MAIN ECONOMIC INDICATORS

COMPARATIVE METHODOLOGICAL ANALYSIS: CONSUMER AND PRODUCER PRICE INDICES

Volume 2002, Supplement 2

FOREWORD

This publication provides comparisons of methodologies used to compile consumer and producer price indices published by the OECD for its Member countries. It is the second in a series of such publications. The first publication covered industry, retail and construction indicators. A third publication covering employment and unemployment indicators will be published towards the end of 2002. These indicators are published in the monthly OECD publication, *Main Economic Indicators* (MEI).

The primary purpose of this publication and the companion publication, *Main Economic Indicators: Sources and Definitions* published in July 2000, is to provide users with methodological information underlying the short-term indicators published in MEI. Such information is essential to ensure their appropriate use in an international context by analysts. The information will also enable national statistical institutes and other agencies responsible for compiling short-term economic indicators to compare their methodology and data sources with those used in other countries. In addition, this publication also contains a significant amount of information relating to recommendations on best practice for the compilation of consumer and producer price indices. Such information will be of use to countries in the process of creating their own indicators or overhauling existing indicators.The companion publication, *Main Economic Indicators: Sources and Definitions*, provides summary descriptions of individual country methodologies used in the compilation of short-term economic indicators for Member countries and for non-member countries within the program of activities of the Centre for Co-operation with Non-Members (CCNM). The current publication differs from the sources and definitions publication in that it contains more extensive analysis of the methodologies countries use to compile short-term economic indicators published in MEI. This analysis focuses on issues of data comparability in the context of existing international statistical guidelines and recommendations published by the OECD and other international agencies such as the United Nations Statistical Division (UNSD), the International Monetary Fund (IMF) and the International Labour Organisation (ILO).

It is not intended that the methodological information in this publication should be as detailed as that provided by national institutes responsible for compiling the indicators. Insofar as possible, the publication contains information enabling the user to access more detailed methodological information available from the national compiler, particularly where such information can be accessed from websites. Nevertheless, it has not been possible to cover all methodological aspects relating to the indicators for every OECD Member country. Indeed, a secondary purpose of the publication is to highlight important areas where, for certain countries, gaps remain so that the national agencies responsible may take action to disseminate the required information with reference to what is available for other Member countries.

International data comparability is but one aspect of the broader issue of "data quality". Another important dimension of data quality given even more prominence for short-term indicators in recent years is timeliness. In particular, the growing importance of financial markets and government and non-government institutions that operate within those markets has meant even more pressure on agencies compiling and disseminating indicators to provide reliable data, on time, and as soon as possible after the reference period.

In recent years, national statistical institutes and international organisations have devoted much attention to the quality of the data they compile and/or disseminate. More often than not, the meaning of the term "quality" is taken as given, together with how the "quality" of a statistic can be described,

either to the statistics specialist or, more importantly, to the non-statistical specialist user primarily interested in the ability of the data to adequately reflect the phenomena it purports to measure. Varied approaches are applied to measuring statistical quality. These range from the identification of a set of very specific quantitative measures, to the provision of qualitative descriptions of methodologies used in the collection and compilation of the statistics. These and other issues have been the subjects of numerous conferences organised by national and international agencies.

The seemingly simple label "quality" encompasses a myriad of issues and trade-offs underlying the statistics compiled by various organisations, the complexity of which precludes any one approach being completely adequate for all statistical series, for all uses of a specific series and for all users of the data. The approach adopted in this publication is to narrow the focus to data comparability. However, even this approach is not without difficulty, for example, what specific aspects of data collection and compilation does one actually compare across countries and what impact do any differences identified really have in terms of the use of the data?

As mentioned above, the comparability of the statistical series published in MEI is undertaken in the context of existing international statistical "standards". Even this term raises the issue of what exactly is an "international statistical standard". Related issues that came to light in the process of identifying statistical standards for use in this publication were: statistical subjects (for short-term economic indicators) where international standards were either non-existent or out of date; the degree of acceptance of a set of guidelines and recommendations as constituting a "standard"; and the often general/broad terms in which the recommendations embodied in the standards are expressed. The authors acknowledge that there is no unique answer to these and other issues raised above and emphasise that the approach adopted here is an initial one.

The main authors of this publication in alphabetical order were: Béatrice Du Boys, Julien Dupont, Brian Finn and Denis Ward.

The OECD Secretariat gratefully acknowledges the contribution of the national statistical institutes and the various other national authorities responsible for short-term economic indicators, and thanks them for their co-operation. Without this assistance it would not have been possible to produce this publication.

Acknowledgement is also given to the United Nations Statistical Division, the International Labour Organisation, the International Monetary Fund and the Statistical Office of the European Communities (Eurostat) for the country methodological information used to supplement and clarify the methodological information provided directly by national statistical agencies.

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Statistics Directorate
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1. INTRODUCTION

1.1 Necessity for metadata in interpreting data

The OECD collects an extensive range of statistics from both Member and non-member countries within the programme of activities of the Centre for Co-operation with Non-Members (CCNM). The primary purpose for collecting such information is to provide the various Directorates in the Organisation with a statistical base for their economic studies of Member countries. Such studies include economic surveys and economic analyses and policy recommendations to Member governments in current areas of OECD activity. However, the statistics collected are of similar use to external agencies and institutions (government, private, academic, international, etc.). In recognition of this, the OECD also disseminates most of the information gathered via an extensive range of paper and electronic publications.

The OECD's monthly publication, *Main Economic Indicators* (MEI), provides an overall view of short-term economic developments through presentation of an extensive range of specific short-term economic indicators within each of the following subjects:

- national accounts
- production
- business and consumer opinions
- composite leading indicators
- manufacturing
- construction

- domestic demand
- labour market indicators
- prices
- finance
- foreign trade
- balance of payments

These indicators are important instruments for the formulation of economic policy at the national level and for use by international organisations such as the OECD, IMF, Eurostat and the European Central Bank (ECB). They are well known, widely collected and used extensively by countries and international organisations.

In addition, the methods for their collection and compilation are usually well established and documented within each country and in statistical methodological information compiled by international organisations such as the IMF for their Special Data Dissemination Standard (SDDS). Even so, the methodologies used are not always transparent for a large number of users. In some cases, this may lead to misinterpretation of statistical data and a misunderstanding of economic phenomena, especially when making international comparisons. Undertaking such comparison requires access to statistical methodological information (also commonly referred to as "metadata") that outlines definitions, sources and methods of compilation, etc., of the indicators in question so that cross-country comparability (or rather limitations to it) can be understood.

1.2 Aim of this publication

This publication is the second in a series presenting comparisons of methodology used in the compilation of key short-term economic indicators published in MEI. In this edition, the comparisons are restricted to consumer and producer price indices. The first edition covered industry, retail and construction indicators. A third publication covering employment and unemployment indicators will be published towards the end of 2002. Subsequent editions will provide similar comparisons for labour

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force earnings; business and consumer opinions; composite leading indicators; foreign trade; and finance.

The main elements used in the comparison of national practices for key indicators published in MEI covered in this publication are:

- existing international statistical guidelines and recommendations for short-term economic indicators;

- target definitions derived from those international standards;

- summaries of statistical methodological information outlining current national practices in individual countries;

- the list of MEI target short-term economic indicators (*i.e.* what the OECD would like to collect for each country); and

- the MEI data inventory that outlines what the OECD actually collects and disseminates.

These elements are used in comparisons of current national statistical practices such as those presented in this publication and in reports and assessments on other aspects of data quality.

The relationship between these elements is illustrated in Diagram 1.

Diagram 1: Elements in the comparison of MEI short-term economic indicators
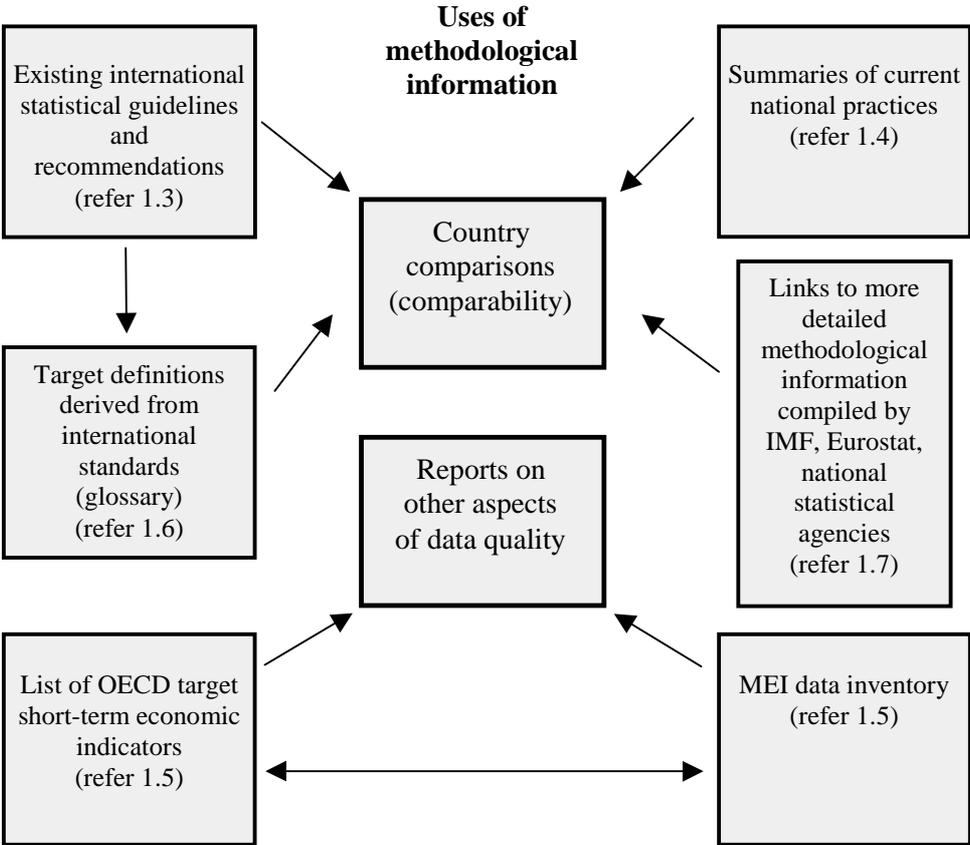
Existing international statistical guidelines and recommendations are the source of the definitions for the MEI target short-term indicators, *i.e.* the short-term economic indicators that the OECD would like to publish for each Member country. The MEI data inventory provides a detailed list of what the OECD actually publishes for those countries, received either directly or via other international organisations. Current national practices regarding the compilation of each short-term economic indicator are provided by national agencies (again received either directly or via other international organisations) in the form of statistical methodological information.

All five components in the above diagram are used in the comparisons provided in subsequent parts of this publication. These comparisons comprise:

- a description of the indicator, and background information on the context and use(s). Such information often provides an insight into areas and issues that impact on the comparability of the indicator, an indication to users on how data may be used, limitations to the use of the data, etc.;

- an outline of specific existing international statistical guidelines and recommendations;

- relevant data specifications and definitions and other information on the indicators actually collected from Member countries;

- summary comparison tables outlining key methodological aspects of current national practice for each of the indicators in this publication (*i.e.* consumer and producer price indices);

- the Internet address of detailed methodological information provided on websites by national agencies and other international organisations (most notably the IMF on their Dissemination Standards Bulletin Board (DSBB) and Eurostat).

Resource constraints preclude comparisons of all the methodological issues involved in the collection, compilation and presentation of the indicators compared in this publication. Those included in the comparison tables are (subjectively) thought to have the greatest impact on data comparability. They vary for each MEI series.

1.3 International guidelines for short-term economic indicators

Over the last two or three decades an extensive range of guidelines and recommendations for most of the short-term economic indicators published in MEI have been prepared by international organisations working with national statistical institutes and other agencies responsible for their compilation and dissemination. The main objective of such guidelines and recommendations is the development of best practice in the collection, compilation and presentation of the indicators. The use of best practice also contributes towards making the indicators more comparable. The content of the guidelines varies although they normally include a number of dimensions such as definitions of key terms, classifications and recommendations on best practice for the collection, compilation and presentation of statistics.

Where they exist, key methodological items within existing international statistical guidelines (generally those developed by the United Nations Statistical Division (UNSD) and the International Monetary Fund (IMF)) have been used as the basis for across-country comparisons in this publication.

A comprehensive list of current international guidelines and recommendations is maintained by UNSD on their website, *Methodological Publications in Statistics* (http://esa.un.org/unsd/progwork).[1] The list includes international guidelines relevant for almost all of the short-term indicators published in MEI. The list is useful in its own right as it provides ready access to what commentators generally refer to as "international statistical standards". It also helps identify areas where standards are non-existent or out of date. Finally, it provides a reference for those wishing to know whether existing standards are currently being developed or modified. Reference in this publication has also been made, where appropriate, to recommendations of the Statistical Office of the European Communities (Eurostat).[2] These are also included on the UNSD site.

The majority of indicators published in MEI have been prepared by national agencies primarily to meet the requirements of policy departments within their own country. In most instances, the indicators have been developed within international guidelines and recommendations. However, because of resource constraints or specific national requirements, national practices sometimes depart from these guidelines. These departures may impact on the comparability of statistics compiled by different countries. The operative word is "may", as some departures from international guidelines could, in fact, have little actual impact on comparability, particularly at the broad aggregate level. It should also be emphasised that national departure from international guidelines and recommendations is not necessarily an indication of diminished data quality as a whole, especially from the perspective of national users.

Examination of the comparison tables in this publication, and in subsequent publications in this series, will show that methodologies used for compiling most of the statistical series presented in MEI are not completely comparable across countries. The extent of comparability varies from series to series. For some series (*e.g.* producer price indices (PPIs), hourly earnings) the differences are significant, for others less so. The tables illustrate the point that international statistical comparability, whilst a desirable goal for cross-country analysis, is seldom achieved. In many instances, the most that can be achieved is for countries to compile series within the broad boundaries of existing international statistical guidelines and recommendations, and provide sufficient methodological information to enable the user to assess whether differences in methodology have any significance in relation to the analysis on hand.

1.4 Statistical methodological information for international comparisons

Much of the discussion on the reliability of statistics centres on issues of "data quality". Without going into too much detail on what is meant by the term, it is sufficient to say that it embodies a number of dimensions including relevance, accuracy, credibility, timeliness, punctuality, accessibility, interpretability, coherence, cost-efficiency [3] and, in the international context, comparability.[4]

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[1] Existing international classifications are also listed on a Eurostat site- http://europa.eu.int/comm/eurostat/ramon

[2] Eurostat guidelines, delivered in the form of "Council Regulations", are binding for European Union member countries and are therefore normally more specific with regard to the statistical characteristics of data than recommendations issued by other international organisations. These Regulations are also being adopted by many eastern and southern European countries as part of the process for gaining membership to the European Union.

[3] *Quality Framework for OECD Statistics*, presented at the OECD meeting of the High Level Group on Statistics, Paris,13 June 2002. Available at http://www.oecd.org/doc/m00029000/m00029990.doc

[4] Issues relating to data quality and international comparisons are described in detail in the paper, *International Comparability and Quality of Statistics,* Raoul Depoutot and Philippe Arondel, published September 1998 in the proceedings of an international conference on Analysis of Economic (Micro) Data 1997 (CAED97) held at Bergamo, Italy, on 15-17 December 1997. This paper outlines a number of approaches to the issue of international statistical comparability. These comprise the:
"uniform approach" which entails attempting to define exactly the same concepts and the same measurement process to produce output as though it were produced in the same country;

In recent years greater emphasis has been given to the importance of ensuring that statistics published by international organisations, national statistical institutes and other agencies are accompanied by adequate methodological information. The provision of such methodological information arises from a desire to lend transparency to the data so that the typical end-user can make an informed assessment of their usefulness and relevance to his or her purpose. However, the notion of the end-user referring to detailed methodological information is somewhat idealistic and seldom occurs in reality. In recognition of this, the approach for presenting methodological information for MEI is similar to one described by Eurostat[5] in that such information is best presented as layers within a pyramid.

In the model presented in Diagram 2, for any specific statistical series (*e.g.* CPI, PPI, industrial production index, unemployment rate, etc.) methodological information describing the data becomes more detailed as one moves down from the apex of the pyramid. A brief description of each layer in the pyramid in the context of MEI is provided below:

- Table headings and footnotes – Are an integral part of each statistical table published in MEI. The aim is to make table headings clear and as brief as possible. Footnotes are also kept to a minimum and are restricted to those essential for an understanding of the data.

- Explanatory notes – Are provided at the back of the MEI paper publication. They provide a brief general description of the indicator and an outline of key issues that can impact on the use of the data. In the main, the explanatory notes in MEI do not provide much detail on individual country methodology/practices.

- Sources and definitions – Provide a brief outline of current national practices for each country summarised under four broad headings (definition, coverage, collection and calculation). Sources and definitions metadata are published in a paper publication, on the OECD website (http://www.oecd.org/std/meimeta.pdf) and in the MEI CD-ROM where it is updated monthly. Sources used for updating the methodological information are national publications and national statistical agency websites, other international organisations and, in relatively few instances, direct contact with national data providers. The latest paper edition of the OECD publication, *Main Economic Indicators: Sources and Definitions*, was released in July 2000.[6]

- Sources and methods – Contains more detailed methodological information on individual country practices collected and disseminated on the basis of a detailed model, template or prompt points. Such models consist of a standard list of methodological items that can be used to describe a statistical series. These encompass the whole range of methodologies involved in describing the source, concepts and coverage, data collection, data manipulation, etc., for the compilation of a short-term economic indicator. There are a finite number of methodological elements that describe a statistical series, from design of the collection frame, actual collection, processing, manipulation, to presentation and dissemination. Unfortunately, the combination and permutations of such methodological elements have yielded an almost infinite number of methodological templates or models developed by different international organisations and national agencies. Examples of

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"subsidiarity approach" which relies on national statistical institutes producing data using national methodologies and producing reports on the dimensions of quality including comparability;

"modelling approach" for which international organisations produce more comparable estimates using econometric techniques;

"metadata approach" which entails using extensive methodological information collected from national sources to highlight the comparability or lack of comparability of a statistical series.

The current publication relies on the metadata approach.

[5] In the paper, *The Metadata Problem in a European Context*, written by Steven Vale and Marco Pellegrino for the Eurostat Workshop on Statistical Metadata, Luxembourg, 14-15 February 2000.

[6] This publication also outlines the conceptual basis of a range of methodological issues relevant to the presentation of statistics in MEI, *e.g.* seasonal adjustment, zone aggregation, index linking, etc.

widely used methodological templates are those developed by the IMF for the Dissemination Standards Bulletin Board at http://dsbb.imf.org/.[7]

Examples of sources and methods publications are the various methodological publications produced by the OECD for CPI, PPI, construction price indices, labour and wage statistics and domestic finance statistics. These are located on the OECD website at http://www.oecd.org/std/meta.htm. The IMF, ILO and Eurostat have also published sources and methods methodological information on short-term indicators.[8]

- Methodological information disseminated by national statistical institutes in publications and/or on websites. These are potentially the source of the most detailed methodological information available. Some (though not all) OECD Member countries publish very detailed concepts, sources and methods for a number of their key economic indicators. The need for provision of more extensive methodological information, and its accessibility to users through dissemination on the web, is now receiving greater recognition.[9] However, the national practices of OECD Member countries in this area vary considerably with regard to the amount of methodological detail provided on their websites (even in the national language), frequency of updating, its proximity to the statistics it describes and ease of access by users.

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[7] The DSBB provides templates (or prompt points) for: quarterly national accounts; industrial production indices; employment; unemployment; wages/earnings; consumer prices; producer prices/wholesale prices; general government operations; central government operations; central government debt; analytical accounts of banking sector; analytical accounts of central bank; interest rates; stock market share index; balance of payments; international reserves; merchandise trade; population, fertility and mortality statistics.

[8] For example, the IMF provides detailed methodological summaries on its Dissemination Standards Bulletin Board (DSBB) website at http://dsbb.imf.org. Examples of detailed metadata published by the ILO includes the *Statistical Sources and Methods* series published for CPI; employment, wages and hours of work (establishment surveys); economically active population, employment, unemployment and hours of work (household surveys). Eurostat has also published an extensive range of detailed methodological publications for industry statistics, services statistics and household labour force surveys.

[9] Examples of such publications include: concepts, sources and methods publications produced by the Australian Bureau of Statistics for CPI, balance of payments, PPI; metadata publications produced by Statistics Canada for CPI, labour force surveys; Statistics New Zealand for PPI, CPI, balance of payments, quarterly national accounts; US Bureau of Labour Statistics in its *Handbook of Methods* for PPI, CPI, household labour force surveys, and compensation surveys. This list is by no means exhaustive.

Diagram 2: Metadata dissemination model
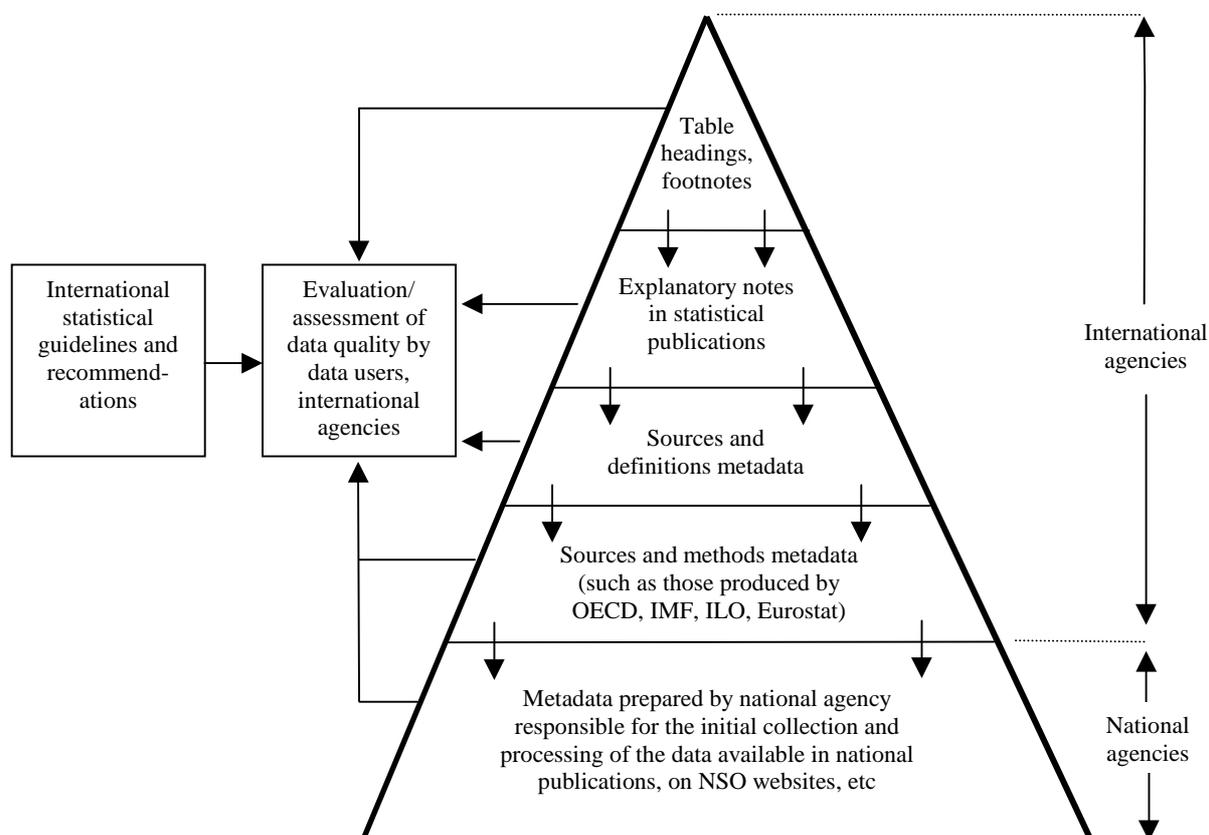
Most users of methodological information disseminated by the OECD and other international agencies in the context of the dissemination model outlined above (in Diagram 2), merely access the top layer. If they require more detailed information on specific methodological aspects to determine the relevance of the data to their requirements, they may have to search through succeeding layers where more detailed methodological information is provided. They may ultimately need to refer to methodological information disseminated by national agencies.

The normal role of the statistician, in relation to statistical methodological information, primarily entails its collection, verification and dissemination. To this should be added the task of giving it structure and providing a clear path that enables users to dig as deeply as necessary without being buried in enormous amounts of text. In addition to helping others make use of statistical methodological information, statisticians in international organisations (and elsewhere), also use it in evaluations and assessments of data quality and comparability.

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1.5 Target indicators for *Main Economic Indicators*

Over the last two decades there has been a trend towards greater convergence in national practice as a result of (i) the development of international statistical standards and their implementation by national agencies, and (ii) improved and more extensive communication between national and international agencies. The emergence of greater economic interdependence between countries and trading blocs, and the resulting demand by users for more comparable statistics and improved methodological transparency, has provided a significant catalyst for this trend.

As will be shown in the comparison tables presented in subsequent Parts of this publication, there is no such thing as complete data comparability between countries owing to methodological differences in national practice arising out of a combination of historical and cultural factors. As mentioned earlier, the real impact and significance of differences in methodological practice between countries is dependent to a large extent on the use of the data. However, it is fair to say that many of the main "headline" short-term indicators are sufficiently comparable to enable broad comparisons of changes in level between countries, particularly where the emphasis is on comparison of period to period changes in levels.

Ideally, the indicators provided by Member countries should be as comparable as possible between countries to facilitate comparison of economic phenomena. In this regard, the series presented in Part One of MEI, *Indicators by subject*, facilitate broad comparisons across countries. However, in many cases, "comparable" series are not available and practicality demands that the OECD often has to accept the next best solution, namely "common" series with associated methodological information. "Common" series are presented in Part Two of MEI, *Indicators for OECD Member countries*. These series can differ significantly in scope, coverage, definition, etc., and comparisons are meaningless unless methodological information is available and understood. Facilitating more transparent comparability through the use of methodological information provided by the national agencies responsible for the initial collection and compilation of the indicators is one of the main aims of this publication.

MEI includes a wide range of specific short-term indicators within each of the subjects listed above in Part 1.1. Table 1 below contains a list of "target" indicators sought by the OECD for inclusion in the monthly publication. No one Member country compiles all the indicators in the list to meet the requirements of its main national users. The main objective of the list is to provide focus for OECD requests to Member country agencies and other international organisations for MEI data and methodological information. Such focus is necessary to ensure the collection of a range of indicators "common" to as many Member countries as possible. Obviously, the list needs to be revised at regular intervals as priorities change and new topics of interest to users emerge.

The target indicators in Table 1 are a draft list of what the OECD would like to collect for inclusion in MEI, in either Part One or Part Two. Another list of what the OECD actually collects and disseminates in both paper and electronic media is provided in the MEI Inventory available on the Internet (http://www.oecd.org/std/meiinv.pdf).

Table 1: List of target short-term economic indicators for *Main Economic Indicators*[1]

National accounts
1. GDP (value)
2. GDP (volume)
3. Implicit price level

Production
4. Industry excluding construction
5. Manufacturing
6. – Consumer goods: total
7. – Consumer non-durable goods
8. – Consumer durable goods
9. – Investment goods
10. – Intermediate goods including energy
11. – Intermediate goods excluding energy
12. – Energy
13. Construction
14. Services
15. Rate of capacity utilisation

Commodity output
16. Cement
17. Crude steel
18. Crude petroleum
19. Natural gas
20. Commercial vehicles
21. Passenger cars

Manufacturing - sales (volume)
22. Total
23. – Domestic
24. – Export
25. Consumer goods: total
26. – Consumer non-durable goods
27. – Consumer durable goods
28. Investment goods
29. Intermediate goods including energy

Manufacturing - new orders (volume)
30. Total
31. – Domestic
32. – Export
33. Consumer goods: total
34. – Consumer non-durable goods
35. – Consumer durable goods
36. Investment goods
37. Intermediate goods including energy

Manufacturing - stocks (volume)
38. Total
39. Finished goods
40. Work in progress
41. Intermediate goods

OECD composite leading indicator
42. Trend restored
43. 6-month rate of change (annual rate)

Construction
44. Orders/Permits: total construction
45. Orders/Permits: residential
46. Work put in place: total construction
47. Work put in place: residential

Business tendency surveys
48. Industrial business climate
49. Industrial production: future tendency
50. Industrial orders inflow: tendency
51. Industrial order books: level
52. Industrial finished goods stocks: level
53. Industrial export order books or demand: level
54. Industrial rate of capacity utilisation
55. Industrial employment: future tendency
56. Industrial selling prices: future tendency
57. Construction orders inflow: future tendency
58. Construction employment: future tendency
59. Retail/wholesale: present business situation
60. Retail/wholesale business situation: future tendency
61. Retail/wholesale stocks: level
62. Other services: present business situation
63. Other services business situation: future tendency
64. Other services employment: future tendency

Consumer tendency surveys
65. Consumers confidence indicator
66. Consumers expected inflation
67. Consumers expected economic situation

Retail sales
68. Total retail sales (value)
69. Total retail sales (volume)
70. New passenger car registrations (level)

International trade
71. Imports c.i.f. or f.o.b. (value)
72. Exports c.i.f. or f.o.b. (value)
73. Net trade (value)
74. Imports c.i.f. or f.o.b. (volume)
75. Exports c.i.f. or f.o.b. (volume)
76. Import prices
77. Export prices

Labour
78. Employment: total
79. – Employment: agriculture
80. – Employment: industry
81. – Employment: services
82. Total employees
83. – Part-time employees
84. – Temporary employees
85. Total unemployment (level)
86. Total unemployment (rate)
87. Unemployment: short-term index
88. Worked hours
89. Job vacancies

Wages
90. Hourly earnings: all activities
91. Hourly earnings: manufacturing
92. Unit labour costs: manufacturing

Producer prices
93. Total
94. Manufacturing
95. – Consumer goods
96. – Investment goods
97. – Intermediate goods including energy
98. – Intermediate goods excluding energy
99. – Energy
100. Food
101. Services

Consumer prices
102. Total
103. Food
104. All items less food and energy
105. Energy
106. All services less rent
107. Rent
108. National core inflation

Domestic finance
109. Narrow Money
110. Broad Money
111. Domestic credit to total economy
112. New capital issues
113. Fiscal balance
114. Public debt

Balance of payments
115. Current account balance
116. – Balance on goods
117. – Balance on services
118. – Balance on income
119. – Balance on current transfers
120. Capital and financial account balance
121. – Reserve assets
122. Net errors and omissions

Interest rates – share prices
123. 3-month interest rate
124. Prime interest rate
125. Long-term interest rate
126. All shares price index

Foreign finance
127. US dollar exchange rate: spot
128. Euro exchange rate: spot
129. Reserve assets excluding gold

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[1] This target list is based on priorities as of December 2001. As stated in the main text, such a list needs to be revised at regular intervals as priorities change and new topics of interest to users emerge.

1.6 Target definitions for MEI target indicators

In addition to the list of target indicators provided above, the OECD has also published a glossary[10] containing "target definitions" for many of the indicators published in MEI. These are derived from existing international statistical recommendations and guidelines. It is stated in the Glossary that "national practices, methodologies and concepts used in the actual compilation of data by OECD Member countries may (and frequently do) depart from these standards for a number of reasons". In the context of using methodological information to make across country comparisons, it is important to remember that such departures do occur. Moreover, even the use of the same definition does not always guarantee a harmonised or uniform interpretation of that definition by different countries. In this current publication, national departures from standard international definitions have been highlighted whenever possible.

The definitions used in the compilation of the glossary were drawn from the international statistical standards located on the UNSD database referred to above. Extensive use was also made of glossaries published by international agencies. Examples of these include the OECD publication, *System of National Accounts, 1993: Glossary*,[11] and Eurostat's CODED Glossary.[12]

In most instances, the definitions in the OECD Glossary of Statistical Tersm are extracted word for word from the relevant international statistical recommendation or guideline. The glossary also provides precise reference information for each definition. The practice of direct quotation from the standard has been adopted to enable the user to refer to the actual guideline document when further information and/or context are required. In some instances, brief context information is also provided for background information, outlining the use of the concept, etc.

1.7 Collection of methodological information for this publication

The OECD currently is looking at ways of streamlining the collection and maintenance of methodological information through more effective co-ordination with other international agencies (in particular IMF, ILO, Eurostat and UNSD). Essentially, this entails the inclusion of links (hyperlinks) in OECD metadata to more detailed methodological information maintained by other international organisations and national agencies in lieu of direct collection by the OECD for MEI. Extensive use of this approach was made in the preparation of the current publication.

There was significant co-operation with national agencies of OECD Member countries, notably national statistical institutes and central banks. Wide use was also made of methodological descriptions provided by these agencies in national publications and on the Internet. Some information was drawn from other sources, for example, information collected by international organisations such as the IMF, ILO, UNSD and Eurostat. In a few instances, direct contact was made with national agencies, usually to verify a specific aspect of methodology.

Finally, extensive material was obtained from papers prepared by OECD staff members for presentation at the Joint OECD-Economic and Social Commission for Asia and the Pacific (ESCAP) Workshop on Key Economic Indicators, held in Bangkok on 22-25 May 2000.

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[10] Refer to OECD Glossary of Statistical Terms at http://cs3-hq.oecd.org/scripts/stats/glossary/index.htm
[11] The preparation of this glossary (published in 2000) entailed extensive input from UNSD, IMF, World Bank and Eurostat. It is available on the OECD website at http://www.oecd.org/std/nahome.htm
[12] Refer to http://forum.europa.eu.int/Public/irc/dsis/bmethods/info/data/new/main_en.htm

It is important to note that the information in the publication was accurate when the original research was carried out. The information was again checked just prior to publication. However, the compilation practices of Member countries are constantly evolving and given the wide range of subject matter and the number of countries covered, it is likely that methodological changes will occur over time, thus affecting the accuracy of the information contained herein.

1.8 Conclusions

As mentioned above, the focus of this publication is the presentation of comparisons of national practice in OECD Member countries in the compilation of consumer and producer price indices. It does this by comparing (in a series of comparison tables) current national practice in important aspects of methodology subjectively believed to have particular impact on the comparability of price indices produced by Member countries. In addition, this volume also contains a significant amount of information relating to recommendations on best practice for the compilation of consumer and producer price indices. Such information will be of use to countries in the process of creating their own indicators or overhauling existing indicators.

The methodological information obtained from national agencies and other international organisations was thus sought for a purpose that is probably more specific to the needs of an international organisation such as the OECD, *i.e.* assessment of the comparability of national indicators. The recommendations on best practice should nonetheless be of use to national organisations. The exercise required use of national metadata that was in most cases intended originally to give transparency to the statistics to national users. The process of preparing the comparison tables highlighted the limitations of currently available metadata for use in international comparisons. These limitations stem from problems of accessibility, differences in semantics (the same term does not necessarily have the same meaning) and the fact that national agencies frequently describe different aspects of the statistical production cycle. It is often difficult to obtain metadata for all 30 OECD Member that describes the same methodological element.

The current publication falls well short of describing in any quantitative way the actual significance that identified differences in national practices have with respect to each of the indicators described. However, not withstanding these issues, it is possible for users to draw some conclusions regarding the comparability of the indicators described from the information provided in this publication. The significance of the differences identified can really only be made in the context of a specific use of the data.

1.9 Feedback on contents

The OECD welcomes your comments on this publication and suggestions for improvement with respect to contents and presentation. Feedback can be provided by mail, fax or Internet to:

OECD Statistics Directorate
2, rue André Pascal
75775 PARIS Cedex 16
E-mail: stat.contact@oecd.org
Fax: + 33 (1) 45 24 96 57

2. CONSUMER PRICES[13]

2.1 Introduction

The study of price change is central to the analysis of macroeconomic conditions. Consumer price indices (CPIs) are one of the key indicators of price changes. A consumer price index measures changes over time in the general level of prices of goods and services that a reference population acquires, uses or buys for consumption. The main uses of a CPI identified in the ILO's Manual on Consumer Price Indices[14] are:

- as a general measure of inflation – an important element of macro-economic analysis, particularly where inflation targets are a key element of monetary policy;

- indexation by government – for the escalation of pensions, wages, benefits, etc. to compensate the recipients for changing prices, thus maintaining the purchasing power of their income; for the escalation of government bonds; and for the adjustment of tax thresholds;

- price and wages and salary adjustments in private contracts;

- current cost accounting – the CPI is generally not ideal for revaluing fixed assets but is often used in the absence of a better indicator;

- national accounts deflation – to derive expenditure or income at constant prices (in real terms);

- retail sales deflation.

In broad terms, three generic types of CPI could be envisaged to meet these uses: indices of inflation, compensation indices, and deflators (*e.g.* for national accounts, retail sales, etc).

At the end of 1996, publication of the Boskin Commission Report[15], which criticised the United States CPI, ignited international debate concerning the differences between the concepts of inflation and the cost of living. The United States CPI was criticised for inadequately reflecting changes that impacted significantly on the cost of living to the extent that it was biased upwards. It identified possible sources of bias such as substitution bias, retail outlet substitution bias, quality bias, and new goods bias. Admittedly, the United States is an unusual case in stating that "the cost of living concept is the measurement objective" for its CPI. Almost all other countries avoid mentioning the phrase "cost of living", instead referring to "change in prices experienced by households" or "change in expenditure required to purchase a fixed basket of goods and services typically purchased by households". So, what is meant by the terms "inflation" and "cost of living" and is there a difference between the two?

An economist's definition of inflation might be along the lines of "persistent increases in the general level of prices. It can be seen as a devaluing of the worth of money. A crucial feature of inflation is that price rises are sustained. A once-only increase in the rate of VAT will immediately put

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[13] The text on conceptual issues outlined in this chapter was drawn extensively from the paper, *Consumer Price Indices*, F. Maitland-Smith, presented at the Joint OECD-ESCAP Workshop on Key Economic Indicators, held in Bangkok on 22-25 May 2000.

[14] *Consumer Price Indices: An ILO Manual*, Turvey, R. et al., International Labour Organization, Geneva, 1989, pp 4-6.

[15] *Toward a More Accurate Measure of the Cost of Living*, *Final Report to the Senate Finance Committee from the Advisory Commission to Study the Consumer Price Index*, Boskin et al, December 4, 1996.

up prices, but this does not represent inflation, unless the indirect effects have repercussions on later periods."[16] The same economist might provide a more theoretically precise definition of a cost of living index as "a comparison of the minimum expenditure required to achieve the same level of well-being (also known as welfare, utility, standard of living) across two different sets of prices. Most often it is thought of as a comparison between two points of time."[17]

The two concepts are linked since inflation will cause a cost of living index to rise. However, a cost of living index will show movements both as a result of changing prices and changing expenditure patterns, whereas inflation in its broadest sense is concerned only with changing prices. In very general terms, a cost of living index might be a more appropriate tool for negotiating income changes, and an inflation index might be preferred for macro-economic policy analysis. This is the tension at the heart of the CPI bias debate ignited by the work of the Boskin Commission.

2.2 CPI indicators in the MEI

Many OECD countries try to satisfy the differing needs of their many CPI users by deriving a "family" of indices with differing coverage, headed by a single wide-ranging official (headline) CPI relevant to the country as a whole. In addition to the headline CPI, which has the widest coverage possible, subsidiary indicators are published which may relate to:

- sub-sectors of the population, *e.g.* employees, employees with children, low income employees, pensioners, etc;

- geographical regions;

- attempts to measure "underlying" or "core" inflation by removing certain sub-sectors of volatile items such as: food, energy[18] or seasonal goods; items affected by interest rates or taxes; or by making adjustments, *e.g.* seasonal adjustments, adjustments for taxes and subsidies, or using trimmed means to minimise the effects of the most extreme changes;

- specific commodity groups - detailed sub-indices of the overall CPI published.

In effect, many national statistical institutes are moving towards a model of maintaining a database of prices and weights from which a range of subsidiary indices are derived. As international standards are developed, it is hoped that their official (headline) CPIs will become more comparable to other national CPIs in terms of coverage and methodology.[19]

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[16] Penguin *Dictionary of Economics*, 4th Edition, 1987.

[17] *Toward a More Accurate Measure of the Cost of Living*, *Final Report to the Senate Finance Committee from the Advisory Commission to Study the Consumer Price Index*, Boskin et al, December 4, 1996.

[18] This is the approach used by the OECD with the measure of underlying inflation being calculated by deducting both food and energy from the All items index. Further work on considering other definitions of core inflation and other techniques of a more econometric nature may be possible in the future.

[19] When attempting to compare price change across countries, it should also be recognised that the use of the term "All items" in the national CPI of each country is not an indication of perfect comparability. Each country compiles its CPI using similar approaches but differences in the range of goods and services included in the index, the treatment of certain difficult items such as housing costs, different aggregation formula and differences in the sources of data for weights will lead to different CPIs, with reduced comparability. Since the choices made by each country will depend on national circumstance, it is a matter of recognising such differences if comparisons across countries are made. Such is the purpose of this publication. The publication *Sources and Methods: Consumer Price Indices*, OECD, Paris, 1994 also helps to explain many of the issues involved.

The MEI publication contains a range of indicators of consumer price changes for OECD member countries and for the country groupings or zones. The main target indicators for which data are currently published are: all items; food; energy; all items non-food non-energy; total services less housing; and housing. It is also intended to focus on national core inflation in the future. In addition to the target indicators, there are also a number of country specific series where such series may be particularly relevant to one or more Member countries. The last addition, from July 1999, to the range of consumer price indicators was the inclusion of the European Union's Harmonised Indices of Consumer Prices (HICP) for 17 European countries.

2.3 Harmonised Indices of Consumer Prices - HICPs

Within the European Union, HICPs are consumer price indices compiled on the basis of a harmonised coverage and methodology. They have been developed under the general direction of Eurostat following the enactment of the Treaty on European Union signed at Maastricht, which, inter alia, required comparable measures of inflation across the Union. Since the commencement of European Monetary Union in January 1999, the European Central Bank (ECB) uses HICPs as the key inflation measure for the Euro area.

HICPs are now compiled on a monthly basis by all members of the European Union, and by Norway and Iceland. A number of other countries including Switzerland, Poland, Hungary and the Czech Republic are in the process of developing estimates of price change according to the rules set out for the construction of HICPs. The aim of producing comparable measures of price change has been largely achieved with agreement reached on the range of items to be included in the index, the formula to be used at each stage of calculation and the frequency of updating weights for the index. While work is still underway to refine the HICP framework to make it more comparable and inclusive, HICPs represent the most comparable measures of price change across countries. More detailed information on the methods of construction of HICPs can be obtained from Eurostat.[20]

Importantly, the HICPs have been constructed with the aim of measuring monetary inflation rather than measuring the broader concept of the cost-of-living, which has a more welfare-oriented philosophy. One of the consequences of this is that interest rate changes, which may be considered relevant in a measure of price change for indexing pensions, are not included in the HICP.

Overall, care must be taken when considering which measure of price change best suits a particular use. Indeed, the differences in CPI scope resulting from differing national uses and requirements have meant that all European Union countries except Luxembourg have continued to publish their national CPIs as well as producing monthly HICPs. MEI also continues to publish national CPIs in its subject and country pages and clearly labels HICP series where they are used.

2.4 Measuring Underlying Inflation in MEI

As mentioned above in Part 2.2, the OECD compiles a measure of underlying inflation that excludes from the all items index the prices of energy and food items. The series for all items, food, energy and underlying inflation (all items non-food non-energy) are presented for various groupings of countries in the CPI subject page in Part 1 of the MEI. These series are also shown for nearly all

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[20] More detailed information about HICPs can be found on the Eurostat website at
http://europa.eu.int/comm/eurostat/newcronos/info/notmeth/en/theme1/euroind/cp/cp.htm. See also The *European Union Harmonised Indices of Consumer Prices*, J. Astin from Statistical Journal of the United Nations Economic Commission for Europe Volume 16, 1999, pages 123-135.

countries in the country pages in Part 2 of the MEI. In recent years, it had become increasingly difficult to collect the detailed information required to estimate both the energy series and the underlying inflation series owing to the lack of consistency between national definitions of energy. However, since November 2001, both the energy and food series published in MEI are, for most OECD Member countries, based on a Classification of Individual Consumption by Purpose (COICOP) definition. Thus, these series and the underlying inflation series follow a common definition. However, there are a number of exclusions and attention should be paid to the use of proxy series as outlined in MEI metadata when users undertake analysis of area totals.[21]

2.5 Zone estimates of CPI in the MEI

In addition to information on national measures of price change, the OECD compiles estimates of price changes for a number of zones, namely the G7, EU15, Euro area, OECD Europe and OECD Total. In addition, two zones are adjusted to exclude the effect of countries that, owing to their high inflation relative to other Member countries have a substantial impact on the zone estimates in which they are included. These zones are "OECD Europe excluding high inflation countries" and "OECD Total excluding high inflation countries". [22]

The estimates are compiled by aggregating the national CPI indices in each period using estimates of Household Private Final Consumption Expenditure (HFCE) as weights. The HFCE for each country is converted into a common currency (US dollars) using Purchasing Power Parities (PPPs) which are rates of currency conversion that eliminate the differences in price levels between countries. The PPP used in the zone estimates relate specifically to HFCE and are not the same as the PPP for GDP, which are more commonly available.

The weights used to compile the zone estimates are updated each year, usually in the July edition of MEI. Owing to the process of updating weights resulting from changes in the underlying national accounts data, the zone estimates are subject to revision even though national CPIs are rarely revised themselves. The main reason for updating the weights annually as opposed to aggregating with weights from a particular base year is to allow for the changing importance of a country within a zone over time. More specifically, the zone indices estimated in MEI are chain-linked Laspeyres indices, though only at the highest level of aggregation. This type of index is calculated in a two-stage process where each sub-index during one particular year of the index, say 1998, is re-referenced so that 1997=100 and then aggregated using the weights from the previous year, *i.e.* 1997 in this example. This forms a single link of length one-year. Next, each link is joined together to create a smooth time series back to a common year, currently 1995=100. Since weights are usually available with some time lag (around one year), estimates of the zone for the latest periods continue to use the most recently available weights until new data are available.

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[21] The target series for food is "food and non-alcoholic beverages" defined as COICOP 01. This excludes restaurant meals as well as alcoholic beverages, tobacco and other narcotics. The target series for energy incorporates the COICOP classification for "electricity, gas and other fuels" (COICOP 04.5) and the COICOP classification for "fuel and lubricants for personal transport equipment" (COICOP 07.2.2). Any exceptions are highlighted in MEI.
[22] The high inflation countries are Hungary, Mexico, Poland and Turkey.

2.6 Frequency of consumer price indices

As Table 2 shows, most OECD Member countries compile consumer price indices on a monthly basis. Australia and New Zealand compile quarterly indices. The indices for all Member countries are compiled and disseminated by their national statistical institutes.

Table 2: Consumer Price Indices: source agency and frequency

	Source agency	Frequency
Canada	Statistics Canada	M
Mexico	National Institute of Statistics, Geography and Information	M
United States	Bureau of Labor Statistics	M
Australia	Australian Bureau of Statistics	Q
Japan	Statistics Bureau and Statistics Centre	M
Korea	National Statistical Office	M
New Zealand	Statistics New Zealand	Q
Austria	Central Statistical Office	M
Belgium	Statistical Office of Belgium	M
Czech Republic	Czech Statistical Office	M
Denmark	Statistics Denmark	M
Finland	Statistics Finland	M
France	Statistical Office of France	M
Germany	Federal Statistical Office of Germany	M
Greece	National Statistical Office of Greece	M
Hungary	Hungarian Central Statistical Office	M
Iceland	Statistics Iceland	M
Ireland	Central Statistics Office	M
Italy	National Institute of Statistics	M
Luxembourg	Statistical Office of Luxembourg	M
Netherlands	Statistics Netherlands	M
Norway	Statistics Norway	M
Poland	Central Statistical Office of Poland	M
Portugal	National Institute of Statistics	M
Slovak Republic	Statistical Office of the Slovak Republic	M
Spain	National Statistical Institute	M
Sweden	Statistics Sweden	M
Switzerland	Federal Statistical Office	M
Turkey	State Institute of Statistics	M
United Kingdom	Office for National Statistics	M

2.7 International guidelines and recommendations

The current international guidelines and recommendations for the compilation of CPIs are those adopted by the 14[23] International Conference of Labour Statisticians in October-November 1987[23]. As will be seen in the comparison of key methodological elements of CPI compilation provided below, the guidelines for a number of methodological elements are very broad or, in some instances (*e.g.* treatment of owner-occupied housing), non existent.

The overview of the methodology for compiling CPIs also provided below is not intended to be exhaustive. A more comprehensive description of the methodologies for collecting price information and compiling these indices is provided in *Consumer Price Indices: An ILO Manua*l (Turvey, R. *et al*., International Labour Organisation, Geneva, 1989). The current international guidelines for CPIs are set out in this manual but in September 1998 an Inter-Secretariat Working Group on Price Statistics (IWGPS) was established at the invitation of the ILO Bureau of Statistics to develop these standards and to produce a set of integrated manuals on price index methodology. The new CPI manual, developed by the Technical Expert Group on the Consumer Price Index (TEG-CPI) under the aegis of the IWGPS, is expected to be published in early 2003[24].

The major compilation elements that impact on the international comparability of CPIs are:

- scope/coverage   - reference population
                        - types of expenditure and transactions
                        - types of price

- basic data   - weighting data and frequency of weight revisions
                        - item selection
                        - outlet selection
                        - price collection methods
                        - frequency and timing
                        - item/product specification

- index calculation   - elementary aggregation
                        - index aggregation
                        - alignment of expenditure and price reference base
                        - chaining re-weighted indices

- treatment of   - missing price observations
                        - seasonal items
                        - quality change
                        - owner occupied housing

These elements are discussed in the remaining sections of this Part.

2.8 Access to detailed methodological information

Detailed methodological information for consumer prices for individual OECD Member countries may be accessed from the following sources.

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[23] Available on the ILO website at http://www.ilo.org/public/english/120stat/res/cpi.htm.
[24] More information about the CPI handbook and draft chapters can be found on the ILO website at http://www.ilo.org/public/english/bureau/stat/guides/cpi/index.htm

Table 3: Consumer prices: Access to detailed methodological information

	National sources	IMF DSBB
Canada	http://www.statcan.ca/cgi-bin/sdds/sdds.cgi?sdds=2301(English) http://www.statcan.ca/francais/sdds/2301_f.htm (French)	http://dsbb.imf.org/country/can/cpimeth.htm
Mexico	..	http://dsbb.imf.org/country/mex/cpimeth.htm
United States	http://www.bls.gov/cpi/#overview	http://dsbb.imf.org/country/usa/cpimeth.htm
Australia	http://www.abs.gov.au/ausstats/abs%40.nsf/525a1b9402141235ca25682000146abc/eca69414ad9af3fbca256888001f2467!OpenDocument	http://dsbb.imf.org/country/aus/cpimeth.htm
Japan	http://www.stat.go.jp/english/data/cpi/index.htm	http://dsbb.imf.org/country/jpn/cpimeth.htm
Korea	http://www.nso.go.kr/examine/ep3.htm	http://dsbb.imf.org/country/kor/cpimeth.htm
New Zealand [1]	http://www.stats.govt.nz/domino/external/omni/omni.nsf/outputs/Consumers+Price+Index	..
Austria	..	http://dsbb.imf.org/country/aut/cpimeth.htm
Belgium	..	http://dsbb.imf.org/country/bel/cpimeth.htm
Czech Republic	http://www.czso.cz/eng/figures/7/71/71020009/innote.htm	http://dsbb.imf.org/country/cze/cpimeth.htm
Denmark	http://www.dst.dk/666	http://dsbb.imf.org/country/dnk/cpimeth.htm
Finland	..	http://dsbb.imf.org/country/fin/cpimeth.htm
France	http://www.insee.fr/fr/indicateur/indic_conj/donnees/method_idconj_29.pdf (French) http://www.insee.fr/en/indicateur/indic_conj/donnees/method_idconj_29.pdf (English)	http://dsbb.imf.org/country/fra/cpimeth.htm
Germany	http://www.destatis.de/basis/e/preis/vpreisueb.htm	http://dsbb.imf.org/country/deu/cpimeth.htm
Greece [1]	..	..
Hungary	http://www.ksh.hu/pls/ksh/docs/eng/emodsz/emodsz01.html#prices	http://dsbb.imf.org/country/hun/cpimeth.htm
Iceland	http://www.statice.is/	http://dsbb.imf.org/country/isl/cpibase.htm
Ireland	http://www.cso.ie/publications/prices/cpi.pdf	http://dsbb.imf.org/country/irl/cpimeth.htm
Italy	..	http://dsbb.imf.org/country/ita/cpimeth.htm
Luxembourg [1]	..	..
Netherlands	Http://www.cbs.nl/en/figures/keyfigures/cpi-info.htm	http://dsbb.imf.org/country/nld/cpibase.htm
Norway	http://www.ssb.no/kpi_en/	http://dsbb.imf.org/country/nor/cpimeth.htm
Poland	..	http://dsbb.imf.org/country/pol/cpimeth.htm
Portugal	..	http://dsbb.imf.org/country/prt/cpimeth.htm
Slovak Republic	http://www.statistics.sk/webdata/english/infora/dca00.htm (for core inflation only)	http://dsbb.imf.org/country/svk/cpimeth.htm
Spain	http://www.ine.es/dacoin/dacoinme/inotipc.htm	http://dsbb.imf.org/country/esp/cpimeth.htm
Sweden	http://www.scb.se/scbeng/eshtm/kpiunden.htm	http://dsbb.imf.org/country/swe/cpimeth.htm
Switzerland [2]	http://www.statistik.admin.ch/stat_ch/ber06/puk/eli2fr01.htm (English) http://www.statistik.admin.ch/news/bfsakt/lik2000_f.pdf (French)	http://dsbb.imf.org/country/che/cpimeth.htm
Turkey	..	http://dsbb.imf.org/country/tur/cpimeth.htm
United Kingdom	http://www.statistics.gov.uk/statbase/Source.asp?vlnk=131&More=Y	http://dsbb.imf.org/country/gbr/cpimeth.htm

[1] New Zealand, Greece and Luxembourg do not subscribe to the IMF DSBB at date of publication.
[2] Information in English not as detailed as that provided in French.
..: metadata are not available

Price Indices
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2.9 Scope/Coverage

It is useful to consider how the uses of CPIs outlined in Part 2.1 have implications for the required scope or coverage.

A general measure of inflation for macro-economic analysis would require a nation-wide scope covering all consumer goods and services. Since inflation is generally viewed as relating to monetary transactions, expenditure should not be imputed. Economic levers such as interest rate and tax effects should be omitted.

The scope of an index used for escalation of pensions, wages, etc., (*i.e.* compensation) should relate to those people affected by the indexation. Price and wage adjustment in private contracts is best done using an all items CPI relevant to the people affected (for wages) and a sub-index of the CPI most relevant to the nature of the work being undertaken (for prices).

When it comes to national accounts deflation, CPI sub-indices will almost certainly be used to deflate components of consumers' expenditure and this requires nation-wide coverage, inclusion of institutional households, inclusion of sales taxes, and imputed expenditure for consumer goods and services acquired as income in kind. This is considered in more detail in later sections of this Part.

When considering scope, a number of decisions must be made regarding: what is included in the basket of goods and services; who purchases them; which expenditures are included, from which outlets are they purchased; and which components of prices should be included in expenditure. Some of the relevant questions are outlined below:

A. Who purchases the goods and services, *i.e.* what is the reference population?

- what is the geographical coverage?

- which types of households are covered?

- which socio-economic groups are covered?

B. Which expenditure and transactions are included, *i.e.* which expenditures, for which purposes, which transactions, and which elements of the prices paid?

- consumption vs. investment

- consumption vs. transfers

- should expenditure be imputed for consumption of goods and services acquired as income in kind?

- should prices include sales taxes and subsidies?

- should items with administered or controlled prices be included?

- should illegal goods and services be included?

- should luxury items be included?

- how to treat discount/sales prices and rebates?

- how to treat loyalty schemes, free gifts and other incentives?

- which outlets should be included?

2.9.1 Reference population

There are a number of dimensions relating to the reference population that need to be considered. These include geographic coverage and coverage of socio-economic groups (*e.g.*, income thresholds, and household types). The ILO guidelines are not very specific in this area and merely state that the reference population should normally be defined very widely and that transparency be given to the income groups and households or family groups excluded. In the context of the CPI, *households* is normally taken to mean private households, which includes one person households but excludes the institutional population, *i.e.* persons permanently living communally in, for example, orphanages, old people's homes or convents.

Geographical coverage

This should be viewed in terms of both the geographical coverage of reference period expenditures and the geographical coverage of price collection. Ideally, these two should coincide, such that a national index is compiled using expenditure data (weights) and prices collected from urban and rural areas in the same regions. Similarly, a regional index should use weights and prices collected in that region only.

In most countries, prices are collected in urban areas only since their movements are considered to be representative of price movements in rural areas[25]. In these cases national weights are applied and the resulting index can be considered a national CPI. If, however, price movements in urban and rural areas are sufficiently different and price collection is restricted to urban areas owing to resource constraints, then urban weights should be applied and the resulting index must be considered as merely an urban CPI, not national.

The situation in OECD Member countries is shown in Table 4. In the majority of countries, the index is described as covering the whole country. As the table also shows, indices are restricted, in the majority of cases, to urban areas above a certain population size, for example 10 000 (Greece) or 20 000 (Turkey). Australia, United States, Turkey, Mexico and Korea cover urban households only (for both weights and prices). All other Member countries use weights covering urban and rural households, although in nearly all these, price collection takes place only in urban areas.

Of course, the borderline between urban and rural is debatable. For example, in France price collection takes place in villages of 2 000 residents. Is such a community considered urban or rural? There is no standard international definition as regards urban or rural in terms of population threshold.

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[25] Also because of the high share of consumer expenditure accounted for by urban centres even in rural areas and for rural based consumers.

Table 4: Consumer prices: Geographical coverage

	Geographical coverage of weights	**Location of price collection**
Canada	Urban and rural areas in all provinces and territory townships of Whitehorse and Yellowknife.	Price collection concentrated in large and medium sized cities. For most commodities these are considered representative of price movements in smaller cities and rural areas. Price collection extends to smaller cities for those goods and services where prices are recognised as being locally determined.
Mexico	46 cities throughout the country.	Prices are collected in retail outlets. Data for rents and utilities are obtained from households in 46 cities
United States	87 urban areas across the country.	Prices are collected from most retail outlets by personal visits or through a paper form in urban areas of 2 500 and more. Telephone contacts are used for households.
Australia	Households in eight capital cities.	Prices are collected in supermarkets, restaurants, travel agents and schools by trained staff of the ABS. Rail fares, electricity and gas charges are collected from the authorities concerned. Information on rents are obtained from property management companies and government housing commissions.
Japan	Whole of Japan.	Prices are collected from retail stores or service establishments in 167 cities, towns and villages using probability sample to represent the whole country. Some prices are collected by Prefectoral governments or by the Statistics Bureau.
Korea	Urban areas of Korea.	Price data are collected in 36 major cities (*i.e.* urban centres with population of more than 50 000 inhabitants) by personal visits. Prices, which are the same throughout the country, are collected centrally.
New Zealand	All households except those living in remote areas and offshore islands.	Prices are collected in 15 urban/suburban areas. These are considered to be representative of the surrounding smaller urban and non-urban areas.
Austria	Whole country.	Prices are collected in the 20 largest Austrian cities.
Belgium	Whole country.	60% of prices are collected from 10 000 sale points in 65 localities spread over country by representatives of the Ministry of Economic Affairs. The remainder is collected centrally.
Czech Republic	Whole country - both urban and rural areas.	Prices collected in 41 districts and in Prague. Price collectors visit 10 000 outlets in 194 locations. Some prices are collected centrally, mainly from administrative sources.

Table 4: Consumer prices: Geographical coverage (continued)

	Geographical coverage of weights	**Location of price collection**
Denmark	Whole country.	For clothes and fresh food price collectors visit 520 shops. Other prices are mainly collected by mailed questionnaires in some 1 500 other outlets.
Finland	Whole country - both urban and rural areas.	Personal visits are used for price collection in the shops. Data for utilities and mail order catalogues are collected centrally.
France	Whole territory of mainland France and overseas départements (Guadeloupe, Martinique, Guyane, Réunion).	Price collection only in urban units with population of 2 000 inhabitants or more. Price collectors visit sale outlets for traditional distribution. Central collection is used for utilities and mail order catalogues.
Germany	Whole of unified Germany from 1991.	Prices are collected in 190 communities. Urban centres are included down to a minimum of 5 000 inhabitants.
Greece	All private households regardless of size or income in the whole country.	Prices are collected in urban population centres with 10 000 or more inhabitants.
Hungary	Whole country.	Prices are collected by personal visits for retail outlets, directly for large companies with a central pricing policy or by printed form or telephone for utilities.
Iceland	Whole country.	Data collection is confined to the capital city except for heating and electricity, which is calculated as an average for the whole country.
Ireland	Whole country.	Prices are collected in 82 towns. Personal visits are made to retail outlets. Utility charges and services are collected through postal and telephone inquiries.
Italy	Whole country.	Data are collected in 93 towns throughout country where inquiries are addressed to 26 000 sales outlets and 12 000 households.
Luxembourg	Whole country.	Price collection takes place in City of Luxembourg and three other municipalities.
Netherlands	Whole country.	Prices are obtained in 100 municipalities of over 10 000 inhabitants. Prices are collected from 9 000 outlets. Some 1 000 enterprises receive a mail questionnaire and 3 500 landlords receive a rent survey questionnaire.
Norway	Whole country.	Prices are collected from about 2 200 retailers mainly by means of questionnaire. Electricity tariffs are collected from the Internet. Rents are collected either from households or from registers.
Poland	Whole country.	Personal visits and paper collection forms are used to collect prices from 28 000 outlets in about 310 research regions (*i.e.*, a town or a part of a large city) all over the country. Some prices (determined centrally) are collected by telephone or by mail to the CSO.

Table 4: Consumer prices: Geographical coverage (continued)

	Geographical coverage of weights	**Location of price collection**
Portugal	Whole country.	Prices are collected in 42 urban areas in seven regions. Prices are collected from some 10 600 outlets by mean of personal visits or paper collection form.
Slovak Republic	Whole country.	The staff of regional statistical authorities visits some 8 500 outlets (shops, service business premises, housing co-operatives).
Spain	Whole country.	Prices are collected three times a month in provincial capitals and once a month in other municipalities. Personal visits and paper collection forms are used to reach some 29 000 outlets, co-operatives and similar stores. Points of travelling sales are excluded. Centrally determined prices are collected by means of personal visits or telephone calls.
Sweden	Whole country.	Prices are collected by enumerators from a random sample of 600 retail stores or restaurants using either telephone or small-scale mail surveys.
Switzerland	Whole country.	Prices are collected from 3 000 sale points in 16 regions by the SFSO and utilities are collected centrally by telephone or by printed form. Prices are also collected from mail order catalogues for certain goods.
Turkey	Urban households.	Price data are collected from 6 390 outlets by the SIS staff in cities with a population greater than 20 000.
United Kingdom	Whole country.	Price collectors visit 20 000 outlets in 147 locations. Central collection is used for major retailers with central pricing policy and for mail order catalogues.

Decisions about the absolute borders of coverage are based on practical and policy considerations. The majority of CPIs in OECD Member countries and HICPs abide by the domestic concept, *i.e.* expenditure by residents while abroad is excluded and expenditure by foreign visitors is included. This is consistent with the concept of domestic inflation. On the other hand, national accounts deflators should have the same concept as household final consumption expenditure (HFCE), *i.e.* including expenditure by residents while at home and abroad, and excluding expenditure by foreign visitors to the domestic territory. This is known as the national concept, and is conceptually consistent with a compensation index. Household budget surveys (HBSs) may or may not record expenditure of residents while abroad, and do not record expenditure by foreign visitors. In theory, a compensation index should take account of the expenditure of residents while abroad, particularly where cross-border shopping and consumption on holidays abroad are significant, although measuring prices abroad may not prove simple in practice.

Socio-economic coverage

In almost all OECD Member countries the CPI is designed to be relevant to as many households as possible, and not to a specific socio-economic group. However, in some countries extremely wealthy households are excluded as their expenditure data are unreliable[26] and because it may be too costly to collect prices for some of the consumer goods and services purchased exclusively by the wealthy. For example, the United Kingdom excludes the top 4% of households by income and, at the other end of the scale, households mainly dependent on state pensions (with the net result that roughly 15% of households and 15% of expenditure is excluded). Japan and Korea exclude households mainly engaged in agriculture, forestry and fishing, and all one-person households.

For CPI purposes, the definition of a household is essentially the same as in the *System of National Accounts 1993* (SNA), which includes both private households, including those consisting of only one person, and institutional households such as religious orders, residential hospitals, prisons, etc.[27]. For many OECD Member countries, however, the institutional population and those living in non-private households are excluded from the scope of the CPI, often due to difficulty obtaining data on their consumption patterns. In these countries the indices are restricted to the private household population or a subset of the private household population. On the other hand, the HICP coverage of households includes institutional households.

Table 5: Consumer prices: Socio-economic coverage

	Inclusions	**Specific inclusions/exclusions**	**Non-private households/Institutional population**
Canada	Families and individuals living in private households.	Excludes persons living on Indian reserves, officials representing foreign countries and residents of the Yukon and Northwest Territories outside Whitehorse and Yellowknife.	Excludes persons living in collective households.
Mexico	All types of households in cities of more than 20 000 inhabitants.	Excludes those households in areas of less than 20 000 inhabitants.	..
United States	Includes wage earners and clerical workers, professional, managerial, and technical workers, short-term workers, self-employed, unemployed, retirees, and others not in the labour force.	Excludes about 13% of total population: those living in urban areas of less than 2 500 inhabitants, farm families.	Excludes military personnel and those living in prisons and mental hospitals.
Australia	All metropolitan private households including the self-employed, old age pensioners, and social welfare beneficiaries. Target population is about 64% of total population.	Excludes about 36% of the population of Australia living outside of the metropolitan areas.	..

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[26] Household budget survey response rates are often lower for these households.

[27] Institutional households do not include convalescent homes, schools and colleges, the military, etc. whose members are treated as belonging to their family households. For a more comprehensive description of households see *System of National Accounts 1993* – Eurostat, IMF, OECD, UN, World Bank (1993), Paragraphs 4.132-4.138.

Table 5: Consumer prices: Socio-economic coverage (continued)

	Inclusions	Specific inclusions/exclusions	Non-private households/Institutional population
Japan	All households with two or more persons.	Excludes one-person households and farmers' and fishermen's households. An index including one-person households is calculated as a supplementary index annually.	..
Korea	All urban households in 36 cities which include 86.5% of the total urban population of Korea.	Excludes the population mainly engaged in agriculture, forestry, fisheries and one-person households.	..
New Zealand	All residents of private households living in permanent dwellings. Target population is 95% of population.	There are no exclusions based on income source or geographical location.	..
Austria	Covers all types of households and incomes.	..	..
Belgium	Covers all households residing in the national territory.	..	..
Czech Republic	All households.	Separate indices are compiled for households of employees, for low income households with children, for households of pensioners and for households living in Prague.	Institutional populations are excluded.
Denmark	Index covers the whole private household population, including institutional households, and private foreigners visiting Denmark	..	Institutional households are included.
Finland	Includes all private households resident in Finland.	Does not exclude any population group.	Excluded
France	Includes all households, resident or not resident (such as tourists).	..	National accounts coverage, thus institutional households are included.
Germany	Includes all private households	..	Excluded
Greece	Index covers all households regardless of size or income.	..	..
Hungary	Index covers all socio-economic groups in country.	..	Excludes institutional households (students, old-age persons) and military garrisons.
Iceland	Index covers all households residing in Iceland where at least one member is between 18 and 74 years of age.	Does not exclude any income group.	Excludes institutionalised persons staying in hospitals or residential homes for the elderly.

Table 5: Consumer prices: Socio-economic coverage (continued)

	Inclusions	Specific inclusions/exclusions	Non-private households/Institutional population
Ireland	All private households residing in the country which cover about 97% of the total population.	..	Excludes persons resident in institutions, boarding houses, barracks, other non-private households or visitors from abroad.
Italy	All families residing in the country.	A specific index is computed for white and blue collars workers.	Some institutional households are covered.
Luxembourg	All households are included since 1996.	..	..
Netherlands	Index relates to both private and non-private households.	As well as the all households index, two other indices are compiled for low income and high income households.	Included.
Norway	All private households are covered.	..	Excluded
Poland	Covers the entire population residing in the country.	There are no size or income limits although foreign households are excluded.	Excluded
Portugal	Covers all population	..	..
Slovak Republic	Includes 90% of households.	Includes wage and salary workers, the self-employed, farmers, pensioners. Excludes manual workers in agriculture. Separate indices are compiled for total households and for households with low income.	..
Spain	Entire population living in family dwellings in Spain is covered.	No exclusion for income level	Excluded
Sweden	Index covers the entire population, including foreign visitors.	A specific index (Basic Amount) to adjust specific socio-economic groups is computed for pensions and education assistance.	National accounts coverage, thus institutional households are included.
Switzerland	All private households residing permanently in Switzerland are included.	No socio-economic group is excluded.	Excluded
Turkey	Urban households with an average monthly income of 3 198 000 to 78 935 000 lira in 1994.	All socio-economic groups are included.	..
United Kingdom	Includes all households including those for which the head is self-employed or unemployed.	Excludes pensioner households dependent on state pensions (11% of households) and high income households (4% of households).	..

..: metadata are not available

2.9.2 Types of expenditures and transactions covered

The ILO guidelines state that CPIs should relate to all goods and services (including imports) acquired, used or paid for by the reference population for non-business purposes. This includes goods and services that may be regarded as non-essential or undesirable (*e.g.* tobacco, alcohol) or that may be illegal. The guidelines also state that the range of goods and services included in a CPI may, but not necessarily should, coincide with consumption expenditure as defined in the SNA.

A CPI does not cover all household expenditures in that it includes only consumption expenditures. The scope of a CPI therefore coincides theoretically with the notion of goods and services intended for household final consumption. It includes durable goods such as furniture and motor cars and luxuries such as perfumes and travel for pleasure, provided they are consumed customarily by the reference population.

Excluded are other types of expenditures, in particular, those representing investment, savings or transfers. Those expenditures that by definition are excluded from the index therefore include: purchase of a dwelling, life insurance premiums, social security contributions and direct taxes. At the same time, services provided by government but not paid for directly by households, such as public schooling or police services, are not covered by the index.

Investment, interest and intermediate consumption – It might at first appear obvious that the scope of a CPI should include consumer goods and services only, excluding investment expenditure, transfers and any expenditure on intermediate consumption. But there are several areas of ambiguity, where, as usual, the use of the CPI dictates the scope.

From a national accounts deflation perspective, since household final consumption expenditure (HFCE) consists of expenditure incurred by resident households on consumer goods and services, where consumer goods and services are defined as those which are acquired by a household and used for the direct satisfaction of the needs and wants of the members of that household[28], then assuming that the scope of a CPI is consistent with HFCE, it seems clear that expenditure on capital goods, financial assets, interest, savings, direct taxes, and goods and services purchased for intermediate consumption should not be covered. Thus, contributions to pension plans, life insurance and health insurance under publicly funded health insurance plans are not covered. Privately funded health insurance and gambling are both included (with weights on a net expenditure basis). Charitable donations are included in principal but rarely in practice as it is nearly impossible to specify an indicator item to be priced over time.

From a compensation perspective, which is concerned with maintaining the purchasing power of household incomes, the scope is generally considered to include only the purchase of goods and services to satisfy current needs, *i.e.*, investment is not covered. Since a compensation index should reflect all payments related to final consumption, it could be argued that any interest required to finance final consumption is in scope. Similarly, arguments can be made for including expenditure on the raw materials used in the production[29] of goods and services consumed by the household that produced them.

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[28] See *System of National Accounts 1993* – Eurostat, IMF, OECD, UN, World Bank (1993), Paragraph 9.42.

[29] According to SNA 93 concepts these goods and services are intermediate consumption, not final consumption, but it can be argued that for practical purposes they should be treated as consumer goods in CPI's. This is the principal underlying the treatment of owner-occupied housing services in many countries. For more details on this subject, see *Non-Market Goods and Services in CPIs* – Peter Hill, Conference of European Statisticians, ECE/ILO CPI Meeting, Geneva, November 1997.

From an inflation point of view, the effects of changes in asset prices, interest rates, exchange rates, direct taxes, wage rates, raw material prices, etc. all need to be measured and analysed in addition to consumer price inflation. But the general view is that this is best done using a family of price indices, of which the CPI is an important member covering only consumer goods and services. Furthermore, analysis for monetary policy making and monitoring requires measures of inflation excluding the effects of economic levers such as interest rates and taxes.

Durable goods – These are goods, which are not consumed within one period (year) but instead provide a flow of services over several periods. They are distinguished from capital/investment goods, which also provide a flow of services, by their services being used in final consumption whereas the services from capital goods are used in production. A true cost of living index would take the "user cost" approach and attempt to price this flow of services, rather than the initial cost of the durable good. One method for pricing the services might be to use rental prices for the good, if such prices exist, as a proxy but this approach is often not feasible in practice. The user cost approach is generally viewed as inappropriate for inflation and compensation indices where it is actual monetary outlays that are of interest. Thus, the usual practice is to monitor acquisition prices (with weights calculated on a net expenditure basis where second-hand markets exist for a good, such as vehicles etc.).

Second-hand goods – Second-hand markets exist for most durable goods and household expenditure on second-hand goods is generally considered to be within scope of a CPI, except that the weight should be calculated based on net expenditure and not total expenditure.

Imputed expenditure – Should expenditure be imputed for the consumption of goods and services acquired via non-monetary transactions, *i.e.*, acquired as income in kind? This includes the consumption of:

- own production, such as agricultural goods, owner-occupied housing services;

- goods and services acquired as wages and salaries in kind;

- goods and services acquired as social transfers in kind, *e.g.*, subsidies from governments and non profit institutions serving households (NPISHs);

- goods and services acquired through barter.

The general view is that imputed expenditures should not be included in CPI weights (although a true cost of living index following the user cost approach would include them), since for the purposes of inflation monitoring and as a compensation index, a CPI should reflect changes in prices actually paid by the reference population. Consistent with its inflation monitoring objective, Eurostat states that the aim of the HICP is to measure inflation faced by consumers, where the concept of "household final monetary consumption expenditure" (HFMCE) defines both the goods and services to be covered, and the price concept to be used, *i.e.*, prices net of reimbursements, subsidies and discounts. HFMCE refers only to monetary transactions and includes neither consumption of own production or consumption of goods and services received as income in kind.

Where CPI components are used to deflate national accounts HFCE values, however, it would be appropriate to include imputed expenditures so that the coverage of the price index matches the coverage of the value aggregate being deflated. For example, deflators for the HFCE on food groups should be weighted to include imputed expenditure for the consumption of own-account production of agricultural goods and any food received as wages and salaries in kind. Owner-occupied housing

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services are also included as part of HFCE. The consumption of goods and services obtained through barter should form part of HFCE.

Taxes and subsidies – All taxes directly related to income or wealth are out of scope of a CPI since they are transfers, with which no identifiable transfer of consumer goods or services can be associated. Thus, the question is concerned with indirect taxes, such as taxes on consumption/use, fees for licences, excise duties, value-added type taxes (VAT) and other sales taxes. Reference to national accounts concepts (scope of HFCE) would suggest that fees for passports and payments for all licences (except those for owning/using vehicles, boats and aircraft, and hunting, shooting and fishing) should be included, as these have the nature of a payment for a service rather than a tax. Car taxes (road fund licences) are excluded, as are licence fees regarded as taxes, *e.g.*, licence fees for TVs, driving, firearms, etc. This is the approach taken in the HICP, although many countries do include taxes for private vehicle use, presumably since this is seen as a tax on consumption so that the SNA 93 treatment as a tax on production is viewed as inappropriate to CPIs.

National accounts concepts also state that sales taxes and VAT should be included as part of the price paid by consumers[30]. Similarly, compensation CPIs are generally intended to reflect the experience of the consumer. Sales taxes are therefore included in the prices used for CPIs, as are subsidised and controlled prices. For example, the CPI records the fixed prices paid by consumers for prescribed pharmaceuticals.

For inflation indices on the other hand, the price increases due to changes in indirect taxes or subsidies are not part of an underlying inflationary process but are of a different nature, and thus the effects of taxes and subsidies might be excluded. But this brings to light an apparent conflict and circularity in the use of compensation indices – on the one hand they should reflect the purchasing experience of households, *i.e.*, including taxes and subsidies, but they are also used to increase the purchasing power of households through the indexation of wages and benefits. So, any increase in indirect taxes leads to an increase in wages and benefits, despite the fact that the aim of the tax increase might have been to reduce consumers' purchasing power. Similarly, an increase in subsidies might be intended to increase purchasing power, but the resulting lower prices are offset by a smaller increase in indexed wages and benefits.

In theory, net price indices that exclude all indirect taxes and subsidies, or changes in them, would require the application of input-output analysis to work out their cumulative impact through all stages of production. However, many countries take a simplified approach.[31]

Charitable donations and gifts – Payments of subscriptions to clubs and societies, including charities, which provide their members with some kind of service (*e.g.*, regular meetings, magazines, etc.) can be regarded as final consumption and in scope for a CPI. Payments of subscriptions or donations to charitable organisations, for which no easily identifiable service is received should be considered as a transfer to a non-profit institution serving households – but by national accounts convention the consumption of the goods and services provided by non-profit-making organisations

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[30] SNA 93 classifies VAT as a tax on products, and all taxes on products and production are included in CPIs. Thus VAT, excise taxes, import duties, etc. are included.

[31] For example, some of the taxes on vehicle fuel will enter the price of transport services which in turn will enter the prices of transported goods, some of which will enter the prices of the consumer goods for which they are inputs and some of which will enter the prices paid for consumer goods by retailers and hence the prices which they charge to consumers. To track all these impacts would demand a much more detailed and up to date input-output table than is available in most countries. A more practicable alternative is therefore to confine the taxes and subsidies for which correction is made to those levied at the final stage of sale at retail, that is primarily to VAT, sales and excise taxes. Estimating prices less only these taxes, or corrected for changes in only these taxes is more feasible. In the case of a percentage sales tax or VAT the calculation is simple, but in the case of excise taxes, it is necessary to ascertain the percentage markup by the retailer, since the excise tax will also be marked up by this percentage.

serving households is considered as part of HFCE and thus also in scope of a deflation CPI. For practical purposes, however, it can be very difficult to specify an indicator item for pricing, or a weight for this type of ad-hoc donation.

Illegal prices and consumption – All consumer goods and services are in scope, irrespective of whether their production or consumption is illegal or carried out on the black market. In the case of a compensation index, where the scope is defined to suit the needs of policy-makers, these expenditures may or may not be in scope, according to policy needs. However, despite the theoretical reasons for including them, these expenditures are rarely included as the expenditures and the prices are almost impossible to collect.

Luxuries – Those countries that exclude the highest income households are effectively excluding those goods and services purchased exclusively by the wealthy. But for all other households covered, judgements are not made about whether certain expenditures are essential or are luxuries, *i.e.*, all expenditures that satisfy all other scope criteria are included.

Loyalty schemes, free gifts and other incentives – Following national accounts concepts, the scope of HFCE is actual prices net of reimbursements, subsidies and discounts. Country practice is usually to reflect unconditional reimbursements, discounts and rebates. Loyalty schemes, money-off coupons, free gifts and other incentives are ignored. Free extra product is usually ignored if the effect is temporary but adjusted for if permanent, *i.e.*, a permanent adjustment is treated as a quality change.

2.10 Basic Data

2.10.1 Weighting data

The household expenditure structure is used as the weighting pattern for CPIs. The ILO guidelines merely state that weights are mainly derived from household expenditure surveys (also referred to as household budget surveys) and that such surveys should be representative of household size, income level, geographic location, socio-economic group and any other factors that may have an impact on household expenditure patterns in a country. Preferably such surveys should cover a whole year to avoid seasonal effects.

Weighting is a top-down process, *i.e.*, the total amount of consumption expenditure is divided between the highest level headings of the classification system, *e.g.*, the twelve categories of COICOP. The resulting weight for each category is then divided between the sub-categories, and the weight of each sub-category is divided between the groups, and then the items that have been identified as important by the national statistical institute. Inevitably there will be a limit to the number of item headings that can be included. Thus, the item headings that have been identified act as proxy representatives for those items not identified.

The aggregation process may also involve the application of weights not derived from either the HBS or the national accounts. For example, weights that relate to outlet type (derived from market research data) or regional weights (ideally derived from HBS, but in some cases population is used) may be used.

As Table 6 shows, in all OECD Member countries except France and Sweden, weighting data are derived directly from a household budget survey (HBS). France and Sweden derive weights from their national accounts expenditure structures (which are generally based to a large extent on HBS data). As

described earlier, differences in national accounts and HBS weights will be due to coverage differences such as the fact that national accounts weights include institutional households and imputed expenditures for consumer goods and services acquired as income in kind or through barter[32]. The survey methods used in different countries are briefly described in the companion methodological publication *Main Economic Indicators: Sources and Definitions*.

Table 6: Consumer prices: Source of weights for aggregation and weight reference period

	Consumer expenditure survey	National Accounts	Frequency of update (years)
Canada	1996		4
Mexico	1989		2 (in the future)
United States	1993-95 average		2 (from 2002)
Australia	1998-99		5
Japan	2000		5
Korea	2000		5
New Zealand	1997-98		Some annual revision
Austria	2000		5
Belgium	1995-96		When rebasing
Czech Republic	1999		5
Denmark	1996	Combined with CES	4-5
Finland		2000	5
France		Revised annually	Annually
Germany	1995		5
Greece	1998-99		5
Hungary	Revised annually		Annually
Iceland	Revised annually		Annually
Ireland	1999-00		5
Italy		Revised annually	Annually
Luxembourg	1993		..
Netherlands	1995		5
Norway	Revised annually		Annually
Poland	Revised annually		Annually
Portugal	1994-95		5
Slovak Republic	2000	Combined with CES	5
Spain	2000-01		5 (from 2002)
Sweden	Revised annually	Combined with CES	Annually
Switzerland	1998		Annually (from 2002)
Turkey	1994		5
United Kingdom	Revised annually		Annually

..: metadata are not available

2.10.2 Frequency of revising/updating weights

The consumption habits of a given group of households, which the basket is supposed to represent, change with time. Such changes may be in response to different relative price movements,

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[32] Obviously, the boundaries between intermediate consumption and HFCE are clouded in HBS data. The purchase of raw materials for the production of goods and services that will ultimately be consumed or bartered by the producing household are in fact recorded as HFCE.

changes in supply, changes in technology, new products being introduced, changes in tastes and fashions and changes in standards of living.

These changes bring with them a gradual shift in consumer preferences. Furthermore, consumers must continuously adjust their spending habits for changing market conditions. All of these factors necessarily have an impact on household consumption expenditures. In practice, the sample of goods and services is chosen to reflect the spending patterns of the reference population at a given time, the weight base of the index. These often refer to specific socio-economic groups in the country. The items chosen are clearly defined and remain unchanged throughout the life of the index. When the weighting pattern is revised, the sample of goods and services and outlets are revised as well so as to reflect new spending patterns.

The ILO guidelines state that weights should be examined periodically to determine whether they still adequately reflect current expenditure patterns. Where changes have occurred, the weights should be revised. The guidelines state that weights should in any case be revised every ten years. The ILO guidelines also state that whenever the composition and/or weighting pattern of the index is changed the new index should be linked to the old index to provide a continuous time series.

There is considerable variation in the frequency with which weights are updated. In several OECD Member countries this is done each year, while in others updating is much less frequent. Table 6 also shows the frequency of weight revision in OECD Member countries.

2.10.3 Item selection

Once the weighting structure is established, it is possible to select representative items for pricing. The identification of these items will depend on their relative shares of expenditure. Thus, during a weighting revision exercise, some items will be dropped from the basket as their expenditure share has declined, and other items will appear because they have become more important. The HICP criterion is that new items should be introduced once their expenditure share reaches one part in 1 000.

The ILO guidelines state that the methodology adopted should result in selections that are as representative as possible. Despite practical problems of implementation (*e.g.* resource constraints and insufficiently detailed expenditure data), the guidelines favour use of probability sampling techniques in the belief that they will enhance the accuracy of the index and allow estimation of the sampling error. However, such techniques are rarely used in practice. Notable exceptions are the United States and Mexico where both items and outlets are selected using probability proportional to size (PPS) methods. Where PPS is not used, items are selected according to expenditure shares. Varieties of items may either be selected by the national statistical institute head office, again using expenditure or market share data where possible, or varieties may be chosen by price collectors who are instructed to choose the most popular varieties based either on the advice of retailers or on the amount of shelf-space taken up.

Item samples below the level at which weights are published can be revised in between major weight revisions[33]. This is most simply implemented where the modified Laspeyres formula (the price reference period is the previous month) is used, but can be done with the standard Laspeyres formula using a double price collection in one month to create an overlap link. The United States CPI takes advantage of the use of the modified Laspeyres to continuously revise lower level samples on a

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[33] The published weights can only change at a major revision, but the unpublished component weights within them can be adjusted when necessary, although this does, of course, violate the fixed base principal of a Laspeyres index.

rotational basis. New and replacement items and varieties can also be introduced in this way, as long as they can be included within an existing published weight, *i.e.*, personal computers could only be introduced at a major weight revision, whereas it might be possible to introduce mobile phones at any time if the lowest level weight published in the telecommunications category is for telephone services.

2.10.4 Outlet selection

As with items, random sampling techniques should be used for outlet selection and, in fact, PPS is used for outlets in more countries than is the case for item selection. Ideally, turnover[34] is used as the size variable although floor space may be used as a proxy.

Alternatively, outlets are selected purposively (also referred to as a judgmental sample). Turnover data and local expertise should also be used to select the most representative outlets, and the national statistical institute head office should stipulate quotas for major outlet types, *e.g.*, 80% of fruit and vegetable prices to be collected in markets, 20% in shops, to ensure representative coverage of outlet types.

The United States CPI takes advantage of the use of the modified Laspeyres to continuously revise the outlet sample on a rotational basis (PPS using turnover), and the United Kingdom reselects 20% of the outlet sample each year as part of the annual weight revision exercise (PPS using floor space).

2.10.5 Price collection methods

In all countries CPIs are compiled using a number of different price collection methods, such as:

- personal visit to outlet, recording prices on paper or electronically;

- paper form sent by mail or fax;

- electronic form sent by e-mail or on floppy disk;

- telephone call to outlet;

- prices observed in catalogues/brochures;

- official price changes notified by other government departments or announced in the press.

By far the most widely used method is personal visit to the outlets, where descriptions and prices are recorded on paper collection forms, or electronically using hand-held computers as in Canada, Mexico and the United Kingdom. In countries where the national statistical institute has regional offices, the price collectors are usually employees of the institute, whereas in other countries price collectors may be the staff of the regional offices of other government agencies, or more rarely, employees of a private company contracted to collect the prices. Whatever the case, it is essential that the price collection system be closely managed. An efficient communication network should be in

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[34] There is no universally accepted definition of "turnover" or "sales" and the terms are often used interchangeably by many national and international agencies. For more detail on this, see *Main Economic Indicators Comparative Methodological Analysis, Supplement 1*, OECD, Paris 2002, pages 57-58.

place to keep collectors up to date with any special circumstances each month and remind them of seasonal goods appearing/disappearing from the market. Collectors should receive training at least annually – to meet other collectors and discuss common problems (*e.g.*, selecting replacement varieties), to be taught about any new procedures, and to learn about new products and their characteristics.

2.10.6 Item/product specification

As mentioned above in Part 2.10.3, the varieties for pricing may be selected by head office, with the price collectors being given a detailed specification, or the price collectors may select the variety. In the latter case, they are given a loose specification and record a detailed description themselves. In either case, for the sake of continuity (comparability) and to avoid quality change bias creeping into the index (see Part 2.12.3), it is vital that price collectors work with detailed descriptions at all times. For each item, it is important that the price-determining characteristics are identified and that these then become the headings (fields) for the detailed description. Price collectors may also note additional features, which, although not price-determining, are useful for future identification, and it is important to label these as irrelevant in terms of quality change. Detailed written descriptions are also needed so that in the event of a price collector being unable to perform their task, the replacement can easily identify the correct varieties to be priced.

When a price collector finds that a variety is no longer available, and therefore selects a similar replacement, it is essential that they record the detailed description of the new variety so that any changes in characteristics can be noted, and quality adjustments made if necessary.

2.11 Index Calculation

2.11.1 Computation of lowest level indices (elementary aggregation)

There are several methods for combining prices to give elementary aggregates (lowest level indices):

- the ratio of averages (RA) – the average price of a sample of observations in the current period is compared to the average price of the same sample in the previous (or base) period, and in order to obtain a correct result, it is vital that the samples of varieties are the same in both periods (matched samples). If a price is missing in the current period and no action is taken the index will be biased. RA is not suitable if the spread of prices being aggregated is so large that the prices are heterogeneous;

- the average of relatives (AR) – is based on comparing each individual price with its corresponding price in the previous (or base) period to give a price relative for each observation. These price relatives are then weighted together, using either the standard or the modified Laspeyres formulae. AR assumes an elasticity of substitution between varieties of zero, and therefore suffers from upward drift when this assumption is invalid and prices are rising. If a price is missing in the current period, then its price relative cannot be calculated (possibly causing computer error). If this price relative has a specific weight, then omitting the relative from the next level of aggregation may cause errors if the weights of the other price relatives are not adjusted accordingly;

- the geometric mean (GM) – is being introduced by more and more countries (as can be seen in Table 7). The approach is to calculate a GM of prices in both periods and then derive the price relative or, alternatively, calculate a geometric average of the price relatives - both calculations will yield the same results. The GM assumes an elasticity of substitution between varieties of one. However, the problem of missing observations is still the same as in the previous two cases. The sample of observations used from each period must have the same number of observations for computing the geometric mean of prices in order to avoid a biased measure of price change. In the case where a weighted geometric mean is used, the weights for missing observations would also need to be distributed to the remaining observations to avoid any bias.

2.11.2 Index aggregation

Elementary aggregation may directly give local, regional or national indices, *i.e.*, relatively few prices may be combined to give local item indices or a wider spread of prices may be combined to give regional indices or, if regional indices are not published and prices are sufficiently homogeneous, then all prices for an item may be combined at this first stage (weighted if possible) to give a national index.

The elementary aggregates obtained above are combined using some kind of index number formula and weights based on expenditure (or population, but this is less desirable). In the case of CPIs, all countries use a Laspeyres formulation – either in the standard or modified form.

Table 7: Consumer prices: Index aggregation

	Elementary aggregation	Higher level aggregation
Canada	GM + some RA	Modified Laspeyres
Mexico	Weighted AR	Standard Laspeyres
United States	GM + weighted AR	Modified Laspeyres
Australia	GM + some RA	Modified Laspeyres
Japan	RA	Standard Laspeyres
Korea	RA	Standard Laspeyres
New-Zealand	RA	Standard Laspeyres
Austria	AR + some RA	Standard Laspeyres
Belgium	RA	Standard Laspeyres
Czech Republic	RA	Modified Laspeyres
Denmark	GM	Standard Laspeyres
Finland	GM	Standard Laspeyres
France	GM + RA for food	Chained Laspeyres
Germany	..	Standard Laspeyres
Greece	..	Standard Laspeyres
Hungary	RA	Chained Laspeyres
Iceland	GM	Standard Laspeyres
Ireland	Weighted RA	Modified Laspeyres
Italy	GM	Chained Laspeyres
Luxembourg	..	Standard Laspeyres
Netherlands	RA	Standard Laspeyres

Table 7: Consumer prices: Index aggregation (continued)

	Elementary aggregation	Higher level aggregation
Norway	GM	Chained Laspeyres
Poland	GM	Chained Laspeyres
Portugal	GM+ weighted AR	Standard Laspeyres
Slovak Republic	Weighted RA	Standard Laspeyres
Spain	AR	Standard Laspeyres
Sweden	GM	Chained linked index
Switzerland	AR	Standard Laspeyres
Turkey	RA	Standard Laspeyres
United Kingdom	AR + RA	Standard Laspeyres

GM: geometric mean; RA: ratio of averages; AR: average of relatives
..: metadata are not available

2.11.3 Alignment of expenditure and price reference base

In practice, data generally are not available as required by the Laspeyres formula. Expenditure weights are calculated using average prices for the base period (preferably a year), and price relatives are calculated using as convenient price reference base period, for example, to correspond with the price reference base of the overall index - commonly either a whole year or a single month[35]. Thus the base period for the weights is different to that of the price relatives. In order to use price relatives based on a different period to their corresponding weights, link factors (or adjustment coefficients) are needed.

2.11.4 Chaining re-weighted indices

A chain index consists of a series of successive indices, each linked (spliced) to its predecessor. Linking consists of multiplying the values of the successor index by the value of its predecessor in an overlap period (linking coefficients are calculated using values in the overlap period), so that the index base period of the successor becomes the same as for the predecessor index, *i.e.* the indices have a common reference base. Linked indices can be produced at any level, *i.e.* item, product, group, total CPI. However, it should be remembered that aggregating linked sub-indices will give a different result to linking aggregated indices. The recommendation is that aggregation should always be done before chain-linking, *i.e.* linking should always be the last stage in the process.

2.12 CPI Problem Areas

2.12.1 Missing prices

There are many reasons why a price collector may find that a price observation is not available in any period and it is important to establish whether the unavailability is likely to be temporary or permanent. A price may be considered as temporarily unavailable if the same commodity is likely to

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[35] For practical reasons it might be preferable to use an annual average price as the price reference base rather than a single month, since this avoids the problems associated with commodities which are never available in the single reference month.

return to the market. Some seasonal commodities show fairly predictable temporary unavailability. Permanent unavailability, on the other hand, occurs when a commodity is withdrawn from the market with no prospect of returning in the same form.

Items may be temporarily unavailable due to supply shortages caused by factors such as the seller underestimating demand, strikes by factory or transportation employees, or supply problems with imported commodities. In these cases a price observation may be unavailable in the current period but the collector has information to suggest that the same commodity will become available again, although it may not be clear when this will happen. Particular care must be taken when dealing with temporary unavailability as bias can arise when prices become available again, especially if a modified Laspeyres formula is being used.

Seasonal commodities often show seasonal patterns of availability, *i.e.*, they are temporarily unavailable over roughly the same months each year so that their unavailability is to a large extent predictable. Primary examples of this phenomenon are fresh fruit, fresh vegetables, clothing and some types of sporting equipment which are available in the market for short periods only each year.

In practically every period for which a price index is compiled, some varieties of a commodity disappear and will not be sold again, *i.e.*, they become permanently unavailable. In such situations replacement varieties should be selected and introduced into the sample, with great care being taken to identify any differences in quality between the original and replacement varieties. If a quality difference does exist, then it is crucial to ascertain whether the difference has a value. If not, then the price of the replacement variety can be compared directly with the price of the original. If the quality difference does have a value, however, then this price effect must be removed from the index calculations using an adjustment technique. If price effects due to quality change are not adjusted for, then the price index will be biased.

The methods most frequently used to deal with the missing prices problem in OECD member countries generally fall under one of the following headings:

- taking no action;

- ensuring that samples are comparable — with particular reference to use of the modified Laspeyres formula;

- carrying forward the last available price;

- imputing prices.

If no action is taken to accommodate missing prices, the outcome will depend on the method used to compile the elementary aggregates:

- with RA the samples will no longer be matched and the index will reflect sample changes as well as price changes;

- with AR computer error may occur, or the weights may be incorrectly distributed;

- with GM any of the above problems can occur.

So, it is important to ensure that samples are matched in the current and reference periods. However, even if this is done, serious problems can occur if the modified Laspeyres is used. If no imputation is done, when a missing price returns it will be omitted from the calculations in the first month of its return and, as there is no price in the previous month with which to compare it, it is necessary to wait until the second month after a price has returned. But this means that any price rises coinciding with the return (*e.g.*, new stocks at a higher price) are not reflected in the index. Thus, the index will suffer a systematic downward bias. The correct method to use in this situation is to impute prices in all months when observations cannot be made.

A common treatment of missing prices is to carry forward the last available price to the months when prices are not available. Although this does provide a price in the months when observations cannot be made, it is likely to mean that monthly movements in the index are biased, since the sub-indices in question will remain flat when prices are not available (if prices in general are rising, the bias will be downwards, whereas if prices are falling the bias will be upwards). There is also likely to be a large step-change in the index when the price becomes available again or when the new season starts. This method is not recommended, particularly with high inflation or where monthly movements in the price index (as opposed to annual movements) are used as a major indicator.

Although carrying forward a price is better than simply adjusting the sample composition to ensure comparability and is undoubtedly better than taking no action at all, by far the best solution is to estimate and impute a price. Imputation makes use of the best available information to provide an unbiased estimate of price movement. Imputation can be done using prices or indices, although if prices are to be imputed then quantities must be used as weights, not values (expenditures).

Imputation can be done in such a way as to be implicit or explicit. In the case of implicit imputation the missing index and its weight are simply omitted from all calculations, resulting in the weight being automatically redistributed, proportionally, over the other indices in the group. Thus the group index is calculated using only those indices that are available and the missing index implicitly assumes the same value as the group index. In the case of explicit imputation the index (or price) for the missing item is explicitly recorded, but flagged as an imputation, and the group index (or average price) is calculated using this imputed value. The imputation of prices is necessarily explicit, whereas the imputation of indices can be implicit or explicit.

It is recommended that imputations should always be made explicitly, so that index movements are fully understood, and that imputed indices/prices are always flagged or marked so as to be readily identifiable. In the case of the CPI, imputed prices should be entered onto price collection forms.

2.12.2 Seasonal items

The supplies and prices of some products, mainly in the food and clothing groups, are subject to marked seasonal variations. As a result, systematic shifts in the spending practices of households take place within those groups. This may lead to distortions in the index unless appropriate adjustments are made. There are several features that might appear in the price patterns of seasonal commodities that can cause problems during index compilation:

A. Seasonal unavailability (commodities being unavailable for some months of each year):

- what to do in missing months - impute prices, or use zero weights?

- how to re-introduce prices when the season starts?

- how to deal with any changes in quality at the start of the new season?

B. Variation in the seasonal pattern from year to year (the season sometimes starts early or late):

- in which month should price collection start - in exactly the same month each year or should there be flexibility?

C. A seasonal pattern that shows extreme price movements:

- should the full extent of the movements be allowed to influence the overall price index?

- annual percentage changes will be unusual if problem B also exists.

D. Seasonal changes in product ranges:

- low prices of seasonal sales (to clear stocks of old products) are likely to be followed by introduction of new products

- how to deal with any changes in quality at start of new season?

Seasonal fruit and vegetable prices are usually strongly dependent on supply conditions such as the weather, and are thus liable to show extreme movements (C) and shifts in seasons (B). Their availability is also seasonal (A). Changes in specification or quality are not common and do not therefore cause the same problems as those experienced with seasonal clothing.

In many countries the price patterns of clothing are the result of seasonal sales (for example, January and July), and seasonal availability (for example, winter coats, bathing suits). So, the problem of extreme price movements (C) is combined with seasonal unavailability (A). The situation is further complicated by seasonal changes in product ranges (D) or, in other words, the effect of fashion. New stocks of clothes arrive in the shops immediately after the sales of existing inventory at discounted prices, and are often of different styles to those that have disappeared during the period of price reductions. So, there is a question of whether the new styles are of different quality to the old styles. Of course, for seasonal items, comparisons must be made between the new products and the old products that disappeared at the end of the previous, comparable, season, maybe six months earlier.

The ILO guidelines in this area are very broad and are restricted to commenting on the need for countries to adopt a "consistent" set of procedures. A general outline of the methods used in OECD countries is provided in Table 8.

In practice, the adjustments intended to maintain the significance and continuity of the index mainly take the form of:

- using imputation techniques: If imputation is used, then all items have fixed weights, and prices are imputed for the months when prices are not available using the techniques described previously. This should avoid the problem of bias in monthly movements and should result in a smaller step-change in the index when the new season starts. It is important that the index reflects the full extent of the price difference between the last month in which a price was imputed and the

first month of the new season. If this difference is not reflected, annual movements in the price index will not correctly reflect price changes over the year. Allowing this price difference to be reflected may cause strange movements in the index between the last month in which a price was imputed and the first month of the new season, but this should be allowed to happen.

If, however, there is a tendency for seasons to shift (B), and prices are collected as soon as the new product appears, these step changes will occur in different months each year and will therefore cause the index to show strange annual changes. In this case it would be wise to collect prices in exactly the same months each year, regardless of temporary shifts in seasonal availability.

- using variable weights: Instead of using imputation to solve the problem of seasonal unavailability, a system of variable weights can be used whereby items have different weights in different months according to consumption, but within a fixed group weight. Thus, zero weights are used in the months when prices are not available (A). This approach, to some extent, answers the question of how to treat extreme price movements (C) as the very high prices common at the start of a season are likely to receive a low weight and thus have a reduced effect on the overall index. A system of variable weights will, by definition, result in prices being collected in fixed months each year (B), but this rigidity can prove a problem if seasons shift so much that prices cannot be found in a month when they have a weight. In this case, imputation may be necessary.

This method needs careful presentation as monthly movements in the group index will not only reflect price movements, but also weighting shifts. In addition, it is important that a fixed price reference base is maintained to avoid the drift bias that could arise when the weights change from month to month. The method will also require the construction of special software, different from that used for ordinary commodities.

Table 8: Consumer prices: Methodology for treatment of seasonal items

	Variable seasonal item weights	Carry forward on-season price	Exclusion of seasonal items	Imputing prices to products that disappear	No special treatment
Canada				X	
Mexico		X			
United States				X	
Australia		X (education fees)		X (food, clothing)	
Japan	X				
Korea		X			
New Zealand [1]	X				
Austria					X
Belgium	X				
Czech Republic		X			
Denmark	X (clothing)		X (food)		
Finland		X			

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Table 8: Consumer prices: Methodology for treatment of seasonal items (continued)

	Variable seasonal item weights	Carry forward on-season price	Exclusion of seasonal items	Imputing prices to products that disappear	No special treatment
France	X (food)	X (clothing)			
Germany		X	X		
Greece	..	..	..	..	..
Hungary				X	
Iceland					X
Ireland	X				
Italy	X (books)	X (food, clothing)			
Luxembourg	X				
Netherlands	X				
Norway				X	
Poland	X				
Portugal	X				
Slovak Republic		X			
Spain	X				
Sweden		X			
Switzerland		X			
Turkey	X				
United Kingdom		X			

1   For food items which are seasonal, *e.g.* fruit and vegetables, the prices collected are seasonally adjusted.
..: metadata are not available

2.12.3 Quality changes

Price indices such as CPIs are intended to measure price change only, not changes in quantity. In order to achieve this, great care must be taken to keep the quantities fixed over time, *i.e.*, not only must commodity weights be identical in the current period and price reference period, but the quality of the commodities must also be identical. Quality in this sense is in fact an extension of quantity, *i.e.,* every commodity can be thought of as a collection of characteristics, so that one variety of a commodity might be better for analysing price mechanisms.

The price quotations used in the computation of the consumer price index are for precisely defined items, *i.e.*, those forming the index basket of goods and services. Conceptually, the basket is representative of household consumption. Its composition is kept unchanged during the life of a series between re-weighting points, this being one of the conditions for the index to measure pure price changes.

In practice, this ideal situation is impaired in a number of ways:

- a product initially chosen for inclusion in the basket may progressively cease to be popular with consumers and a new one may attract their favour. Once it has become obsolete, it no longer qualifies as representative and should be replaced. This is fairly common in the textile and clothing groups;

- a commodity may no longer be produced so that when existing stocks are sold out, pricing is no longer possible and a replacement cannot be avoided. This is typically the case with model changes in household appliances and motor vehicles;

- without any radical change occurring, a product may undergo minor alterations, which nonetheless modify the product. Examples of such alterations include a change in design, standard quantity sold or colour mix or the replacement of a particular component;

Therefore, for a number of reasons it is not realistic to assume that the basket remains both constant and representative at the same time. Replacements may become necessary and item specifications may vary over time. Even in identical marketing conditions, the "old" and the "new" item are not likely to have the same price.

The treatment of quality changes is one of the more difficult areas of CPI compilation. Several procedures may be used when an item change occurs, depending mainly on:

- the importance of the quality change;

- the size of the price difference arising from this change;

- the possibility of splitting the price difference into a pure price component and a quality component;

- the possibility of simultaneously collecting the prices of the two items at least once.

The ILO guidelines in the area of quality are again very broad and are restricted to commenting on the need for countries to adopt a "consistent" set of procedures. They mainly advise that countries be aware of the need to ensure that price changes are not an unspecified combination of price and quality change.

The most critical step in taking account of quality change is to identify that such a change has occurred. In order to do this, it is first necessary to identify those characteristics of a commodity that affect its price. This can be done by consultation with producers, retailers, consumers, etc. or, for some commodities, by using hedonic regression techniques, which estimate values for individual characteristics bundled together to form a good or service.

Once the important characteristics have been identified, price collection forms should be reviewed and redesigned to force the collector or the respondent to provide information about specific characteristics. In other words, the forms will need reasonably detailed specifications for some commodities. Price collectors should be given training in correctly observing the characteristics, and in consulting retailers or producers about the price effects of any specification changes.

Wherever possible, direct adjustment procedures should be employed but this is resource-intensive and requires the co-operation of experts, retailers or producers. However, where

direct adjustment is possible, the information needed to make such adjustments may be obtained from a variety of sources (as shown in Table 9):

- very experienced price collectors or data analysts in the statistics office, may be able to quantify the effect of a quality change on the price of a commodity (used in Canada and the United States);

- retailers can often determine the effect of quality changes because they are knowledgeable about the quality characteristics of their goods or services, pricing policy and consumer behaviour;

- similarly, producers are often able to estimate the effect of quality change on price, or can calculate the marginal cost of the new features which can then be marked up by the appropriate margin at each step of the distribution chain until it reaches the consumer;

- for some commodities, it may be possible to use the "option costs" approach, which makes use of the fact that the prices of additional features are widely advertised for some commodities, *e.g.* cars, personal computers and other technological goods. Thus, previously advertised option costs are used to make adjustments when a feature becomes standard (used for various technological goods in France, Mexico and the United Kingdom);

- expert panels may be consulted to provide a consensus valuation of any quality change. The experts may represent consumers, producers, marketing experts, analysts, etc. (used in Finland and Sweden);

- hedonic regression models can be used to estimate the contribution of each unit of each characteristic to the price. This method requires a large quantity of detailed data on characteristics, and also has the disadvantage that the models can quickly become outdated in rapidly evolving markets. Models need to be completely re-estimated whenever a new feature appears. Thus, they are not ideal for commodities such as personal computers. However, the hedonic approach is extremely useful for identifying which characteristics have an influence on price (used in Canada, France and the United States).

If it is not possible to quantify the effect of a quality change, as is normally the case in all countries, then a choice must be made between the following assumptions. These are the only choices:

- any quality differences will be ignored, *i.e.*, if there is any price difference it is treated as a genuine price movement. In this case the price of the new variety can be compared directly with that of the old variety, and 100% of the price difference is reflected in the index. Obviously there is a danger that some of the price difference is due to quality change and, assuming the quality change is an improvement, the index will be biased upwards. In the case of a worsening of quality, which is not uncommon with services, there may be no price difference, but if the old and new prices are compared directly the index will be biased downwards;

- that all, or most, of any price difference is due to quality difference and that it is necessary to remove the price difference due to quality. This can be achieved in several ways depending on data availability. Firstly, by overlap imputation. If the old and new varieties are available in the market at the same point in time, the observed difference in their market prices can be used as an estimate of the value of the quality difference. In this case all of the price difference is assumed to be due to quality differences. The point in time at which the products are jointly sold is called the overlap period.

If there is no overlap period, it is necessary to create one by imputing a movement in the index for the time between the period when the old variety was last available and the period when the new variety is first available. In this case, the difference between the imputed price for the old variety and the price of the new variety is assumed to be due to quality differences. The imputed movement could be the movement of the next highest level of index aggregation (if an individual price is being imputed, then use the movement of the item index, or, if an item index is being imputed, use the movement of the group index). This is called overall mean imputation. Ideally, varieties of a similar quality would be isolated and their movement would be used. This is called class mean imputation in the United States.

The main danger with these methods arises from the marketing and pricing policies used for some goods. For many electrical and technological goods, the introduction of new varieties or ranges of varieties, is a regular occurrence. There may even be annual product development cycles. In this situation it is commonly observed that in the few months prior to the launch of the new range, manufacturers and retailers will try to clear the market of the old varieties by reducing their price. The new varieties are then launched onto the market at a higher price (in fact, new varieties are often launched at a high price to take advantage of the novelty or fashion value of the new variety, and the price may be reduced after a few months). The result is a large difference between the last price of the old variety and the first price of the new, which is partly due to marketing tactics and not just quality differences. Thus, if 100% of this difference is removed as an adjustment for quality change, the index will be biased downwards. Where possible, regular prices should be compared. There are often other price effects in operation when new varieties are introduced, and it is important to try to understand how a particular market is operating.

It is important that imputation methods are carried out based on informed judgements and that they do not become automatic procedures. In every case where a quality change has been identified, it is essential that a price analyst in the statistics office makes a judgement about whether to directly compare the old price with the new, or whether to remove any price difference.

Table 9: Consumer prices: Methodology for treatment of quality changes

	Summary of main methodologies used
Canada	Commodity specialists estimate quality differences based on product and market knowledge, taking into account information received from retailers and manufacturers. Hedonic techniques are used for computer equipment and are being investigated for clothing and other products. Option costs for cars. Expert collectors evaluate quality of clothing. Imputation used in other areas.
	Whenever a new product has gained a sufficient market share, a specification for the product is added to the pricing sample.
Mexico	Option costs for cars, electrical and electronic goods. Unit prices are computed for items sold by weights and linking.
	New goods are included at the time of the sample revision; replacement items are chosen by price collectors and controlled by officials.
United States	Various techniques are used such as imputation procedure or direct estimates and hedonics for clothing, PCs, rent and new houses. Production cost approach for cars plus some mean class imputation.
	When a specific variety is not available anymore in an outlet it is replaced by the closest one; new items are introduced when the sample is revised each year.
Australia	Overlap imputation in most areas. Option costs and expert panel for new cars. Adjustment for quality differences relies largely on external industry data.
	Decision regarding selection of replacement items after consultation. New products are included between weight updates via linking or splicing process.

Table 9: Consumer prices: Methodology for treatment of quality changes (continued)

	Summary of main methodologies used
Japan	Production cost approach is widely used (changes in production costs provide information about the value of quality change). The option cost method is applied to motor vehicles; hedonic method to the compilation of the PCs indices.
	New items are added when the sample is revised every 5 years; if an item spreads quickly on the market it is included before the next revision.
Korea	For minor changes in quality a direct adjustment is made; for major changes the splicing or overlap method is used.
	New items are introduced once the weights are revised every 5 years.
New Zealand	Prices are adjusted so that no price change is shown that is related to the change in quality.
	If an item is permanently removed from sale in an outlet it will be priced in a similar outlet; if a similar item is clearly more popular it will be priced.
Austria	Overlap price method; judgmental adjustment method; option costs for new cars.
	New products selected with regard to demand, actuality and availability and new models are implemented as soon as they are available.
Belgium	Specific computations are used for a number of items such as cars, some agriculture or pharmaceutical products and services.
	A product that disappears is replaced by a similar product.
Czech Republic	Imputation of price change using the price change of a similar product.
	Linking method is used for the replacement of outdated items; new products are included once a year and weights are reallocated within the 4-digit group.
Denmark	Overlapping prices or "monthly matched model and chaining" are used if possible and appropriate. Explicit adjustments are made for rented accommodation.
	For replacement items, the nearest substitute or item with the largest sale is taken instead.
Finland	Collector assessment of value of quality change. CSO ensures consistency of assessments. Hedonics for cars.
	New items are included when weights are updated.
France	Specific methods are used for determining "pure" price movements on a constant-quality basis, when a product is eliminated and replaced by another during the year. Splicing except PCs (hedonics) and cars (option costs and production costs).
	New items introduced annually.
Germany	Consumer price index measures only genuine price changes and reflects a constant quality of goods. Option costs for cars.
Greece	
Hungary	Price Collectors are assigned the task of selecting products of the same quality. The representative items are revised every year.
	New items are introduced every year in December. When a product gains sufficient importance it is added to the pricing sample.
Iceland	No adjustments are made.
Ireland	Expert (trade association) assessment for new cars. Adjustment are made when size pack s change.
	Prices replace products that are no longer available; new products are included at each rebasing.
Italy	Option costs for cars, otherwise overlap imputation.
	The basket of goods and services is reviewed every year and maintained fixed all through the year.
Luxembourg	

Table 9: Consumer prices: Methodology for treatment of quality changes (continued)

	Summary of main methodologies used
Netherlands	Effects of quality changes are eliminated from the index using quantifiable characteristics, specialist judgements, and overlap prices. Option costs for cars with imputation for full model changes. Option costs for PCs.
	New products are introduced into the index at base year revisions.
Norway	Imputation procedures are used to reflect quality differences.
	New products are introduced and old products retrieved once a year.
Poland	Products with substantial quality changes are treated as new ones; minor changes are not considered.
	New products are introduced when they have reached a sufficient share in the market.
Portugal	Adjustment for quality changes by overlap prices.
	New products are introduced when there is enough information to decide upon their inclusion and re-weighting.
Slovak Republic	Adjustment for quality differences is taken into account when replacement of the product is planned: a parallel price survey is conducted for the product with new specification.
	New products are determined through the results of the annual household budget survey.
Spain	Several techniques are used for quality changes; hedonic techniques are currently being investigated for some products.
	The list of products is reviewed every year (since January 2002).
Sweden	Quality adjustments are made when a forced substitution is performed; price collectors judgement for most goods; hedonics for clothing; expert panel for cars.
	New products are introduced continuously and old products removed.
Switzerland	Small quality changes are not taken into account. Prices are adjusted for substantial quality change where differences can be quantified, otherwise products considered as totally new ones and linked into the index.
	List of varieties is reviewed continuously and new products included according to specific rules.
Turkey	No adjustments are made.
United Kingdom	Option costs for new cars and PCs. Imputation in all other areas.
	List of new products is reviewed in January of each year; New products are included and old products removed.

2.13 Treatment of rent and home ownership

The cost of housing is generally a major component of household expenditure in all OECD Member countries. For example, the CPI weight for "shelter" in 1992 in Canada was just under 28%[36]. The 14th International Conference of Labour Statisticians in 1987 agreed that a CPI should include a component for shelter. However, the measurement of shelter costs is far from straightforward and several serious measurement problems occur in many countries.

Firstly, although it might at first appear a simple matter to identify weights and price indicators for rents paid for housing, there are often conceptual decisions to be made about how to treat controlled rents and how to design price surveys where the rental market is small or unregulated. There are also often quality adjustment issues to take into account.

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[36] Statistics Canada, *Your Guide to the Consumer Price Index*, Catalogue No. 62-557-XPB, 1996, page 6.

The second major problem with shelter costs is how to deal with owner-occupied housing. Here, there may be no monetary payments (in which case a decision is needed about whether to impute) or house purchases (cash or mortgage payments) may contain a capital component as well as a consumption component. There is no generally accepted method for dealing with owner-occupied housing. Practices vary widely between countries because the various uses of a CPI have different priorities in different countries, and different practices have different data requirements.

The main questions surrounding the treatment of shelter costs are:

- what is being consumed?

- should expenditure weights, and thus prices, be imputed in CPIs?

- which measurement approach (user-cost, acquisitions or payments) is appropriate?

- should interest be included in CPIs?

2.13.1 What is being consumed?

Housing services in the national accounts

In the case of rented dwellings, it seems straightforward that a tenant is paying for, and consuming, housing services produced by the owner of the house. The owner is treated as being the proprietor of an enterprise that uses the house as a capital asset to produce housing services. When the owner of a dwelling occupies their own house, the housing services are treated as being produced and consumed by the household, and a value is imputed for this output despite the fact that no monetary transaction has occurred.

The 1993 SNA recommends valuing non-monetary transactions at market prices. In the absence of reliable market prices, the SNA recommends a second-best solution whereby the value of the output of a good or service for own use is estimated using the sum of its costs of production. In the case of owner-occupied housing services, the relevant market prices are the estimated rents that would be charged for similar rented accommodation. In the absence of reliable data on rents, it is extremely difficult to estimate a value for rent that would cover all costs of owner-occupied housing services based on the sum of the costs of production. However, the SNA considers that the existence of a well-organised rented housing market in most countries means that this problem is rarely encountered by national accountants.

In the 1993 SNA the use of housing is treated as a genuine process of production which will normally require some inputs such as routine repairs and maintenance. Routine repairs and maintenance are those needed to maintain the dwelling in working condition, and not those which increase its life, thereby adding to the stock of fixed assets. Routine repairs and maintenance are generally treated as intermediate consumption [37] whereas major renovations are treated as gross fixed capital formation. The use of the house is treated as consumption of fixed capital (depreciation) even though this is usually very difficult to estimate.

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[37] However, routine repairs carried out by the tenant or owner is treated as final consumption expenditure. *System of National Accounts 1993 – Eurostat, IMF, OECD, UN, World Bank (1993), Paragraph 9.59, page 211.*

Housing services in CPIs

The 1993 SNA thus views a dwelling as a capital good that is used in the production of housing services. The view amongst price statisticians is not so clear, and an owner-occupied house is treated either as a capital good, a consumer good, or both. Some statistical agencies view owner-occupied dwellings as entirely capital goods and exclude their costs from their CPIs (Belgium, France, Greece, Italy, Luxembourg, Poland, Portugal and Spain). Other agencies view owner-occupied dwellings entirely as consumer goods and employ either an acquisitions or payments approach (Australia, New Zealand and Ireland). Other agencies see owner-occupied dwellings as having both capital and consumption components and thus employ a user cost approach which attempts to remove the capital component (United States, Canada, Japan and several EU countries).

2.13.2 Which measurement approach (user-cost, acquisitions or payments) is appropriate?

Consumption expenditure may be measured either from the consumption approach (user cost), or the expenditure approach (acquisitions or payments/outlays). Similarly CPIs may be constructed using any of these approaches, depending on the use to which the CPI is put:

User cost approach

This measures the total value of goods and services *consumed* during the period. It is the approach most consistent with SNA concepts, where the consumption of services from durable goods is treated as flowing over several time periods. A deflator of household final consumption expenditure would be based on the user cost approach.

In theory, a CPI based on the user cost approach should measure the cost of consuming the flow of services from a durable good rather than its purchase price. This is rarely done in practice, however, although an exception is made for owner-occupied housing as this is considered to have a much more significant investment component than other durables.

The user cost approach is not concerned with whether any monetary outlay is involved in the consumption and therefore involves notional measurements. The main imputation is for owner-occupied housing.

A household is seen as consuming the flow of shelter services provided by the dwelling of which it is the owsner-occupier. The cost of this consumption should be included in a CPI despite the fact that monetary transactions may not be needed for this consumption to take place. The user cost approach estimates the costs of consumption using an approach based on rental equivalence either through: i) the imputation of actual rents; or ii) estimated rents derived from the costs of consumption.

Imputation of actual rents – The rental equivalence approach to measuring the costs of consumption assumes that these costs are equal to the rent that could be charged for the property. Thus the costs can be imputed from the rent that is being paid in the market for equivalent dwellings. The main problems with this approach are:

- establishing a sound estimate of base period expenditure in order to impute a weight for owner-occupied dwelling costs. This is often derived from the owner-occupiers' own assessments of the rental value of their dwellings, which may be unreliable;

- where the rental market is small, and made up of different types of dwellings to those that are owner-occupied, it may be difficult to set up and maintain a representative sample of rental dwellings;

- rental markets are frequently controlled to some extent by governments.

This is the approach used in Mexico, the United States, Japan, Korea, Czech Republic, Denmark, Germany, Hungary, Iceland, Netherlands, Norway, Slovak Republic, Switzerland and Turkey.

Rents estimated from the costs of consumption — In theory, a house owner would charge a rent which at least covers the following items:

a. repairs and maintenance (including materials and owner's labour costs)
b. taxes (*e.g.* rates)
c. insurance (service charge only)
d. cost of ownership   =   consumption of fixed capital   *i.e.* depreciation
                                  Plus   property income payable   *i.e.* mortgage interest
                                  plus   earnings foregone   *i.e.* opportunity cost of owning house rather than receiving property income by investing elsewhere
                                  less   gain in equity   *i.e.* gain in value of house

In practice, statistical agencies impute a weight based on items a, b and c plus mortgage interest payments and an estimate of depreciation based on the value of the housing stock. Earnings foregone and gains in equity are generally not covered.

This is the approach used in Canada, Finland, Sweden and the United Kingdom.

Acquisitions approach

This measures the total value of goods and services *delivered* during the given period, regardless of whether payment has been made, *i.e.* it covers all monetary transactions undertaken by households for which payment should be made, regardless of whether the item acquired is used or paid for. It is generally considered the best approach for measuring inflation for monetary policy purposes (in which case interest must be excluded). It is thus the best when a CPI is being used to index-link gilts or bonds.

Only prices for actual market transactions are included, with no notional or imputed prices.

Owner-occupied housing services are measured as the change in the cost of the net acquisition of owner-occupied dwellings, although since the net acquisition of existing dwellings is assumed to be zero, it is the change in the total market value of new dwellings only which is measured. A conceptual problem with this approach is that it reflects price changes caused by investment factors (*i.e.* includes changes in the costs of capital formation) as well as consumption factors. A more practical problem is that house prices are subject to short-term speculative pressures, which creates price volatility.

The costs of repairs and maintenance, taxes and insurance are also covered. Expenditure is defined as occurring when a purchase agreement becomes binding and the full cost is taken into

account when ownership passes to the purchaser. The weight is the net purchases of dwellings in the base period.

This approach is used in Australia and New Zealand.

Payments/outlays approach

This measures the payments made during the period regardless of whether the goods and services were delivered or consumed. It is generally considered the best approach when a CPI is being used to escalate incomes, benefits, pensions or wages.

Only prices for actual market transactions are included, with no notional or imputed prices.

For treatment of owner-occupied housing services, the weight is derived from all payments made in the base period regardless of when the dwelling was purchased. Thus, repairs and maintenance, taxes and insurance are covered, plus either:

a. mortgage interest payments
            or
b. mortgage interest payments +   mortgage principal
            or
c. mortgage interest payments +   mortgage principal   +   down payments and
                                                                                net cash purchases

Approaches b and c will reflect changes in the cost of capital formation. Approach a is used in Ireland.

2.13.3 Owner-occupied housing in OECD Member Countries

As mentioned above in Part 2.13, a wide range of methods are used by countries in the treatment of owner-occupied housing in the CPI. Again, the ILO guidelines do not provide any specific recommendations as to which methodology should be used. Table 10 compares the different approaches used by countries in the treatment of owner-occupied housing in their national CPIs.

Table 10: Consumer prices: Summary of approaches in treatment of owner-occupied housing [1]

	Excluded from CPI	Acquisitions approach	Imputed actual rent	Cost of consumption	Other methodology
Canada				X	
Mexico			X		
United States			X		
Australia		X			
Japan			X		
Korea			X		
New Zealand		X			
Austria					X [2]

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Table 10: Consumer prices: Summary of approaches in treatment of owner-occupied housing [1]
(continued)

	Excluded from CPI	Acquisitions approach	Imputed actual rent	Cost of consumption	Other methodology
Belgium	X				
Czech Republic			X		
Denmark			X		
Finland				X	
France	X				
Germany			X		
Greece	X				
Hungary			X		
Iceland			X		
Ireland					X [3]
Italy	X				
Luxembourg	X				
Netherlands			X		
Norway			X		
Poland	X				
Portugal	X				
Slovak Republic			X		
Spain	X				
Sweden				X	
Switzerland			X		
Turkey			X		
United Kingdom				X	

[1] Minor repairs and maintenance and property taxes are included in all cases as part of final consumption expenditure of households.
[2] House construction commodities only.
[3] Mortgage interest only.

2.13.4 Should expenditure weights, and thus prices, be imputed in CPIs?

The standard definition of HFCE in the 1993 SNA includes many imputed expenditures for which prices are also imputed, principally goods and services that households produce for their own consumption, such as agricultural goods and household services (actual final consumption also includes social transfers in kind). Thus, a deflator for HFCE in the national accounts should cover the goods and services consumed by households, rather than those purchased by monetary transaction, and should therefore include imputed weights and prices for goods and services produced by households for their own consumption.

However, deflation of the national accounts is rarely the principal role for a CPI. In his 1997 paper "Non-market Goods and Services in CPIs"[38] Peter Hill argues that the most objective measure of consumer inflation is provided by a price index based on goods and services purchased by households only in monetary transactions. Hill argues that imputed prices contribute no information about

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[38] Paper submitted by the ECE secretariat (prepared by Peter Hill) to the Joint ECE/ILO Meeting on CPIs, Geneva , November, 1997.

inflation and should thus be excluded from a CPI whether it is designed to measure inflation or the cost of living (a household does not need compensation for increases in its imputed expenditures). Thus, the index will not cover consumption of goods and services produced by households for their own use. It should, however, cover expenditure on the inputs to this production (but not expenditure on capital formation).

The majority of members of a 1997 CPI advisory committee in New Zealand agreed that the credibility of a CPI is enhanced by its use of prices paid in market transactions, and reduced by the use of imputed prices and notional transactions.

CPIs should, however, cover household expenditure on non-market goods and services sold by governments and non-profit institutions, despite the fact that the prices are reduced and may be independent of the general rate of inflation. These prices are an essential part of inflation experienced by households. There may be a need, however, to produce subsidiary indices excluding these prices for the purposes of analysing inflationary pressures.

2.13.5 Should interest be included in CPIs?

The question of whether or not to include interest payments in a CPI stems from the question of whether or not debt should be treated as a commodity, where interest becomes a payment for a service.

Interest payments should be included when a CPI is being used to assess the impact of inflation on households, to maintain the purchasing power of welfare benefits, as an input into wage negotiations or as an escalator for contracts of supply of goods and services. However, since interest rates are a key instrument of monetary policy, their inclusion in a CPI detracts from its use as a tool for monitoring the effectiveness of monetary policy. Interest rates tend to show short-term cyclical volatility, which masks inflation trends.

There are three ways of measuring mortgage interest - simple revaluation, debt profile, and acquisition.

2.13.6 Rented housing

The ILO guidelines in the area of rented housing merely state that rent information should be obtained from specially designed surveys of dwellings periodically updated to ensure continuing representativeness. The issues of particular concern regarding the quality and comparability of such information include the:

• collection of price data from a variety of dwelling types and sizes;

• inclusion of both high and low value housing;

• geographic representativity of the sample of dwellings;

• inclusion of both private and government owned dwellings;

- methodologies for ensuring that attempts are made to collect information about quality changes for individual dwellings such as basing the survey on dwellings and not households, using a matched sample approach.

Rent surveys are employed in almost all OECD Member countries. These are often quite small surveys though a notable exception is the United States where a survey of 40 000 tenants is conducted monthly. In a number of other countries, for example Australia, New Zealand and the United Kingdom, rent survey information for private sector properties is supplemented by data supplied directly by public rental authorities.

Table 11 summarises methodologies actually used and lists a range of different approaches to obtain price details on rent. These entail the collection of information from agents, landlords or tenants.

Table 11: Consumer prices: Methodology for treatment of rented housing

	Methodology
Canada	Rent data are collected as part of the Labour Force Survey in which 15 000 dwellings are surveyed monthly.
Mexico	Rents are collected from 5 000 households monthly.
United States	Rent data are obtained from a sample of about 50 000 landlords and tenants. The sample is divided into 6 panels and each panel is contacted once every 6 months.
Australia	Rent data are obtained from property management companies and from government housing commissions.
Japan	Public and private sector rent data are obtained by monthly surveys of 22 000 rental units.
Korea	Rents are collected monthly from households as part of the Family Income and Expenditure Survey (FIES).
New Zealand	Rent data are obtained directly from Housing New Zealand.
Austria	Rental data (15 000 prices) are obtained quarterly in a sample survey.
Belgium	Rental data are collected centrally.
Czech Republic	Rents are included.
Denmark	Rent data are obtained from a survey of about 4 000 rental units distributed throughout country twice a year.
Finland	Rents are included.
France	Rents are included.
Germany	Rents are included.
Greece	Rent data derived from a twice-yearly sample survey of rented dwellings in greater Athens area.
Hungary	Rents are included.
Iceland	Rent data obtained by means of special surveys.
Ireland	Index for rent comprises rent, local authority charges, house insurance, repair and maintenance.
Italy	Data on rents are obtained from a quarterly survey of about 12 000 households.
Luxembourg	Rents are included.
Netherlands	Rent quotations are obtained by an annual mail survey to 3 500 landlords.
Norway	Rent data are collected quarterly by phone inquiry to 1 300 tenants and by centralised survey to 75 000 part owner in housing co-operatives.
Poland	Rents are included.

Table 11: Consumer prices: Methodology for treatment of rented housing (continued)

	Methodology
Portugal	Rent data are obtained quarterly directly from households.
Slovak Republic	Rents are included.
Spain	Rents are included.
Sweden	Rent data are obtained from a quarterly survey of about 1 000 dwellings.
Switzerland	Rent data are obtained from a quarterly survey of about 5 000 residences, with an eight of the sample being renewed each quarter. Quotations exclude electricity, water and heating costs.
Turkey	Rents are included.
United Kingdom	Private rents are taken net of any inclusive water, sewerage or council charges, as these are allowed for as centrally collected items.

3. PRODUCER PRICES [39]

3.1 Introduction

A variety of tools are used to measure price changes taking place in an economy. These include consumer price indices (CPIs), price indices relating to specific goods and/or services, GDP deflators and producer price indices (PPIs). Whereas CPIs are designed to measure changes over time in average retail prices of a fixed basket of goods and services taken as representing the consumption habits of households, the purpose of PPIs is to provide measures of average movements of prices received by the producers of commodities.

PPIs are not a measure of average price levels or a measure of the costs of production. Moreover, PPIs do not include commercial mark-ups. In principle, they also exclude transport costs and consumption taxes.

Though the scope of PPIs varies, they are generally calculated on the basis of the total turnover of a definable industry such as manufacturing, agriculture or mining.

PPIs are used extensively at a detailed level for monitoring price movements (or deflating output) of specific products or industries. In addition, they are usually aggregated in some way, to provide more general indicators of inflationary pressure. Many countries aggregate by stage-of-processing, *i.e.*, PPIs are calculated for raw materials, intermediate goods and finished goods (sometimes split into consumer and investment goods) for specific industries, where possible, or for the whole economy.

In the same way that there is no single, precise definition of what a CPI should measure, the term PPI is used to cover a number of different concepts, and the indices themselves are put to a range of uses. The term PPI is most commonly used to refer to output PPIs, which have a scope consistent with the national accounts definition of output, *i.e.*, they reflect changes in ex-factory gate prices valued at basic prices. In other words, they are the prices received by the producer at the first stage of commercialisation. Input PPIs, on the other hand, reflect changes in prices paid by producers for raw materials and intermediate goods. Their scope is consistent with the national accounts definition of intermediate consumption, hence they are valued at purchasers' prices.

Wholesale price indices (WPIs) reflect changes in the prices paid at various stages of distribution and can include prices of raw materials for intermediate and final consumption, prices of intermediate or unfinished goods, and prices of finished goods through the distribution chain up to the point of retail. Prices for WPIs will generally be valued at purchasers' prices[40].

Output PPIs often include or are published alongside price indices for exported products. Similarly, input PPIs and WPIs either include or are associated with import price indices. The relationships between price indices for the different stages of production, distribution and final demand of consumer goods (and some investment goods) – input/output PPIs, import/export price indices, WPIs and CPIs – has led several statistical offices to develop a framework or family of price

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[39] The text on conceptual issues outlined in this chapter was drawn extensively from the paper, *Producer Price Indices*, F. Maitland-Smith, presented at the Joint OECD-ESCAP Workshop on Key Economic Indicators, held in Bangkok on 22-25 May 2000.
[40] For several countries the term "producer price index" replaced the term "wholesale price index" in the 1970's or 1980's after a change in methodology. For some countries, the term "wholesale price index" is used for historical reasons and in fact refers to a price index following the same methodology as for a producer price index. This publication describes the wholesale price index for those countries that do not measure producer prices.

statistics. Work is underway in several countries to fill some of the gaps in the framework, *e.g.*, through the compilation of PPIs for services, price indices for government output, price indices for all investment goods.

Some countries are taking this a step further and combining the appropriate component indices to produce whole economy, or at least final expenditure, price indices. For example, the United Kingdom Office of National Statistics developed the Final Expenditure Prices Index (FEPI) as a broad measure of United Kingdom inflation. The index covered the economy more widely than indices such as the Retail Prices Index (RPI) and the Producer Prices Index (PPI). It was published on an experimental basis from September 1997 to December 2001.[41] The transactions covered in the index were final purchases by United Kingdom residents. The index covered:

- the Index of Consumer Prices (ICP), with a weight of 60.2%

- the Index of Investment Prices (IIP), with a weight of 18.8%

- the Index of Government Prices (IGP), with a weight of 18.5%

- the Index of Non-Profit Institutions Prices (INP), with a weight of 2.4%

The main uses of PPIs include:

- deflation of national accounts values. This should be viewed in the context of the SNA 93 supply-use framework, [42] insofar as the valuation and scope of a deflator is automatically clearly defined for each cell of the supply-use table. To produce supply-use tables in constant price terms, it is necessary to have deflators of output, imports, intermediate consumption, and all categories of final demand. Domestic output is deflated by output PPIs, where separate PPIs are compiled for domestic output destined for the domestic market, and for domestic output destined for export. These output PPIs should be compiled using basic prices. Input PPIs, compiled using purchasers' prices, are used to deflate intermediate consumption. Similarly, PPIs at purchasers' prices are used to deflate components of gross fixed capital formation, such as domestically produced machinery and equipment. So, national accounts deflation requires a range of detailed PPIs, on different valuation bases, as well as deflators for household final consumption expenditure (CPI components), imports (usually a combination of price indices and unit value indices), government final consumption expenditure (various, including earnings indices), and construction price indices;

- as an indicator of inflation. PPIs are often viewed as leading indicators of pressure on consumer price inflation, *i.e.* price change in PPIs feeds through to CPIs with varying time-lags for different commodities. Inflation analysts generally require a framework of price indices, similar to the one described for national accounts deflation, although their coverage requirements may be different;

- contract escalation;

- revaluing fixed assets or stocks.

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[41] It was withdrawn because of the impossibility of calculating reliable indices for government output prices. When these output prices become available, the question of producing the FEPI will be reconsidered. For more detail see
http://www.statistics.gov.uk/themes/economy/Articles/PricesAndInflation/FEPI.asp#art
[42] These are "tables in the form of matrices that record how supplies of different kinds of goods and services originate from domestic industries and imports and how those supplies are allocated between various intermediate or final uses, including exports". *System of National Accounts 1993* – Eurostat, IMF, OECD, UN, World Bank (1993), Paragraph 1.16.

3.2 PPI indicators in the MEI

Part One of MEI publishes a table of aggregate indices for manufacturing whilst Part Two contains a range of different country disaggregations. These are mainly either on an activity basis (*e.g.* total industry, manufacturing, mining, electricity, gas and water) or by type of end use (*e.g.* finished investment goods, finished consumer durables, finished consumer non-durables, intermediate goods), though indices on individual commodities are provided for some countries.

As the country descriptions of the indicators provided in *Main Economic Indicators: Sources and Definitions* show, individual Member countries compile and disseminate a range of indices in respect of the manufacturing sector. These comprise:

- input price indices for the market purchase prices of raw materials/inputs to the manufacturing process;

- output price indices for goods as they leave the factory gate;

- wholesale price indices which refer to prices received by wholesalers;

- indices covering exported commodities;

- indices covering imported commodities.

Table 12 lists the types of indices published in *Main Economic Indicators*. Although some countries may publish a range of these types of series (in particular output price indices and wholesale price indices), only those series types published in *Main Economic Indicators* are shown here. Moreover, it does not list the series by activity or by type of end use since the published series vary considerably across Member countries that such a list would be too cumbersome. However, a number of target series have been targeted for countrywide inclusion in MEI. These series are listed in Table 1 in Part 1.5. They are available or are expected to become available at national level for most OECD countries, in particular the EU Member States, within the next year. Target series that are available for a particular country will be included in MEI within a similar timeframe.

In terms of data that can currently be compared across countries in MEI, output PPIs for manufacturing are published in Part One. However, at the present time, Iceland and Slovak Republic are not included in the subject table and for Mexico, Austria, Greece, Ireland, Italy, Luxembourg, Spain, Switzerland and Turkey, alternative series are used because PPIs for manufacturing are not available.

Table 12: Producer prices: Types of indices published in *Main Economic Indicators*

Country	Input PPI	Output PPI	Wholesale Price Index	Export Price Index	Import Price Index
Canada		X		X	X
Mexico		X		X	
United States		X			
Australia	X	X			X
Japan	X		X		
Korea		X			
New Zealand		X			
Austria			X		
Belgium		X			X
Czech Republic		X			
Denmark		X	X		
Finland		X			
France		X			
Germany		X			
Greece			X	X	X
Hungary		X		X	
Iceland		X			
Ireland	X	X	X	X	X
Italy		X			
Luxembourg		X		X	
Netherlands	X	X		X	X
Norway		X	X	X	X
Poland				X	X
Portugal		X			
Slovak Republic		X			
Spain	X	X			
Sweden		X		X	X
Switzerland		X		X	
Turkey		X	X		
United Kingdom	X	X		X	X

3.3 Access to detailed methodological information

Detailed methodological information for producer prices for individual OECD Member countries may be accessed from the sources listed in Table 13.

Table 13: Producer prices: Access to detailed methodological information

	National sources	IMF DSBB
Canada	http://www.statcan.ca/cgibin/sdds/sdds.cgi?sdds=2318 (English) http://www.statcan.ca/cgibin/sdds/sdds_f.cgi?sdds=2318 (French)	http://dsbb.imf.org/country/can/ppibase.htm
Mexico	..	http://dsbb.imf.org/country/mex/ppibase.htm
United States	http://stats.bls.gov/opub/hom/homch14_itc.htm	http://dsbb.imf.org/country/usa/ppibase.htm
Australia	Http://www.abs.gov.au/ausstats/abs%40.nsf/7884593a 92027766ca2568b5007b8617/7678ad84c4e5f97fca256 888001f52c3!OpenDocument	http://dsbb.imf.org/country/aus/ppibase.htm
Japan	..	http://dsbb.imf.org/country/jpn/ppibase.htm
Korea	..	http://dsbb.imf.org/country/kor/ppibase.htm
New Zealand[1]	http://www.stats.govt.nz/domino/external/pasfull/pasfull.nsf/7cf46ae26dcb6800cc256a62000a2248/4c2567ef00247c6acc256bc60082f908?OpenDocument	..
Austria	..	http://dsbb.imf.org/country/aut/ppibase.htm
Belgium	http://www.statbel.fgov.be/products/pmopi_fr.asp (French)	http://dsbb.imf.org/country/bel/ppibase.htm
Czech Republic	http://www.czso.cz/eng/figures/7/70/70030008/i7003008.htm	http://dsbb.imf.org/country/cze/ppibase.htm
Denmark	http://www.dst.dk/666	http://dsbb.imf.org/country/dnk/ppibase.htm
Finland	..	http://dsbb.imf.org/country/fin/ppibase.htm
France	http://www.insee.fr/en/indicateur/indic_conj/donnees/method_idconj_25.pdf (English) http://www.insee.fr/fr/indicateur/indic_conj/donnees/method_idconj_25.pdf (French)	http://dsbb.imf.org/country/fra/ppibase.htm
Germany	..	http://dsbb.imf.org/country/deu/ppibase.htm
Greece[1]	..	..
Hungary	..	http://dsbb.imf.org/country/hun/ppibase.htm
Iceland	..	http://dsbb.imf.org/country/isl/ppibase.htm
Ireland	..	http://dsbb.imf.org/country/irl/ppibase.htm
Italy	..	http://dsbb.imf.org/country/ita/ppibase.htm
Luxembourg[1]	..	..
Netherlands	..	http://dsbb.imf.org/country/nld/ppibase.htm
Norway	http://www.ssb.no/english/subjects/08/02/20/ppi_en/	http://dsbb.imf.org/country/nor/ppibase.htm
Poland	..	http://dsbb.imf.org/country/pol/ppibase.htm
Portugal	..	http://dsbb.imf.org/country/prt/ppibase.htm
Slovak Republic	..	http://dsbb.imf.org/country/svk/ppibase.htm
Spain	http://www.ine.es/dacoin/dacoinme/inotipri.htm	http://dsbb.imf.org/country/esp/ppibase.htm
Sweden	..	http://dsbb.imf.org/country/swe/ppibase.htm
Switzerland	..	http://dsbb.imf.org/country/che/ppibase.htm
Turkey	..	http://dsbb.imf.org/country/tur/ppibase.htm
United Kingdom	http://www.statistics.gov.uk/statbase/Source.asp?vlnk=511	http://dsbb.imf.org/country/gbr/ppibase.htm

[1] New Zealand, Greece and Luxembourg do not subscribe to the IMF DSBB at date of publication; ..: metadata are not available

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3.4 International guidelines and recommendations

There are no universally accepted international guidelines and recommendations for the compilation of PPIs. An overview of the steps involved in the compilation of PPIs is provided in the United Nations publication, *Manual on Producers' Price Indices for Industrial Goods*.[43] However, it should be emphasised that this manual only provides a detailed description of methodologies and best practice for the collection of price data and the compilation of PPIs.

As the United Nations publication was drafted more than twenty years ago, the Inter-Secretariat Working Group on Price Statistics (IWGPS) formed the Technical Expert Group for Updating the Manual on PPI (TEG-PPI) to provide the IWGPS with technical advice on revision of the PPI Manual. The new manual is being co-ordinated with the development of the CPI manual referred to in Part 2.7 and, wherever appropriate, it reflects consistent content, terminology and methodology with the CPI manual. As with the CPI manual, it is expected that the PPI manual will be published in early 2003.[44]

Following the adoption of European Council Regulation No. 1165/98 of 19 May 1998 concerning short-term statistics, EU Member States are required to collect total output prices, output prices of the domestic market and output prices of the non-domestic market (although if the latter is not available, it may be approximated by a unit value index). Although output prices consistent with the Regulation are not yet available for all Member States, it is anticipated that such data will be available in 2003. The Eurostat manual associated with the Regulation, *Methodology of Industrial Short-term Statistics - Rules and Recommendations*, contains methodological guidelines for output prices.[45]

The major elements in the compilation of PPIs that impact on their international comparability are:

- scope/coverage
  - PPI vs. WPI
  - activity versus product
  - domestic versus export market
  - gross output versus net sector weights

- basic data
  - weighting data and frequency of weight revisions
  - establishment and product sample design and selection
  - frequency and timing
  - price collection methods
  - product specification
  - sample maintenance and rotation

- index calculation
  - elementary aggregation
  - index aggregation
  - alignment of expenditure and price reference base
  - chaining re-weighted indices

These elements are discussed below in the remaining sections of this Part.

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[43] *Manual on Producers' Price Indices for Industrial Goods*, Series M, No. 66, United Nations, New York, 1979.

[44] Drafts of the manual can be viewed at http://www.imf.org/external/np/sta/tegppi/index.htm

[45] See http://forum.europa.eu.int/irc/dsis/bmethods/info/data/new/embs/sts/part2d.html for an updated version of the output prices part of this publication.

3.5 Scope/coverage

Producer price indices versus wholesale price indices

The majority of OECD Member countries only produce PPIs, some only produce WPIs, and some produce a mixture of both. The differences between WPIs and input and output PPIs arise from differences in the basket of products in the sample (weights), the inclusion/exclusion of prices of imported/exported goods, the types of establishment in the sample (wholesalers and/or producers), and the price components included.

Wholesale price indices reflect changes in the prices paid at various stages of distribution and can include prices of raw materials for intermediate and final consumption, prices of intermediate or unfinished goods, and prices of finished goods through the distribution chain up to the point of retail. Investment and consumer goods may be covered. Prices of imports are usually included. Prices for WPIs will generally be valued at purchasers' prices, *i.e.*, discounts and rebates are reflected, taxes and subsidies on products are included and trade and transport margins are included.

Input producer price indices reflect changes in prices paid by producers for raw materials and intermediate goods. They are valued at purchasers' prices.

Output producer price indices reflect changes in ex-factory gate prices valued at basic prices, *i.e.*, actual transaction prices of domestic production, taking account of discounts and rebates, excluding taxes and subsidies on products and excluding trade and transport margins. This is sometimes referred to as the first stage of commercialisation. The UN manual makes the following recommendations regarding the treatment of various price components in output PPIs:

- taxes and subsidies (including VAT) – although the preferred treatment for PPIs is that taxes and subsidies on products should be excluded, particularly where PPIs are being used to deflate output, a pragmatic approach should be taken, since in some countries there may be no choice as to whether the prices collected are inclusive of taxes and subsidies. Where there is a choice, user requirements should determine the treatment. The UN Manual stresses the importance of knowing exactly what is being reported for each product by each respondent and that a uniform approach be taken for all products;

- discounts and rebates margins – actual transaction prices should be used, taking account of discounts and rebates, rather than list prices or prices calculated as the sum of inputs and profit margins;

- trade and transport margins – for PPIs, ex-factory gate prices should be collected, excluding any costs associated with transportation. Country practice is normally to exclude transportation where it is invoiced separately, but where goods are sold on the basis of delivered prices (*i.e.* transport is not invoiced separately) delivered prices are collected.

Table 14 gives an idea of the basis of prices collected in OECD Member countries. Most countries collect basic prices (excluding taxes and subsidies and transportation costs). However, in many cases, flexibility must be exercised as basic prices may not be available. For example, the United States uses market prices for certain farm products whereas Australia includes transportation costs except for imports, which are priced free-on-board. Furthermore, depending on the type of index produced, adjustment for taxes may differ. For instance, Japan includes excise tax in the domestic wholesale price index but excludes it from the export price and the import price indices.

Table 14: Producer prices: Basis of prices

	Are taxes and subsidies on products included?		Are rebates and discounts taken into account?	Are transportation costs included?
	VAT	**Other**		
Canada	No	No	Yes	No
Mexico	No	No	Yes	No
United States	..	No	Yes	No
Australia	No	No	Yes	Yes [1]
Japan	Yes	Yes	No	No
Korea	No	Yes (indirect taxes)	Yes	No
New Zealand	No	No	No	No
Austria	No	No	No	..
Belgium	No	No	Yes	..
Czech Republic	No	No	..	No
Denmark	No	Subsidies	No	Factory-gate
Finland	No	No	No	1st stage
France	No	No	No	Factory-gate
Germany	No	Yes	Yes	Yes [2]
Greece	No	No	..	No
Hungary	No	Subsidies only	..	..
Iceland	..	..	..	..
Ireland	No	No	No	Factory-gate
Italy	No	No	No	Factory-gate
Luxembourg	No	No	No	1st stage
Netherlands	No	No	No	Factory-gate
Norway	No	No	No	Factory-gate
Poland	No	Yes	..	..
Portugal	No	No	No	..
Slovak Republic	No	No	..	No
Spain	No	Yes	No	No
Sweden	No	No	No	Factory-gate [3]
Switzerland	No	Yes	Yes	Factory-gate
Turkey	Yes	..	No	Factory-gate
United Kingdom	No	Excise duties	Yes	No

[1] Imports f.o.b.
[2] If they form an integral part of price
[3] Imports c.i.f.
..: metadata are not available

Activity versus product

Individual OECD Member countries have developed their own national activity classifications that reflect the structure of their own economies but at the higher levels of aggregation they are all consistent with standard international classifications such as the *International Standard Industrial*

Classification (ISIC) Revision 3 or the equivalent European Union classification, the *Statistical Classification of Economic Activities in the European Community (NACE) Revision 1.* They all publish activity indices, albeit at varying degrees of aggregation, ranging from 2 digit ISIC – giving up to 23 manufacturing series – to 6 digit NACE.

In most countries, PPIs cover those activities that produce goods, such as mining and manufacturing (ISIC tabulation categories C-D) and sometimes agriculture and fishing (ISIC A-B), electricity, gas and water supply (ISIC E), construction (ISIC F) and transport, storage and communications (ISIC I). Some OECD countries exclude a number of specific manufacturing activities where production is not significant such as office and computing machinery, shipbuilding, aircraft manufacture and recycling.

Many countries also publish product or commodity indices, using national classifications. National product classifications are less likely to be consistent with the international standard, *Central Product Classification (CPC), Version 1.0*, than is the case for activity classifications. The *Statistical Classification of Products by Activity (CPA)* is the European Union version of the CPC. Whereas the CPC is merely a recommended classification, the CPA is legally binding in the European Union although national versions of the CPA are possible. The CPA relates directly to the classification structure in NACE Rev 1, the first four digits being the same, and is linked to CPC via the fifth and sixth digits. Both CPC and CPA are linked to the World Customs Organisation's commodity coding system, the *Harmonised System*. Finally, another EU product classification system is PRODCOM. This extends the CPA code structure from six to eight digits although PRODCOM only covers sections C, D and E of the NACE Rev I classification.

Table 15 provides information about activity and product classification, as well as the activity coverage in Part One of MEI. The subject table in Part One contains PPIs for manufacturing wherever possible, but as can be seen from information in the third column, in several cases, proxy series must be used. Iceland and the Slovak Republic are not covered at the present time. Where national activity classifications are used, the international classification system to which the national system corresponds is also given.

Table 15: Producer prices: Activity and product classification, etc.

	Activity Classification	**Product Classification**	**Activities covered (ISIC sections)**
Canada	North American Industry Classification System (broadly corresponds to ISIC Rev. 3 at 2-digit level)	Canadian Principal Commodity Groups Classification	Manufacturing
Mexico	1980 Mexican Catalogue of Economic Activities	End-use data available	Agriculture, mining, manufacturing and construction
United States	1987 US Standard Industry Classification (corresponds to ISIC Rev. 2)	End-use data available	Manufacturing
Australia	Australian and New Zealand Standard Industry Classification (corresponds to ISIC Rev. 3 at 4-digit level)	Australian and New Zealand Standard Commodity Classification	Manufacturing
Japan	Standard Industrial Classification of Japan (corresponds to ISIC Rev. 3 at 2-digit level)	End-use data available	Manufacturing

	Activity Classification	**Product Classification**	**Activities covered (ISIC sections)**
Korea	1991 Korean Standard Industrial Classification (corresponds to ISIC Rev. 3 at 3-digit level)	..	Manufacturing
New Zealand	Australian and New Zealand Standard Industry Classification (corresponds to ISIC Rev. 3 at 4-digit level)	Australian and New Zealand Standard Commodity Classification	Manufacturing
Austria	..	National version of CPA	All products
Belgium	NACE Rev. 1	PRODCOM	Manufacturing
Czech Republic	National version of NACE Rev. 1	National version of CPA	Manufacturing
Denmark	..	World Customs Organisation's Harmonised System (HS)	Manufacturing
Finland	NACE Rev. 1	..	Manufacturing
France	NACE Rev. 1	National version of CPA	Manufacturing
Germany	National German SGP 1995 (approximates to ISIC Rev. 3 and NACE Rev. 1)	National version of CPA	Manufacturing
Greece	..	..	Agriculture, fishing, mining and manufacturing
Hungary	National version of NACE Rev. 1	National version of CPA	Manufacturing
Iceland	..	..	Not included
Ireland	NACE Rev. 1	End-use data available	Manufacturing
Italy	National version of NACE Rev. 1	PRODCOM	Mining, manufacturing, electricity, gas and water
Luxembourg	..	..	All industrial products
Netherlands	National version of NACE Rev. 1	National version of SITC Rev 3	Manufacturing
Norway	National version of NACE Rev. 1	National versions of CPA and HS	Manufacturing
Poland	National version of NACE Rev. 1	National version based on NACE, CPA and PRODCOM	Manufacturing
Portugal	National version of NACE Rev. 1	PRODCOM	Manufacturing
Slovak Republic	NACE Rev. 1	CPA	Not included
Spain	NACE Rev. 1	PRODCOM	Mining, manufacturing, electricity, gas and water
Sweden	National version of NACE Rev. 1	National version of HS	Manufacturing
Switzerland	NACE Rev. 1	..	Agriculture, mining, manufacturing, electricity and gas
Turkey	ISIC Rev. 3	None	Agriculture, fishing, mining, manufacturing, electricity, gas and water
United Kingdom	National version of NACE Rev. 1	UK Standard Industry Classification (national activity classification) 14-37	Manufacturing

..: metadata are not available

PPIs for Services

In principle, PPIs should cover the market output of all activities, and a number of countries are currently working to develop PPIs for services other than transport and utilities. In 1999 the United Nations Statistical Commission requested the Voorburg Group on Services Statistics to focus their attention on improving the collection of data on prices of services provided to establishments. A study prepared by the OECD in 1999 and continued in 2000 and 2001[46] indicates expanding activity by Member countries in this area although the number of such countries remains limited.

Of the 29 OECD Member countries that have responded to the OECD survey since it was initiated, it seems that only eleven Members (Canada, United States, Australia, Japan, South Korea, New Zealand, France, Germany, Poland, Sweden and the United Kingdom) publish PPIs for services. However, three other Member countries (Czech Republic, Finland and the Netherlands) provide service PPI data to the OECD survey for the quarterly publication *Indicators of Activity of Industry and Services*, and a further four (Mexico, Norway, Portugal and Spain) collect price data on services. Therefore, 18 OECD Member countries collect this type of data in some form. Only 11 of the 29 respondents do not collect such data.

The study shows considerable diversity both with regard to the service activities covered and to the methods used to construct the PPIs. For instance, some countries collect data on the prices of services provided to enterprises whereas others collect actual producer price indices for services. There are also variations within the types of service activities covered, the number of price quotations within and between ISIC groups, and the frequency for which prices are collected. In general, the PPI data are relatively sparse in coverage and are undergoing further development. Where data series are sufficiently well established, they are used as deflators of services output in the national accounts and/or as short-term economic indicators.

Table 16 provides a summary of those OECD countries publishing PPIs for services, those collecting services price data, those countries that collect no data and those with plans for future collection, of which there are twelve. It is intended to begin including services PPIs in the MEI within the next year.

Table 16: Producer Prices: Services Producer Prices

	Publishes PPI data	Collects data	Does not collect data	Plans to expand collection of data
Canada	X	X		X
Mexico		X		
United States	X	X		X
Australia	X	X		X
Japan	X	X		
Korea	X	X		X
New Zealand	X	X		
Austria			X	
Belgium			X	
Czech Republic		X[1]		
Denmark			X	

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[46] Refer paper *OECD 2001 Inquiry on National Collection of Services Producer Pricess*, July 2002, available at http://www.oecd.org/pdf/M00023000/M00023496.pdf

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Table 16: Producer Prices: Services Producer Prices (continued)

	Publishes PPI data	Collects data	Does not collect data	Plans to expand collection of data
Finland		X[1]		X
France	X	X		X
Germany	X	X		
Greece			X	
Hungary			X	
Iceland			X	
Ireland			X	
Italy			X	X
Luxembourg	..	..	..	..
Netherlands		X[1]		
Norway		X		X
Poland	X	X		
Portugal		X		
Slovak Republic			X	
Spain		X		
Sweden	X	X		X
Switzerland			X	X
Turkey			X	X
United Kingdom	X	X		X

[1] Czech Republic, Finland and the Netherlands provide service PPI data to the OECD survey for the quarterly publication *Indicators of Activity of Industry and Services*

..: metadata are not available

Domestic versus export market

A significant number of countries produce separate indices for domestic markets and for exports, which can be combined if necessary to give indices for all output. Depending on the method used to produce export price indices, however, the latter may not be available at a detailed industry level. This is particularly the case if indices are derived from trade data using a unit value approach.

Table 17 shows information regarding OECD countries that publish output series including or excluding exports, and separate series for the domestic and export markets. Though incomplete, it can be seen that in at least eight OECD Member countries, PPIs cover prices that are charged in domestic markets only, *i.e.* export prices are not included.

Table 17: Producer Prices: Inclusion or exclusion of exports

	Domestic Market	Export Market	Total
Canada	..	..	Yes
Mexico	..	..	Yes
United States	..	..	Yes
Australia	Yes	No	No
Japan	Yes	Yes	Yes
Korea	Yes	No	No

Table 17: Producer Prices: Inclusion or exclusion of exports (continued)

	Domestic Market	Export Market	Total
New Zealand	..	..	Yes
Austria	..	..	Yes
Belgium	Yes	Yes	Yes
Czech Republic	Yes	Yes	No
Denmark	Yes	No	No
Finland	..	..	Yes
France	..	..	..
Germany	Yes	No	No
Greece	..	..	..
Hungary	Yes	Yes	Yes
Iceland	No	Yes	Yes
Ireland	No	No	Yes
Italy	Yes	No	No
Luxembourg	..	..	..
Netherlands	Yes	Yes	Yes
Norway	..	..	Yes
Poland	..	..	Yes
Portugal	Yes	No	No
Slovak Republic	Yes	Yes	No
Spain	Yes	No	No
Sweden	Yes	Yes	Yes
Switzerland	..	..	Yes
Turkey	Yes	No	No
United Kingdom	..	..	..

..: metadata are not available

Gross output versus net sector weights

Gross output weights are simply the total deliveries or sales of each product, including intermediate and final sales to other producers, whether in the same or different industrial sectors. Their use gives a measure of price change of all transactions for those products (*i.e.*, inter- *plus* intra-industry sales). Net sector weights are based on the value of sales to establishments outside the industry or group of industries in question (inter-industry sales only).

The differences between gross and net weights depends on the level of aggregation being considered in the industrial classification and on the extent of intra-industry transactions. Obviously gross weights will always be larger for a particular industry heading but to a varying degree across industries depending on the number of establishments, complexity of the activity, degree of horizontal or vertical integration, etc. within each industry heading. Industries where horizontal or vertical integration is increasing within the industry heading will show declining gross weights but constant net weights. Net weights will also decline where the integration results in reclassification of units to other industry headings, but the size of this effect will obviously depend on the levels of aggregation. The differences between gross and net weights will become larger at successively higher levels of aggregation.

Gross output indices are needed for deflation of industry output in the national accounts, where indices are used at a disaggregated (4-digit ISIC) level. However, aggregation of industry or group indices using gross weights will result in some degree of double-counting of the price changes of raw materials, *i.e.*, the higher the number of transactions involved in the production of a finished good, the higher the effective weight of the raw materials of that good in any aggregate indices across stages of production. The double-counting will be greater in industries with high raw material costs (high input-output ratios).

To avoid the double-counting problem, net sector weights should be used in the compilation of higher level aggregates and for indices used to analyse how inflationary pressures are transmitted from one sector to another. Ideally, stage of processing indices should also be compiled using net sector weights. Increasingly, countries are moving towards the use of net weights for compiling aggregate indices for inflation monitoring but since detailed input-output tables are needed to derive net weights, not all countries are in a position to do this.

The stage of processing concept categorises flows of goods and services according to their economic destination in a sequential basis along the production chain. Input-output tables form the basis for the categorisation. The most common categorisation is:

- raw materials, where it may be useful to compile separate indices for domestic production and imports;

- intermediate goods, where again, it may be useful to compile separate indices for domestic production and imports;

- finished goods, often split into consumer and investment goods, for which separate indices for exports may be useful.

This range of indices is compiled for specific industries where possible, otherwise for the whole economy.

3.6 Basic data

Weighting data

In almost all countries the first stages of index aggregation result in product indices, which are then aggregated further to give both higher level product indices and industry (activity) indices.

At the first stage of elementary aggregation, individual prices are combined and where possible each price should be weighted by the value of production which it represents, *i.e.*, where one price from each of several establishments (X, Y, Z) are combined to give an elementary aggregate for product A, then the weight for $P_{X,A}$ should correspond to the share of establishment X's production of A in the economy-wide production of A. Where more than one price (i, j, k) for product A is collected from a single establishment, then the prices should be weighted using relative production values of the establishment for the different transaction specifications i, j, k. Thus, it is important to have output data at detailed product level for all establishments in the PPI sample.

The detailed level product indices are weighted together to give higher level product indices using the values of production of the detailed products for the economy as a whole. Industry indices

are obtained by weighting together the product indices relevant to each industry, using the values of output of the different products for that industry, not only the establishments in the sample. Ideally, account should be taken of secondary products when compiling industry PPIs, *i.e.*, detailed product indices covering both the principal and the secondary activities (products) should be combined to give industry PPIs with the same coverage as the industry output which the PPIs may be used to deflate.

Detailed weights are very important in PPIs since the big differences in market shares of individual establishments should be represented both during sample selection and price aggregation.

It is usually recommended that weights be updated at least every five years, although the ideal frequency depends on the extent to which industrial structures are changing and relative price movements. There may be pressure from national accountants to update weights on an annual basis to allow annual chain-linking of constant price estimates. The weights are normally obtained from a census of manufacturing or some alternative source of data on the value of sales or the value of production.

Table 18 provides details on the sources of weighting data and the current weight reference year for the OECD countries. The weights used in these indices relate to a range of years from 1989-90 to 2000, with 1995 the most common year for the weights (twelve of the twenty-two cases).

Table 18: Producer prices: Sources of weighting data

Country	Methodology	Current weight reference year
Canada	Production data reported for the Census of Manufacturers for indices of higher levels	1997
Mexico	National Accounts	1993
United States	Value of shipments derived from information provided by the Census Bureau	1997 revised every 5 years
Australia	Annual values of production	Various[1]
Japan	Value of transactions of domestic products for domestic demand.	1995 revised every 5 years
Korea	Commodity weights are based on turnover and service weights are derived from output values for domestic use.	1995 revised every 5 years
New Zealand	Economic Censuses and National accounts	
Austria	Structural business statistics for wholesale trade	1998 revised every 5 years[2]
Belgium	Input output tables generated by NSO at the component product level.	2000
Czech Republic	Annual domestic sales according to statistical reports received from all industrial enterprises.	1999 revised every 5 years
Denmark	Turnover in production and imports.	1990
Finland	Industrial statistics supplemented by national accounts and foreign trade statistics.	1995 revised every 5 years
France	Value of sales provided by the firm at the time of rebasing.	1995 revised every 5 years
Germany	Turnover data.	1995 revised every 5 years

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Table 18: Producer prices: Sources of weighting data (continued)

Country	Methodology	Current weight reference year
Greece	Value of sales in agriculture and Industry, Foreign trade statistics.	1990
Hungary	Value of sales two years prior to the current year.	Revised annually
Iceland	1993 volume of production.	1993
Ireland	PPI: value of sales of farm excluding both the value of inter-farm and the value of own produce consumed in farm households. WPI: values of gross output from the Census of Industrial Production.	1995
Italy	Weights are established at the national level by ISTAT. For the higher aggregation level domestic sales of own-produced manufacturing products according to the Survey of Enterprise Accounting Systems. For fewer level, PRODCOM Survey is used as the source	1995 revised every 5 years
Luxembourg	Turnover of enterprises	1995
Netherlands	Input-Output tables of National Accounts.	1995 revised every 5 years
Norway	National accounts	Revised annually
Poland	Value of sales	1995 revised every 5 years
Portugal	Total sales in base year at detailed level and sales to domestic market at higher level.	1995 revised every 5 years
Slovak Republic	Industrial sales at the 4-digit level and on the results of a "One-time Survey for the Purpose of Selection of Representatives for Observation of Price Developments of Individual Producers" that involved 800 respondents.	2000 revised every 5 years
Spain	Industrial turnover at branch level and production in the base year at products level	1990 revised every 5 years
Sweden	Annual manufacturing statistics and foreign trade statistics	Revised annually
Switzerland	Gross production value or turnover if gross production value is not available	1990 revised every 10 years
Turkey	Industrial production and agricultural and mining and energy censuses	1994
United Kingdom	PRODCOM inquiry	1995 revised every 5 years

[1]   1989-90 for input indices and 1993-94 for output indices
[2]   2000 for producer prices

Sample design and selection (establishments and products)

Once the necessary decisions have been made regarding the objectives of the PPI (*e.g.* for deflation of output or for measuring inflation), the format of the inputs and outputs, the desired level of accuracy and the available resources, the process of designing the sample can begin. Again, a number of decisions are required but the main objective of the design process is to maximise efficiency, *i.e.* to minimise sampling and non-sampling errors, and to minimise costs.

Although there are two main advantages to using a probability sample as opposed to a non-probability sample (also known as a judgmental or purposive sample), namely an impartial selection of the items to be priced and the possibility of measuring the variance or sampling error, there are occasions where it is not necessary. This is particularly the case for price indices where the potential diversity of the change in prices charged by various producers of a given commodity over many time periods is relatively low. Moreover, in many countries, the range of domestically produced

mining and manufacturing goods is so limited and the number of producers so small that a census rather than a survey should be used.

Notwithstanding these points, there are some potential problems associated with non-probability sampling (dealt with in Part 3.8) and decisions still have to be made about:

- sampling techniques (probability versus non-probability);

- sampling frames;

- sample structures and stratification;

- sample allocation between strata;

- methods for reducing non-sampling errors.

Table 19 shows information regarding the number of products, establishments and prices collected in the national samples, as well as their frequency. Most OECD Member countries compile producer price indices on a monthly basis. Australia and New Zealand compile quarterly indices. The indices for all Member countries are compiled and disseminated by their national statistical institutes (see Table 2 for names of national statistical institutes).

Table 19: Producer prices: Summary information on data collection

	Frequency	No. products	No. enterprises	No. prices
Canada	M	980	About 3 000	9 000
Mexico	M	626	1 500	20 000
United States	M	3 200	25 000	100 000
Australia	Q	340	750	7 000
Japan*	M	971	1 280	3 367
Korea	M	949	..	4 000
New Zealand	Q	..	3 000	13 000
Austria	M	373	270	1 630
Belgium	M	1 096	280	..
Czech Republic	M	5 656	1 250	..
Denmark	M	1 680	1 000	5 000
Finland	M	1 333	800	..
France	M	..	4 200	24 000
Germany	M	1 718	6 500	13 000
Greece	M	906	..	3 150
Hungary	M	800	1 400	6 800
Iceland	M	..	..	..
Ireland	M	..	800	..
Italy	M	1 034	3 680	12 000
Luxembourg	M	1 360	125	..
Netherlands	M	3 695	5 529	27 350
Norway*	M	2 800	800	..

Table 19: Producer prices: Summary information on data collection (continued)

	Frequency	No. products	No. enterprises	No. prices
Poland	M	19 000	3 600	48 000
Portugal	M	500	2 498	12 335
Slovak Republic	M	2 900	440	2 900
Spain	M	869	6 000	20 000
Sweden	M	1 850	1 500	2 300
Switzerland	M	1 500	1 600	8 500
Turkey	M	678	1 287	5 176
United Kingdom	M	1 400	3 500	9 000

..: metadata are not available

Price collection methods

Prices are usually collected using a variety of methods, such as:

- personal visit to outlet, recording prices on paper or electronically. This is rare although personal visits are strongly recommended during establishment recruitment and product/transaction selection;

- paper form sent by mail or fax. This is the most common method;

- electronic form sent by e-mail or on floppy disk;

- telephone call to establishment. It is frequently the case that index compilers need to call the data provider to validate prices;

- prices observed in catalogues/brochures. This is not recommended since actual transaction prices should be recorded, not list prices.

By far the most widely used method involves paper forms sent to establishments, where descriptions and prices are recorded on the forms. In some countries, prices for the previous period remain on the form so that corrections can be made if necessary, whereas other countries send forms with no previous data to discourage any copying forward of prices. It is essential that the form contains full product and transaction specifications each month and careful instructions to the respondent on how to proceed if any of the specifications change. In countries where the national statistical institute has regional offices, the price collection is usually administered by the regional offices. However, it is essential that the process be closely managed from head office. An efficient communication network should be in place to keep collectors up to date with any special circumstances each month. Regional staff should receive training at least annually – to meet other collectors and discuss common problems, *e.g.* selecting replacement varieties, to be taught about any new procedures and to learn about new products and their characteristics.

Product specifications

When selecting representative products and transactions for pricing, the aim is to choose varieties and transaction characteristics that, account for a significant proportion of sales, are broadly representative of other products, and are expected to stay in production for a long period. While it is always hoped that products and transaction types will stay constant over time, this often is not the case in practice and it is necessary to select replacements. Because of this, it is vital that information about all price-determining characteristics is recorded so that judgements can be made about any differences in quality between the old and replacement items, and so that adjustments can be made for quality change if necessary. So, both to ensure that the same item is being priced month after month and to allow quality change to be identified if replacements are made, price-determining characteristics must be carefully discussed and recorded on the form. Examples of such characteristics are as follows:

- Product characteristics:

  - type of product
  - brand name or model number
  - main price determining characteristics: size, weight, power, etc.

- Transaction characteristics:

  - type of buyer: exporter, wholesaler, retailer, manufacturer, government
  - type of contract: single/multiple deliveries, orders, one year, agreed volume
  - unit of measure: per unit, per meter, per tonne
  - size of shipment
  - delivery basis: free on board, sale with/without delivery to customer,
  - type of price: average, list, free on board, net of discount
  - type of discount: seasonal, volume, cash, competitive, trade.

Sample maintenance and rotation

PPI surveys are panel surveys in that data are collected from the same establishments on more than one occasion. A number of problems that cause bias generally apply to such surveys, *i.e.* the panel will become depleted as establishments stop producing, become increasingly unrepresentative as time passes and the universe changes, some establishments may resent the burden of responding and, either leave the panel or provide poor quality data.

A widely used method to alleviate some of these problems is to limit the length of time that establishments remain on the panel by using some form of panel rotation. It is generally the case, however, that rotation is only done for smaller respondents, where responding to surveys imposes a more significant burden. Rotation has two main benefits. Firstly, it ensures that all but the largest producers participate in the survey for a limited time and, therefore, the burden is shared among establishments. Secondly, it helps to alleviate the problems caused by a sample being out of date, *i.e.* sample depletion and lack of representativity. Recruiting new establishments helps to ensure that new products are represented in the PPI.

If using panel rotation, a rotation rate should be agreed first of all. For example, if the whole panel is to be rotated every five years, then the annual rate is 20%. There are then several options as to how 20% of respondents might be rotated. Examples are:

- rotation could be implemented by dividing the industry headings into five groups and dealing with one group each year;

- 20% of all respondents, across all industries, could be dropped each year and replacements recruited;

- an establishment's rotation cycle could be related to its size so that larger establishments stay in the sample for more than five years, whereas small establishments stay in for less than five years.

If rotation is undertaken on the basis of industry group, then this provides a good opportunity to review the sample design and reallocate and select as necessary. Rotation and sample revision fit best within a system of annual chain-linking.

3.7 Index calculation

The basic principles of index calculation – elementary aggregation, higher index aggregation, alignment of expenditure and price reference base, and chaining re-weighted indices – are the same for PPIs and CPIs. As these have been covered in Part 2.11, there is no need to repeat them here. There are, however, differences in practice. For example, although all OECD Member countries use a Laspeyres formula (standard or modified) for their published PPIs, some produce Paasche or Fisher indices at a later date as these may be preferred for national accounts deflation. Also, as previously discussed, weighting and aggregation systems may be considerably more complex for PPIs than CPIs due to the different coverage of product and industry (activity) indices, and the conceptual preference for net sector weighting.

3.8 Problem areas

There may be many reasons why PPI samples are unrepresentative and thus liable to provide inaccurate results. All national PPIs suffer from collection and compilation problems to a greater or lesser extent. Problems associated with missing prices and seasonal items have been dealt with in Part 2.12 and there is no need to repeat them here. Examples of other problems are:

- samples are selected purposively rather than using probability sampling methods, increasing the chances of bias. For example, establishments may be selected for their convenient geographical location or because they are known to be good respondents;

- without probability selection methods, estimates of statistical accuracy cannot be made (but without some initial estimate of variance, a randomly selected sample cannot be optimised either so that stratification must be based on judgement);

- the sample size for an industry may have become outdated if the industry has grown or contracted since the base period, *i.e.* the period when the sample was selected;

- new products may not be identified or included in the survey. This problem may be relieved to some extent by rotating the sample of establishments;

- the sampling frame may be out of date or may not include certain groups of the target population. A common problem is that information on small producers is unreliable as this group is often volatile, with the result that the weight for small producers may be wrong. Typically they are under-represented.

In an ideal world, it would always be possible to use statistically sound sampling techniques to produce PPIs of the required accuracy, within given resource constraints. Reality, however, usually does not conform to this ideal. It is usually impossible to correctly optimise samples since reliable estimates of population variances are rarely available, sampling frames are always deficient to some extent, and response rates are unpredictable.

The aim is, therefore, to make the best use of what is available and to apply the principles of sampling in a common-sense and practical way. Arguably the most important step in sampling is to fully establish and understand what the survey is trying to estimate, the limitations of the sampling frame and the environment in which the survey will be conducted, *i.e.* likely response rates, data quality, and the level of available resources.

Once this starting position has been established a sample design can be drawn up, with decisions being made about stratification, sample size and allocation. Random sampling techniques may be employed in countries where a large amount of data are available and reasonable estimates of variance can be made but it is usually the case that samples are selected judgementally. If done wisely, this may be a perfectly reasonable approach.

As with most panel samples, PPIs suffer from the problems associated with a changing population. Any sample of establishments and products will become increasingly unrepresentative over time, and is likely to be depleted as establishments cease production. Some form of panel rotation or supplementation is advised to minimise any bias caused by these problems.

Changes in quality

Ideally, the index should not be affected either by changes in quality or changes in the sale conditions. Although it is not always possible to achieve this objective, the following procedures are useful in trying to separate pure price movements from other changes in a situation where a particular product is replaced by a substitute product of different quality. In all cases, the judgement of the national statistical institute officer and his knowledge of the particular product are of vital importance:

- if the two products have been available for some time on the same market, both having sold in reasonable quantities and having fairly stable prices, it can be assumed that the price difference between the products is attributed to a quality change. The new series is simply spliced to the old one;

- if the two products are not available at the same time or if their prices have been unstable, the ratio of production costs of the two may be used along with judgement based on this and other information provided by the manufacturer to separate the change in the price from the change in quality.

As with the compilation of consumer price indices, the diversity of techniques applied by any one country in treating quality changes for the various goods priced for PPIs prevents direct comparison of each methodology actually used. The following analysis of the methodologies is, therefore, restricted to determining whether or not any adjustments are undertaken and to outlining some of the main methodologies used.

Table 20: Producer prices: Methodology for treatment of quality changes

	Summary of main methodologies used
Canada	..
Mexico	Differences between products are identified to deduct from the new price the part that correspond to the additional characteristics and unit prices are obtained for those products that change in weight or volume.
United States	Production cost method[1] and hedonic regression method[2] for technology products
Australia	Mainly production cost method
Japan	Mainly production cost method, hedonic regression method for technology products from 1990 base index
Korea	Mainly production cost method, hedonic regression method for technology products
New Zealand	No adjustments are made
Austria	Adjustment of the base prices
Belgium	No adjustments are made
Czech Republic	Overlapping pricing[3], linking
Denmark	The price index for a new commodity is chained to the index for the Old commodity
Finland	..
France	..
Germany	Direct valuation of differences in quality characteristics, overlapping pricing, linking.
Greece	..
Hungary	No adjustments are made
Iceland	..
Ireland	..
Italy	A correction factor is applied based upon prices surveyed for the new and old varieties in a month of overlap.
Luxembourg	..
Netherlands	Overlap imputation.
Norway	Using a new base price (December price of the previous year) or estimating using the price development of the old product, or in the group. Hedonic methods for computers.
Poland	No adjustments are made
Portugal	No adjustments are made
Slovak Republic	..
Spain	..
Sweden	Using a new base price (December price of the previous year) or estimating using the price development of the old product, or in the group. Hedonic methods for computers.
Switzerland	No precise information about method.
Turkey	No adjustments are made
United Kingdom	Overlap method

..: metadata are not available