

Distr.
GENERAL

CES/AC.49/1999/24
29 October 1999

ENGLISH ONLY

STATISTICAL COMMISSION and
ECONOMIC COMMISSION FOR EUROPE

INTERNATIONAL LABOUR
ORGANIZATION (ILO)

CONFERENCE OF EUROPEAN STATISTICIANS

Joint ECE/ILO Meeting on Consumer Price Indices
(Geneva, 3-5 November 1999)

PRACTICAL IMPLICATIONS OF THE TRANSITION TO A CHAIN INDEX

Contributed paper submitted by ISTAT Italy*

Introduction

Since January 1999 ISTAT has begun to calculate a type Laspeyres chain index for national CPI and HICP. Until 1998, the reference period of index was updated every 3 or 5 years.

The choice of a chain index permits to avoid the loss of representativity of basket and weights due to changes in the consumption pattern of the households.

In general, the household modifies his consumer behaviour according to the price development and acquire cheaper products. If weights remain unchanged over time, this substitution effect is not taken into account and a fixed Laspeyres index overestimates price changes. In addition some new products are introduced in the market and others disappeared. Only a frequent updating of the basket can represent this situation.

In a chain index the difference between two consecutive basket and weights is not relevant and it permits to maintain the comparability over time establishing a link year by year.

* Prepared by Mr. Franco Mostacci and Ms. Francesca Di Iorio, CPI Researchers.

From an operational point of view, chain index needs more work for collecting statistics on a continuous basis in order to update weights yearly, but in the same time, if the price reference period is the December of the previous year, it permits to choose the new goods and services just at the end of the year.

One defect of the chain index is the so called *bouncing effect*, that is the result of the 1 year lag between price and quantity used for weights.

An other disadvantage is the non-additivity of the chain index. It means that it is not possible to manage with sub-indexes and their weights to compute the general index unless the calculation is made considering the price reference period. In this case it's not easy to calculate the contribution of sub-indexes to the overall index.

From the fixed binary index to the chain index

In 1993, Italy has begun to analyse the advantage of using a chain index. In 1995, the final report of an internal study group suggested to investigate the solution adopted by other countries, to verify if it was possible to bear the additional work of annual updating of weights and to evaluate the convenience in comparison with a fixed Laspeyres index.

In the same years, it begun the works for the construction of an harmonised CPI between EU member states, with the main scope to provide a comparable measure of final consumption inflation, following a requirement of Maastricht Treaty upon the convergence of countries' economy towards Monetary Union. HICP is now one of the main tool used by ECB to make monetary policy.

The first steps of the harmonization process didn't regard the frequency of updating weights and didn't establish rules on how to compute the overall index. Countries maintained their own methodologies, but some of these (France, UK and Sweden) already used a chain index for their national CPI.

The European Index of Consumer Prices (EICP) and the Monetary Union Index of Consumer Prices (MUICP) are calculated by Eurostat as chain indexes¹. The index reference period is the year 1996 and the price and weight reference periods are the December of each year (starting with December 1997).

According to Commission Regulation n. 2454/97², countries are called to verify every year the representativity of the basket and the associated weights and to update them, using new information on expenditure or price updating weights with the change measured between the index of December of the year y and the average index of the year $y-1$.

In the meanwhile, in Italy an experimental approach has been made for the period 1985-1995, in order to evaluate the difference between a chain index

and a fixed Laspeyres index³. The first is less than the second for 0.1 percentage points on annual average. The results obtained confirm that the choice of an option does not depend from the level of the index, but it derives from the analyses of methodological and procedural issues.

In the summer 1998, ISTAT takes the final decision to introduce a chain index starting with January 1999 index, in consideration that the advantages of the new calculation method are considerable and that the drawbacks are tolerable.

The annual revision of the basket of goods and services and the update of the weights give the opportunity to maintain an high level of representativity of the index and this requirement has an high priority, especially in periods of fast market evolution.

It gives also the opportunity of a more frequent updating of the sample outlets and to introduce gradually other improvements.

The additional work deriving from the annual updating of weights can be borne with an adequate organization. It can be considered an opportunity to take advantage of the annual improvements made in National Accounts (NA hereafter) or Household Budget Survey estimates.

The annual revision of the basket is restricted to few products and require less information because the price reference period is a month and no more an year.

In the meanwhile, in EU Netherlands has adopted the chain index calculation and it's plausible that in the future the HICP of every Member States will be based on this methodology.

Finally the monthly reference period makes easier the use of geometric mean in the calculation of the elementary aggregates.

Chain index and geometric mean for elementary aggregates both reduce the bias existing between the CPI and a cost of living index (COLI). Even if italian CPI and HICP are not constructed bearing in mind the cost of living goal, there is no reason to not minimising the difference between them, over all if it raises the representativity and didn't compromise the integrity of time series.

The reasons of some choices

The adoption of the Laspeyres chain index requires some technical and methodological choices that have practical implications:

1. the index and price reference period;
2. the link with the indexes published until December 1998;

3. the opportunity of price-updating consumption expenditure before calculating the weights;
4. the elementary aggregates computation formula;
5. the treatment of seasonal products.

In the CPI terminology three different base periods are generally considered:

- *index reference period*, or reference base, that is the period for which index is set to 100. The period considered is normally an year;
- *price reference period*, or calculation base, that is the period chosen as a base for the calculation of the current index;
- *weight reference period*, that is the period for which consumption expenditure (or quantity) are considered for the system of weights.

In the fixed binary index, the first and the second are coincident. In the chain index price reference period change every year, it's a month and except for the first year it differs from index reference period. Weight reference period is always nearest as possible to price reference period.

For price reference period any month can be chosen, but it's better to consider a month doesn't affected by particular anomalies. It must be a month for which almost all products are available on the market, that minimise the seasonality problems, in which prices are regular and information for the definition of weights has been just released.

In Italy, the choice is fallen on December, for the practical reason to have the twelve months' indices of the same year in the same calculation base. Surely, it's not the best solution because of the proximity of Christmas that can affects both price and volume of sales. In addition, in December National Accounts estimates are one year old and the information for the year that is ending are not still ready.

The choice of the index reference period has been more complicate, because it implies the decision on how to link with the time series until then published. Two alternatives has been considered:

- a) to carry on the 1995 based indices;
- b) to start with a new base, the year 1998.

Choice b) would has been the advantage to sign a clear-cut division with the past, in which indices are calculated with a fixed binary Laspeyres approach. In this case, the price reference period, for the first year, could be:

- b1) the average of the year;
- b2) the month of December.

The b1) option has been adopted by EUROSTAT⁴ in 1996 for starting HICP. Price reference period is equal to index reference period for the first year. In the following years price reference period is December.

The b2) option implies a double reference period: the average of the year for the index and the month of December for the price. It is the model adopted in France⁵, where the monthly indices of the new reference year are divided for the year average index to translate them to 100 average level.

In Italy the solution adopted is the a) option and the existing index reference period, the year 1995, has been carried on.

The innovations introduced in the index (chain calculation, geometric mean, new COICOP classification) are too much for the public and it was not convenient to add further confusion deriving from the use of linking coefficients to calculate annual change.

In the period 1996-1998 the inflation process has been limited and the index didn't grow to a level that needs an alignment to 100. Finally it has been considered that HICP change the index reference period in 2000 and this will be the occasion to have all CPI produced in the same reference period⁶.

In January 1999 has been also introduced, for national CPI, the new COICOP/Rev.1 classification based on 12 major heading⁷. The revision of classification has required a back calculation for the period 1996-1998, to establish a link with the series already published. In order to have sufficient elements of analyses, it has been produced a new breakdown in 206 item groups, strictly related to the breakdown of consumption expenditure made by NA.

The time lag between available consumption expenditure used for the definition of weights and price reference period is 1 year. For this reason the index calculated is not a true Laspeyres index and it can be called a type Laspeyres index⁸, in the sense that quantities are maintained unchanged for an year and are referred to a period former than the price reference one.

The use of quantity of the previous year is based on the assumption that household consumption pattern doesn't change from year y-1 to year y.

Generally, it is not true for two reasons:

- a) it doesn't consider the long term change of consumer behaviour (for example, in the last 50 years the weight for food and beverage has been halved);
- b) it doesn't consider the short term change, that occurs when sudden price raise or production falls due to exogenous factors change the preference of consumers⁹.

For CPI it's not possible to wait the distribution of consumption expenditure for year y and it is not convenient to produce in the meanwhile a provisional index subject to subsequent revision.

On the other side the error made using quantities one year old is negligible and the approximation can be borne.

To partially correct this time lag is possible to price update quantity of year $y-1$, appreciating them at average price of year t and subsequently at price of December of year y , to make coincident weight and price reference period:

$$\begin{aligned}
 W_i &= \frac{P_{i;y,12} Q_{i;y-1}}{\sum_i P_{i;y,12} Q_{i;y-1}} = \frac{\frac{P_{i;y,12}}{P_{i;y-1}} \times Q_{i;y-1} P_{i;y-1}}{\sum_i \frac{P_{i;y,12}}{P_{i;y-1}} \times Q_{i;y-1} P_{i;y-1}} = \\
 &= \frac{\frac{P_{i;y,12}}{P_{i;B}} \times \frac{P_{i;B}}{P_{i;y-1}} \times Q_{i;y-1} P_{i;y-1}}{\sum_i \frac{P_{i;y,12}}{P_{i;B}} \times \frac{P_{i;B}}{P_{i;y-1}} \times Q_{i;y-1} P_{i;y-1}} = \frac{\frac{I_{i;y,12}}{I_{i;y-1}} \times E_{i;y-1}}{\sum_i \frac{I_{i;y,12}}{I_{i;y-1}} \times E_{i;y-1}} \quad \text{where,}
 \end{aligned}$$

W are weights; P are prices; Q are quantities; E are expenditures and i is an item indicator.

The operation above is based on the assumption that in the short term the elasticity between price and quantity is null or, in other words, that consumer doesn't react to price modification.

Price updating is made at the lowest possible level and it permits to correct the situation in which the assumption is surely false. In Italy, for example, has been used a coefficient of 1 for personal computing and mobile phones, even if the price index is below 100, to taking into account the growth of the market.

In January 1999 has been also modified the formula to compute elementary aggregates, for which weights are not available. Until then, elementary aggregate was calculated as the relative between month m of year y and base period B of price average. This method has been substituted with the geometric mean of relatives¹⁰.

Apparently, there is not a relation between the two innovations. The reason of the choice to change at the same time these two elements of CPI calculation is based on the following considerations:

- the adoption of geometric mean is considered an improvement in the calculation of elementary aggregates, because it permits to minimise the bias effect of the variability in the price distribution;
- the price reference period for using geometric mean must be a month and cannot be an year;
- both geometric mean and chain index reduce the lower level substitution bias¹¹.

Among the several methodological innovation introduced with the Laspeyres chain index, the treatment of seasonal products has been also considered.

This problem is deeply studied¹² and its relevance is related to the mutual fluctuations of prices and quantity of seasonal products. A Laspeyres index can be a good measure of the seasonal price fluctuations for the year but the monthly indices can be seriously affected because of the fixed weights for the seasonal product. A way to reduce this problem is to consider a geometric mean of seasonal prices, but also to introduce a "variable basket " procedure to calculate the seasonal produces sub-price index.

In 1998 ISTAT conducted an experimental adoption of the Rothwell procedure for seasonal goods¹³. In particular a generalisation of the Rothwell formula, which consider a monthly system of weights and an annual base, was experimented on the basis of quantity for seasonal products collected the previous year in the agricultural wholesale markets.

The experiments give some encouraging results, but to introduce this formula in the calculation procedure of the CPI, an improvement of the quality of the data from agricultural wholesale markets is need. For this reason and to reduce the number of the innovations the introduction of a "variable basket " procedure to calculate the seasonal produces sub-price index is delayed to 2000.

A comparison between fixed binary index and chain index

In order to test the difference between the fixed binary index and the chain index, a comparison has been made during 1998, based on the period 1996-1998¹⁴

The new system of breakdown has also permitted to carry on the fixed binary index for 1999.

Results are presented in table 1 and 2, for overall index and for the 12 major headings.

Table 1 contains fixed binary index for the period january 1996 - september 1999. Years 1996,1997 and 1998 are the official published national CPI, while 1999 are the series carried on for comparison and based on 1995 basket of goods and services.

Table 2 contains type Laspeyres chain index and the 1999 figures are the official published national CPI. The year 1996 is the same of the fixed binary index and the first chain is made in december 1996. In 1997 and 1998 weights are updated, but the basket remains the same fixed in 1995. In 1999 both weights and basket are changed.

The difference between the two indices in the 45 months considered is negligible, but it's important to remark that the chained overall index is always not less than the fixed binary one and at the end of the period is of 0.2 percentage points lower. This is a countertendency result that can be explained analysing the trend of some headings.

The weight for Foods and non-alcoholic beverages fall down from 18.6 % in 1996 to 16.9 % in 1999. The indices is now lower of about 5 points than the general index and it has been a decisive factor of freezing inflation in the period considered. In the fixed binary index the item group is lower of 0.3 percentage points than chained index and it depends from the internal distribution of weights that has been considered in 1999.

In Communications the difference are consistent in 1999. Weights are about 50 % higher than the 1995 fixed base and this is due to a revision made in National Accounts during 1998. In this case the contribution to the overall trend index reflects the general opinion that a chain index is slightly lower than a fixed binary one.

The introduction of new products (social protection services) and the difference in the weights of jewellery and insurance can explain the difference of 1.2 percentage points piled up in 1999 in Miscellaneous goods and services.

REFERENCES

- ALLEN (1975), *Index numbers in theory and practice*.
- BERNADINI PAPALIA R. (1998), *Calcolo degli indici di prezzi dei prodotti stagionali mediante l'impiego di panieri variabili mensilmente. Aspetti metodologici ed applicativi*, Contributi ISTAT n. 21/1998
- BOSKIN et al. (1996), *Report of the Advisory Commission to Study the Consumer Price Index: Toward a More Accurate Measure of the Cost-of-Living*.
- FORSYTH AND FOWLER (1981), *The theory and the practice of Chain Price Index Numbers*, Journal of Royal Statistical Society (2), vol. 144.
- TURVEY (1999), *True Cost of Living Indexes*, International Conference of the Ottawa Group, Reykjavik-1999.
- EUROSTAT (1999), *Compendium of HICP reference documents*.
- INSEE (1998), *Pour comprendre l'indice des prix*, INSEE Méthodes.
- QUARANTA, DI IORIO (1997), *Frequenza dell'aggiornamento dei pesi degli indici dei prezzi al consumo ed indici a catena*, Contributi ISTAT n. 14/97.

Table 1 - Italian national CPI (fixed binary index)

1996 - Base 1995=100	Weight	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave
Food, non-alcoholic bever.	186161	102,2	102,6	103,0	103,9	104,7	105,0	104,8	104,5	104,3	104,2	104,1	104,1	104,0
Alcoholic bev. and tobacco	28280	105,1	105,6	106,0	106,4	106,7	106,9	107,1	107,2	107,2	107,3	107,5	107,5	106,7
Clothing and footwear	104527	102,3	102,5	102,9	103,4	103,7	103,9	104,0	104,1	104,3	105,0	105,4	105,6	103,9
Housing;water;electr.;gas	96358	103,1	103,3	103,4	104,6	104,6	104,5	103,0	103,3	103,8	104,9	105,8	105,9	104,2
Furnishings,...	98620	102,3	103,0	103,1	103,2	103,8	103,9	103,9	104,3	104,3	104,4	105,2	105,2	103,9
Health	76670	102,9	103,1	103,9	104,0	104,1	104,2	104,0	104,0	104,0	104,0	104,1	104,1	103,9
Transport	113181	102,5	102,9	103,5	104,0	104,3	104,5	104,6	104,8	104,9	104,9	105,7	105,8	104,4
Communications	16321	100,6	100,6	100,6	100,1	100,1	100,1	100,1	100,1	100,1	98,9	98,9	98,9	99,9
Recreation and Culture	86165	102,4	102,7	102,9	102,9	103,1	103,4	103,5	103,5	103,9	103,9	104,0	104,2	103,4
Education	9446	101,8	101,8	101,8	102,2	102,2	102,2	102,2	102,3	102,3	103,2	104,3	104,3	102,6
Hotels;cafes, restaurants	102047	102,2	102,8	103,1	103,5	104,0	104,2	104,4	104,7	104,9	105,0	105,1	105,2	104,1
Miscellan.Goods &services	82224	102,6	103,5	103,8	103,9	104,3	104,5	104,6	104,9	104,9	105,0	105,2	105,3	104,4
<u>Overall index</u>	1000000	102,5	102,9	103,3	103,7	104,1	104,3	104,2	104,3	104,4	104,5	104,9	105,0	104,0
Monthly change			0,4	0,4	0,4	0,4	0,2	-0,1	0,1	0,1	0,1	0,4	0,1	
Annual change														
1997 - Base 1995=100	Weight	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave
Food, non-alcoholic bever.	186161	104,1	103,9	103,9	104,0	104,0	103,9	103,6	103,3	103,4	103,6	103,8	104,1	103,8
Alcoholic bev. and tobacco	28280	107,6	107,6	111,0	111,0	111,1	111,2	111,2	111,2	111,3	111,4	111,6	111,7	110,7
Clothing and footwear	104527	105,6	105,7	105,8	106,1	106,1	106,2	106,2	106,3	106,5	107,2	107,8	107,9	106,5
Housing;water;electr.;gas	96358	107,0	107,4	107,7	108,2	108,3	108,2	108,5	108,6	108,4	109,4	109,7	109,8	108,4
Furnishings,...	98620	105,2	105,5	105,6	105,6	106,1	106,1	106,1	106,2	106,2	106,3	106,8	106,9	106,1
Health	76670	106,3	106,6	107,1	107,1	107,2	107,3	107,4	107,4	108,5	108,6	108,7	108,7	107,6
Transport	113181	105,0	105,4	105,8	105,7	106,0	106,0	106,1	106,4	106,3	106,8	106,9	106,8	106,1
Communications	16321	98,9	98,9	99,6	99,6	101,8	101,8	100,8	100,8	100,8	101,3	101,3	100,0	100,5
Recreation and Culture	86165	104,5	104,6	104,3	104,3	104,5	104,5	104,5	104,5	104,5	104,8	105,4	105,5	104,7
Education	9446	104,3	104,6	104,6	104,6	104,7	104,7	104,7	105,1	105,1	105,5	106,8	106,8	105,1
Hotels;cafes, restaurants	102047	105,7	106,0	106,3	106,6	106,8	107,0	107,2	107,4	107,5	107,8	108,0	108,1	107,0
Miscellan.Goods &services	82224	105,4	105,6	105,8	105,9	107,5	107,6	107,7	107,8	107,9	108,1	108,2	108,1	107,1
<u>Overall index</u>	1000000	105,3	105,4	105,7	105,8	106,1	106,1	106,1	106,2	106,3	106,6	107,0	107,0	106,1
Monthly change		0,3	0,1	0,3	0,1	0,3	0,0	0,0	0,1	0,1	0,3	0,4	0,0	
Annual change		2,7	2,4	2,3	2,0	1,9	1,7	1,8	1,8	1,8	2,0	2,0	1,9	2,0
1998 - Base 1995=100	Weight	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave
Food, non-alcoholic bever.	186161	104,5	104,6	104,6	104,9	105,0	105,1	104,8	104,7	104,8	105,0	105,1	105,4	104,9
Alcoholic bev. and tobacco	28280	111,8	112,0	116,0	116,2	116,3	116,4	116,5	116,5	116,6	116,7	116,7	116,8	115,7
Clothing and footwear	104527	108,1	108,1	108,6	108,9	109,1	109,2	109,2	109,3	109,5	110,2	110,5	110,6	109,3
Housing;water;electr.;gas	96358	110,3	110,4	110,4	111,1	110,9	110,9	110,8	110,8	110,5	111,0	111,0	111,0	110,8
Furnishings,...	98620	106,9	107,4	107,5	107,6	107,9	107,9	107,9	108,0	108,1	108,2	108,7	108,7	107,9
Health	76670	109,3	109,7	109,9	110,0	110,3	110,5	111,2	111,4	111,4	111,5	111,7	111,7	110,7
Transport	113181	106,7	107,7	107,5	107,2	107,5	107,6	107,4	107,8	107,7	107,3	107,4	107,3	107,4
Communications	16321	100,0	100,0	101,4	101,4	101,3	101,3	101,3	101,3	101,3	101,3	101,3	101,3	101,1
Recreation and Culture	86165	106,0	106,0	105,9	105,8	105,8	105,9	106,1	106,2	106,1	106,4	106,5	106,5	106,1
Education	9446	106,8	107,0	107,0	107,0	107,2	107,2	107,2	107,3	107,3	108,0	109,0	109,0	107,5
Hotels;cafes, restaurants	102047	108,8	109,1	109,6	109,8	110,1	110,2	110,2	110,5	110,8	110,8	110,9	111,1	110,2
Miscellan.Goods &services	82224	108,2	108,6	108,8	108,9	109,2	109,2	109,4	109,5	109,4	109,4	109,6	109,7	109,2
<u>Overall index</u>	1000000	107,3	107,6	107,9	108,0	108,2	108,3	108,3	108,4	108,4	108,6	108,8	108,8	108,2
Monthly change		0,3	0,3	0,3	0,1	0,2	0,1	0,0	0,1	0,0	0,2	0,2	0,0	
Annual change		1,9	2,1	2,1	2,1	2,0	2,1	2,1	2,1	2,0	1,9	1,7	1,7	2,0
1999 - Base 1995=100	Weight	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave
Food, non-alcoholic bever.	186161	105,7	105,8	105,8	106	106	105,8	105,3	105	105				
Alcoholic bev. and tobacco	28280	116,8	116,9	117,0	117,1	117,1	117,2	118,9	118,9	119				
Clothing and footwear	104527	110,7	110,7	110,9	111,3	111,4	111,5	111,6	111,6	111,8				
Housing;water;electr.;gas	96358	110,3	110,6	110,5	111,2	111,6	111,5	112,1	112,3	113,5				
Furnishings,...	98620	108,7	108,9	109,0	109	109,3	109,3	109,4	109,5	109,5				
Health	76670	112,0	112,4	112,6	112,6	112,7	112,7	113,8	114	114,1				
Transport	113181	107,2	108,0	108,2	108,9	109,6	109,6	110,2	110,6	111				
Communications	16321	100,1	100,1	100,6	100,6	99,9	99,8	99,8	99,3	99,3				
Recreation and Culture	86165	106,7	106,5	106,6	106,4	106,4	106,4	106,5	106,6	106,5				
Education	9446	109,0	109,3	109,3	109,3	109,6	109,6	109,6	109,8	109,9				
Hotels;cafes, restaurants	102047	111,4	111,9	112,2	112,4	112,7	113	113,3	113,6	113,7				
Miscellan.Goods &services	82224	109,8	109,9	110,0	110,2	110,6	110,7	110,9	111,1	111,1				
<u>Overall index</u>	1000000	108,9	109,1	109,2	109,5	109,7	109,7	110,0	110,0	110,2				
Monthly change		0,1	0,2	0,1	0,3	0,2	0,0	0,3	0,0	0,2				
Annual change		1,5	1,4	1,2	1,4	1,4	1,3	1,6	1,5	1,7				

Table 2 - Italian national CPI (chain index)

1996 - Base 1995=100	Weight	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave
Food, non-alcoholic bever.	186161	102,2	102,6	103,0	103,9	104,7	105,0	104,8	104,5	104,3	104,2	104,1	104,1	104,0
Alcoholic bev. and tobacco	28280	105,1	105,6	106,0	106,4	106,7	106,9	107,1	107,2	107,2	107,3	107,5	107,5	106,7
Clothing and footwear	106962	102,3	102,5	102,9	103,4	103,7	103,9	104,0	104,1	104,3	105,0	105,4	105,6	103,9
Housing;water;electr.;gas	96358	103,1	103,3	103,4	104,6	104,6	104,5	103,0	103,3	103,8	104,9	105,8	105,9	104,2
Furnishings,...	95039	102,3	103,0	103,1	103,2	103,8	103,9	103,9	104,3	104,3	104,4	105,2	105,2	103,9
Health	76315	102,9	103,1	103,9	104,0	104,1	104,2	104,0	104,0	104,0	104,0	104,1	104,1	103,9
Transport	113515	102,5	102,9	103,5	104,0	104,3	104,5	104,6	104,8	104,9	104,9	105,7	105,8	104,4
Communications	16321	100,6	100,6	100,6	100,1	100,1	100,1	100,1	100,1	100,1	98,9	98,9	98,9	99,9
Recreation and Culture	85822	102,4	102,7	102,9	102,9	103,1	103,4	103,5	103,5	103,9	103,9	104,0	104,2	103,4
Education	9446	101,8	101,8	101,8	102,2	102,2	102,2	102,2	102,3	102,3	103,2	104,3	104,3	102,6
Hotels;cafes, restaurants	103737	102,2	102,8	103,1	103,5	104,0	104,2	104,4	104,7	104,9	105,0	105,1	105,2	104,1
Miscellan.Goods &services	82044	102,6	103,5	103,8	103,9	104,3	104,5	104,6	104,9	104,9	105,0	105,2	105,3	104,4
<u>Overall index</u>	1000000	102,5	102,9	103,3	103,7	104,1	104,3	104,2	104,3	104,4	104,5	104,9	105,0	104,0
Monthly change			0,4	0,4	0,4	0,4	0,2	-0,1	0,1	0,1	0,1	0,4	0,1	
Annual change														
1997 - Base 1995=100	Weight	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave
Food, non-alcoholic bever.	181834	104,1	104,0	104,0	104,0	103,9	103,8	103,5	103,3	103,4	103,6	103,8	104,1	103,8
Alcoholic bev. and tobacco	28805	107,5	107,6	110,8	110,9	110,9	111,0	111,2	111,2	111,2	111,3	111,5	111,6	110,6
Clothing and footwear	109655	105,6	105,7	105,9	106,1	106,1	106,2	106,2	106,3	106,6	107,3	107,9	108,0	106,5
Housing;water;electr.;gas	93735	107,1	107,4	107,8	108,3	108,4	108,3	108,7	108,9	108,7	109,5	109,9	109,9	108,6
Furnishings,...	93258	105,2	105,5	105,6	105,6	106,1	106,1	106,1	106,3	106,3	106,1	106,9	107,0	106,1
Health	71180	106,3	106,5	106,9	107,0	107,0	107,2	107,2	107,2	109,1	108,3	108,4	108,5	107,5
Transport	118160	105,2	105,5	105,7	105,6	105,8	105,9	105,9	106,2	106,1	106,6	106,8	106,6	106,0
Communications	16156	98,9	98,9	99,6	99,6	101,9	101,9	100,8	100,8	100,8	101,4	101,4	100,0	100,5
Recreation and Culture	84438	104,5	104,5	104,2	104,2	104,3	104,3	104,3	104,3	104,3	104,5	105,1	105,2	104,5
Education	9523	104,3	104,6	104,6	104,6	104,7	104,7	104,7	105,1	105,1	105,6	106,8	106,8	105,1
Hotels;cafes, restaurants	111002	105,7	106,0	106,4	106,6	106,8	107,0	107,2	107,4	107,5	107,7	108,0	108,1	107,0
Miscellan.Goods &services	82254	105,4	105,8	105,8	105,9	107,6	107,7	107,8	107,9	108,0	108,2	108,4	108,4	107,2
<u>Overall index</u>	1000000	105,3	105,4	105,7	105,8	106,1	106,2	106,2	106,2	106,4	106,6	107,0	107,0	106,2
Monthly change			0,3	0,1	0,3	0,1	0,3	0,1	0,0	0,2	0,2	0,4	0,0	
Annual change			2,7	2,4	2,3	2,0	1,9	1,8	1,9	1,8	1,9	2,0	1,9	2,1
1998 - Base 1995=100	Weight	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave
Food, non-alcoholic bever.	174634	104,5	104,6	104,7	104,9	105,1	105,1	104,9	104,7	104,9	105,1	105,1	105,5	104,9
Alcoholic bev. and tobacco	29234	111,7	111,8	116,0	116,2	116,3	116,4	116,4	116,5	116,6	116,7	116,8	117,0	115,7
Clothing and footwear	106340	108,1	108,2	108,5	108,9	109,2	109,3	109,3	109,3	109,6	110,3	110,6	110,7	109,3
Housing;water;electr.;gas	96898	110,4	110,6	110,6	111,2	111,0	111,0	110,9	111,0	110,8	111,2	111,2	111,2	110,9
Furnishings,...	90559	107,0	107,5	107,6	107,7	108,0	108,0	108,1	108,2	108,2	108,3	108,8	108,9	108,0
Health	75751	109,2	109,5	109,7	109,7	110,1	110,2	111,0	111,1	111,2	111,2	111,4	111,5	110,5
Transport	116975	106,5	107,5	107,2	106,9	107,2	107,2	107,0	107,6	107,5	107,0	107,1	106,9	107,1
Communications	16537	100,0	100,0	101,5	101,5	101,4	101,4	101,4	101,4	101,4	101,4	101,4	101,4	101,2
Recreation and Culture	82987	105,8	105,6	105,6	105,5	105,5	105,6	105,8	105,9	105,8	106,1	106,1	106,1	105,8
Education	10173	106,8	107,0	107,0	107,0	107,2	107,2	107,2	107,2	107,2	108,0	108,9	108,9	107,5
Hotels;cafes, restaurants	117225	108,7	109,2	109,5	109,8	110,0	110,2	110,3	110,5	110,7	110,8	110,9	111,5	110,2
Miscellan.Goods &services	82687	108,5	108,9	109,1	109,2	109,5	109,5	109,7	109,8	109,8	109,8	110,1	110,1	109,5
<u>Overall index</u>	1000000	107,3	107,6	107,9	108,0	108,2	108,3	108,3	108,4	108,5	108,6	108,8	108,9	108,2
Monthly change			0,3	0,3	0,1	0,2	0,1	0,0	0,1	0,1	0,1	0,2	0,1	
Annual change														
1. Monthly change														
Annual change		1,9	2,1	2,1	2,1	2,0	2,0	2,0	2,1	2,0	1,9	1,7	1,8	1,9
1999 - Base 1995=100	Weight	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave
Food, non-alcoholic bever.	169402	105,8	105,9	106,1	106,3	106,3	106,1	105,6	105,4	105,3				
Alcoholic bev. and tobacco	27830	116,8	116,9	117,0	117,0	117,2	117,2	119,0	119,0	119,1				
Clothing and footwear	100137	110,6	110,7	110,9	111,3	111,4	111,5	111,5	111,6	111,8				
Housing;water;electr.;gas	98708	110,6	110,8	110,8	111,4	111,8	111,8	112,3	112,4	113,7				
Furnishings,...	99812	108,7	108,9	109,0	109,0	109,2	109,4	109,4	109,5	109,5				
Health	70610	111,9	112,4	112,5	112,6	112,7	112,6	114,0	114,2	114,2				
Transport	146677	107,3	108,1	108,2	108,9	109,6	109,6	110,2	110,6	110,9				
Communications	24891	100,1	100,0	100,6	100,5	99,8	99,4	99,4	98,9	98,9				
Recreation and Culture	78607	106,7	106,6	106,8	106,7	106,6	106,6	106,7	106,9	106,8				
Education	11308	109,0	109,2	109,2	109,2	109,5	109,5	109,5	109,7	109,8				
Hotels;cafes, restaurants	99836	111,4	112,0	112,2	112,4	112,8	113,0	113,3	113,5	113,7				
Miscellan.Goods &services	72182	110,0	110,2	110,4	110,6	111,1	111,3	111,8	112,0	112,3				
<u>Overall index</u>	1000000	108,9	109,1	109,3	109,6	109,8	109,8	110,1	110,2	110,4				
Monthly change		0,0	0,2	0,2	0,3	0,2	0,0	0,3	0,1	0,2				
Annual change		1,5	1,4	1,3	1,5	1,5	1,4	1,7	1,7	1,8				

ENDNOTES

¹ [EUROSTAT,1999].

² [EUROSTAT,1999].

³ [QUARANTA,DI IORIO;1997].

⁴ [EUROSTAT,1999].

⁵ [INSEE,1998].

⁶ From a theoretic point of view the chain is never interrupted and there is not a need to change the index reference period over time].

⁷ The same classification will be used by HICP starting with january 2000.

⁸ [TURVEY,1999].

⁹ See, for example, the shock caused by *mad cow* in 1997.

¹⁰ For geometric mean, average of relatives and relative of average prices borne to the same results, but the first is easier to calculate than the second.

¹¹ [Boskin et al., 1996].

¹² [Forsyth and Fowler,1981].

¹³ [BERNARDINI PAPALIA,1998].

¹⁴ The trials has been also a good benchmark to verify all practical implications of the chain index and to update and test data processing procedure.
