reference and price reference period and rescaling to sum to unity.
- “Index reference period” is the period for which the value of the index is set at 100.0. This may be a year, a quarter or an individual month.

- “Price reference period” is the period whose prices the prices in the current period are compared. The period whose prices appear in the denominators of the price relatives.
- The “weight reference period” is the period, usually a year, whose estimates of the volume of consumption and its components are used to calculate the weights.
- Probability sampling is the selection of a sample of units, such as outlets or products, in such a way that each unit in the universe has a known non-zero probability of selection.
- Cut-off sampling is a sampling procedure in which a predetermined threshold is established with all units in the relevant population at or above the threshold being eligible for inclusion in the sample and all units below the threshold being excluded. The threshold is usually specified in terms of the size of some relevant variable (such as some percentage of total sales), the largest sampling units being included and the rest excluded.
- Imputed expenditures are the expenditures assigned to an item that has not been purchased, such as an item that has been produced by the household for its own consumption (including housing services produced by owner-occupiers), an item received as payment in kind or as a free transfer from government or non-profit institution.
- Imputed price refers to the estimated price of an item whose price during a particular period has not been observed and is therefore missing. It is also the price assigned to an item for which the expenditures have been imputed, see above.
- “Outlet” indicates a shop, market stall, service establishment, internet seller or other place where goods and/or services are sold or provided to consumers for non-business use.
- “Linking” means joining together two consecutive sequences of price observations, or price indices, that overlap in one or more periods, by rescaling one of them so that the value in the overlap period is the same in both sequences, thus combining them into a single continuous series.
- “Price” is defined as the value of one unit of a product, for which the quantities are perfectly homogeneous not only in a physical sense but also in respect of a number of other characteristics.
- “Pure price change” is that change in the price of a good or service which is not due to any change in its quality. When the quality does change, the pure price change is the price change remaining after eliminating the estimated contribution of the change in quality to the observed price change.
- “Quality adjustment” refers to the process of adjusting the observed prices of an item to remove the effect of any changes in the quality of that item over time so that pure price change may be identified.
- “Consumer substitution” occurs when, faced with changes in relative price, consumers buy more of the good that has become relatively cheaper and less of the good that has become relatively more expensive. It may occur between varieties of the same item or between different expenditure categories.

Annex 2: Quality adjustment methods

Implicit quality adjustment methods

- The “overlap” method assumes that the entire price difference at a common point in time between the disappearing item and its replacement is due to a difference in quality.
- The “overall mean imputation” method first calculates the average price change for the elementary aggregate without the disappearing item and its replacement, and then uses that rate of price change to impute a price change for the disappearing item. It assumes that the pure price difference between the disappearing item and its replacement is equal to the average price changes for continuing (non-missing) items.
- The “class mean imputation” method is a variant of the overall mean imputation method. The only difference is in the source of the imputed rate of price change to period $t+1$ for the disappearing item. Rather than using the average index change for all the non-missing items in the elementary aggregate, the imputed rate of price change is estimated using only those price changes of the items that were judged essentially equivalent or were directly quality-adjusted.

Explicit quality adjustment methods

- The “expert’s adjustment” method relies on the judgement of one or more industry experts, commodity specialists, price statisticians or price collectors on the value of any quality difference between the old and replacement product. None, some, or all of the price difference may be attributed to the improved quality.
- The “differences in production costs” approach relies on the information provided by the manufacturers on the production costs of new features of the replacements (new models), to which retail mark-ups and associated indirect taxes are then added. This approach is most practicable in markets with a relatively small number of producers, with infrequent and predictable model updates. However, it should be used with caution as it is possible for new production techniques to reduce costs while simultaneously improving quality.
- The “quantity adjustment” method is applicable to items for which the replacement item is of a different size to the previously available one. It should only be used if the differences in quantities do not have an impact on the quality of the good.
- The “option cost” method adjusts the price of the replacements for the value of the new observable characteristics. An example of this is the addition of a feature that earlier has been a priced option as standard to a new automobile model.
- A hedonic regression method estimates the price of an item as a function of the characteristics it possesses. The relationship between the prices and all relevant and observable price-determining characteristics is first estimated and then results are used to estimate the effects of changes in these characteristics on prices.

Annex 3: Types of errors

- “Quality change error” is the error that can occur as a result of the index’s failure to make proper allowance for changes in the quality of goods and services.
- “New goods error” is the failure to reflect either price changes in new products not yet sampled, or given a COLI objective, the welfare gain to consumers when those products appear.
- “Outlet substitution error” can occur when consumers shift their purchases among outlets for the same item without proper reflection of this shift in the data collection for the index. Most relevant when trying to estimate a COLI.
- “New outlets error” is conceptually identical to new goods error. It arises because of the failure to reflect either price changes in new outlets not yet sampled, or the welfare gain to consumers when the new outlets appear.
- “Upper level substitution error” arises when the index does not reflect consumer substitution among the basic categories of consumption owing to the use of an inappropriate method for aggregating elementary aggregates in the construction of the overall index value. Only relevant to a COLI, although an equivalent (representativity error) may be defined from the perspective of the pure price index.
- “Elementary index error” arises from the use of an inappropriate method for aggregating price quotations at the very lowest level of aggregation. The elementary index error can take two forms: formula error and lower level substitution error. The index suffers from formula error if, as a result of the properties of the formula, the result produced is biased relative to what would have been the result if a pure price change could have been estimated. The index suffers from lower level substitution error if it does not reflect consumer substitution among the items contained in the elementary aggregate. Lower level substitution error is only relevant to a COLI.
- “Sampling imprecision ” is not an error, but a consequence of the CPI being based on samples and not on a complete enumeration of the population.
- “Selection error” arises when the sample of price observations is not fully representative of the intended population of outlets and/or items. The first four types of errors listed above can be seen as special cases of this type of error.

Annex 4: Classification of Individual Consumption According to Purpose (COICOP)¹³

01 - 12	Individual Consumption Expenditure of Households
01.0	Food and non-alcoholic beverages
01.1.0	Food
01.2.0	Non-alcoholic Beverages
02.0	Alcoholic beverages and tobacco
02.1.0	Alcoholic Beverages
02.2.0	Tobacco
02.3.0	Narcotics
03.0	Clothing and Footwear
03.1.0	Clothing
03.2.0	Footwear
04.0	Housing, Water, Electricity, Gas and Other Fuels
04.1.0	Actual Rentals for Housing
04.2.0	Imputed Rentals for Housing
04.3.0	Maintenance and Repair of the Dwelling
04.4.0	Water Supply and Miscellaneous Services Related to the Dwelling
04.5.0	Electricity, gas and other fuels
05.0	Furniture, Household Equipment and Routine Household Maintenance
05.1.0	Furniture and Furnishing, Carpets and Other Floor Coverings
05.2.0	Household Textiles
05.3.0	Household Appliances
05.4.0	Glassware, Tableware and Household Utensils
05.5.0	Tools and Equipment for House and Garden
05.6.0	Goods and Services for Routine Household Maintenance
06.0	Health
06.1.0	Medical products, Appliances and Equipment
06.2.0	Outpatient Services
06.3.0	Hospital Services
07.0	Transport
07.1.0	Purchase of Vehicles
07.2.0	Operation of Personal Transport Equipment
07.3.0	Transport Services
08.0	Communication
08.1.0	Postal Services
08.2.0	Telephone and Telefax Equipment
08.3.0	Telephone and Telefax Services
09.0	Recreation and culture
09.1.0	Recreational Equipment and Accessories
09.2.0	Recreational and Cultural Services
09.3.0	Newspapers, Books and Stationery
09.4.0	Package holidays
10	Education
10.1.0	Educational Services
11.0	Hotel, Cafes and Restaurants
11.1.0	Catering services
11.2.0	Accommodation services
12.0	Miscellaneous Goods and Services
12.1.0	Personal Care
12.2.0	Prostitution
12.3.0	Personal Effects n.e.c.
12.4.0	Social Protection
12.5.0	Insurance
12.6.0	Financial services n.e.c
12.7.0	Other services n.e.c.

¹³ Explanatory notes are available on <http://esa.un.org/unsd/cr/registry/regcst.asp?Cl=5&Lg=1>