РЕПУБЛИКА БЪЛГАРИЯ

НАЦИОНАЛЕН СТАТИСТИЧЕСКИ ИНСТИТУТ

A COMPARISON OF THE PORTUGUESE AND BULGARIAN CONSUMER PRICE INDICES [*]

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Abstract

This paper compares the Portuguese and Bulgarian consumer price indices (CPI) and attempts to identify some areas in which the CPI compilation methodology could be improved in the two countries. This work is organised into six sections. The first section briefly describes the organisational structure on which the production of the CPI is based in the two countries. The second section focuses on the methodological differences between the two indices. The third section revolves around practical CPI compilation aspects. The fourth section presents three cases of complex goods and services (electricity, cars and telecommunication services) in more detail. The fifth section gives a short overview of other price indices that are calculated in the two countries. The last section summarises the main findings and conclusions.

Key words
Consumer Price Index, organisational structure, compilation CPI practices

INTRODUCTION

The general objectives of this paper are twofold. Firstly, it aims to compare the Portuguese and Bulgarian consumer price indices and their compilation practices. Secondly, it attempts to identify some areas in which the CPI compilation methodology could be improved.

In both countries, the consumer price index (CPI) is defined as an index of 'pure price change' and is mainly intended to measure inflation. The two CPIs are also used as deflators in National Accounts, in wage negotiations and in index linking of interest, rents and other contractual payments.

In both countries, CPI improvements are analysed and implemented by the national statistical institutes. Both countries have advisory boards where main users' opinions are represented and taken into consideration.

Notwithstanding these similarities, the Portuguese and Bulgarian experiences in terms of CPI production are quite different. While the regular production of the Portuguese CPI goes back as far as 1929, the Bulgarian CPI is still rather 'young' as statistics on consumer prices have only been produced since 1990.

In addition to the national CPI, the Harmonised Index of Consumer Prices (HICP) is also compiled in both countries. Other indices published alongside the CPI are, in Portugal, a core inflation index and, in Bulgaria, a special price index known as the 'Price Index for a Small Basket'.

This paper is organised into six chapters. The first chapter briefly describes the organisational structure on which the production of the CPI is based in the two countries. The second chapter focuses on the methodological differences between the two indices. The third chapter revolves around practical CPI compilation aspects such as price collection, quality adjustment procedures, data quality checks and dissemination of results. The fourth chapter presents three cases of complex goods and services (electricity, cars and telecommunication services) in more detail. The fifth chapter gives a short overview of other price indices that are calculated in the two countries. The last chapter summarises the main findings and conclusions.

1. ORGANISATIONAL STRUCTURE

CPI work is organised in a slightly different way in the two countries. In Portugal, the CPI is produced in the Department for Short Term Economic Analysis. This department is divided into several units, which are mainly focused on the production of short-term statistics (CPI, short-term indicators, HICP, production price index, business and consumer surveys, purchasing power parities, etc). The head of the department co-ordinates all statistical production, research and administrative tasks. The CPI unit, which also produces the HICP and other price indices, currently consists of six people and is responsible for the whole CPI statistical project. Three of the six are in charge of the validation of the data at a national level. Their work is monitored by a national CPI co-ordinator who, together with the remaining two people, is responsible for CPI calculation, development of methodological tasks and research work.

In Bulgaria, the CPI is produced in the CPI division, part of the Demographic and Social Statistics department of the National Statistical Institute (NSI). Several statistics are produced there. The director co-ordinates the production and research process and, at the same time, has administrative responsibilities. As well as compiling the CPI, the CPI division is also responsible for two additional surveys one on dwelling prices and another on prices in co-operative markets. The head of the division has both production and administrative responsibilities. Currently, six people (the head of division included) work in the CPI division. All of them have responsibilities in terms of data validation, CPI and HICP production (including the development of the methodology and research work). The staff are also responsible for the above-mentioned additional surveys.

2. GENERAL INDEX METHODOLOGY

2.1. Index definition and compilation

2.1.1. Nature and purpose

The Bulgarian and Portuguese indices are built upon the same methodological premises. The main ones are the following:

- in both countries, CPI is defined as a general indicator of 'inflation' (or 'deflation') and not as a cost-of-living index;
- the two indices are built as Laspeyres-type indices.

The Portuguese and Bulgarian CPIs are, therefore, designed to measure changes over time in the amount that consumers need to spend to purchase the same quantities of products which are considered to be representative of private consumption in the reference period.

The two CPIs are not especially aimed at measuring the level of prices over a fixed time period, but rather the change in this level between two time periods.

2.1.2. Structure

In both countries, the CPI is structured according to the Classification of Individual Consumption by Purpose (COICOP). The structure is hierarchical and is built upon five main levels: division (2-digit level), group (3-digit level), class (4-digit level), sub-class (5-digit level) and elementary aggregates.

The following table compares the structure of the first four levels of the two indices.

Table 1: Number of groups, classes and sub-classes

COICOP Division		Groups		Classes		Sub-classes	
		P	BG	P	BG	P	BG
01	Food and non-alcoholic beverages	2	2	11	11	60	36
02	Alcoholic beverages and tobacco	2	2	4	4	7	4
03	Clothing and footwear	2	2	6	6	10	12
04	Housing, water, gas and other fuels	4	4	9	11	10	12
05	Furnishings, household equipment and routine maintenance of the house	6	6	12	11	21	20
06	Health	3	3	7	7	9	7
07	Transport	3	3	13	10	16	12
08	Communications	3	2	3	3	3	5
09	Recreation and culture	6	6	17	17	20	20
10	Education	4	1	4	1	4	3
11	Restaurants and hotels	2	2	3	3	4	3
12	Miscellaneous goods and services	6	5	10	9	12	20
00	**Total**	**43**	**38**	**99**	**93**	**176**	**154**

INE (2003), Consumer Price Index base 100 = 2002 – Methodological notes.
NSI (2003), unpublished data.

As can be seen above, the number of the groups and classes considered do not vary much in the two indices. However, there is a bigger difference concerning the number of sub-classes covered by the two indices. This is partly due to the different consumption patterns shown by the population of the two countries.

2.1.3. Weights

In both countries, weights are defined according to the concept of Household Final Monetary Consumption Expenditures used in the System of National Accounts.

Furthermore, Household Budget Surveys (HBS) are the main source for CPI weight definition in the two countries.

Perhaps one of the biggest differences between the weighting systems of the two indices is the treatment of 'games of chance' (i.e. betting and gambling). While Portugal includes this item in its CPI, Bulgaria does not. In this instance, Bulgaria follows the rules of the Harmonised Index of Consumer Prices (HICP) more closely than the Portuguese CPI.

In Portugal and in Bulgaria, the information derived from the HBS is further combined with other data sources in order to obtain more disaggregated weights. The use of these data sources is, however, greater in Portugal than in Bulgaria. Examples of these data sources include the following (Portugal):

- fuel sales per type of fuel;
- vehicle sales figures according to the cylinder class and the make;
- information on the consumption of fixed line and mobile phone services;
- information about insurance activity, by non-life insurance categories.

At the moment, the Bulgarian CPI is only using additional weight data sources for telecommunication services and electricity.

In general, both countries follow the same weight derivation procedures. It would be beneficial if, in the future, the HBS in the two countries could, when appropriate, provide more detailed information. Another possible development in this area could be the identification and exploration of additional weight data sources.

2.1.4. Index formula

The Laspeyres formula is used as the main conceptual reference in the compilation of the Portuguese and Bulgarian CPIs. The formula can be stated in the following manner:

$$I_{t,0} = \frac{\sum_i w_{i,0} \cdot \frac{p_{i,t}}{p_{i,0}}}{\sum_i w_{i,0}} \quad (1)$$

where,

$I_{t,0}$ is the price index, where t corresponds to the current period and 0 to the base period;

$\dfrac{p_{i,t}}{p_{i,0}}$ is the price relative of the ith product in period t;

$w_{i,0}$ is the expenditure weight of the ith product in the total expenditure in reference period 0.

Since its origin in 1990, the Bulgarian CPI has always been chained on an annual basis using a Laspeyres formula. This procedure is quite flexible, enabling the index to take into account recent changes in consumers' behaviour and the introduction of newly significant goods in the CPI basket.

In Portugal, annually chained indices were adopted with the publication of the new CPI base year=2002. Prior to this date, the Portuguese CPI was a fixed base year index, with its expenditure weights being revised, on average, every five years.

Overall, both countries use the same linking methodology which consists of chaining together the old and new CPI series on an annual basis using December as the link (i.e. overlap) period. This methodology is presently applied to the compilation of the HICP and is generally accepted as good practice by many price experts.

2.1.5. Aggregation and calculation of the index

The main similarities between the two indices are the following:

- the use of the Jevons formula at the lowest level of the CPI aggregation process;
- the adoption of the Laspeyres formula at the first level in which it is possible to use reliable weights.

The main differences between the Portuguese and the Bulgarian aggregation and calculation procedures stem from the different geographical stratification of the two indices. The differences are:

- the adoption, in the Portuguese CPI, of an aggregation process that follows regional stratification and, in the Bulgarian CPI, of an aggregation process aimed at the direct compilation of the national index;
- the use of weighted average prices in the calculation of elementary aggregates in the Portuguese CPI. Weights are derived from the Population Census. In the Bulgarian CPI, no such weighting system exists.

The regional stratification of the Portuguese CPI implies the implementation of more compilation stages than in the Bulgarian CPI. The main steps needed for the compilation of

the all-items CPI are shown below. A more detailed representation of the two processes is given in the annex.

Portugal	Bulgaria
1. calculation of average prices at the price collection *centre* level;	1. calculation of average *national* prices;
2. calculation of weighted average *regional* prices;	
3. calculation of *regional* elementary indices;	2. calculation of *national* elementary indices;
4. calculation of the *regional* all-items index;	
5. calculation of the *national* all-items index.	3. calculation of the *national* all-items index.

From the comparison, it is possible to see that the two CPIs start the compilation at very different geographical stratification levels. The used formulas at each of the above-mentioned compilation steps are the following:

Portugal	Bulgaria
1. $\quad _c\overline{p}_{i,t} = \prod\limits_{i,i\in c}\left(p_{i,t}\right)^{1/n}$	1. $\quad \overline{p}_{i,t} = \prod\limits_{i}\left(p_{i,t}\right)^{1/n}$
2. $\quad _r\overline{p}_{i,t} = \sum\limits_{c,c\in r} {}_c\alpha \cdot {}_c\overline{p}_{i,t}$	
3. $\quad _rI_{i;t,0} = \dfrac{_r\overline{p}_{i,t}}{_r\overline{p}_{i,0}}$	2. $\quad I_{i;t,0} = \dfrac{\overline{p}_{i,t}}{\overline{p}_{i,0}}$
4. $\quad _rI_{t,0} = \dfrac{\sum\limits_{i,i\in r} {}_rw_i \cdot {}_rI_{i;t,0}}{\sum\limits_{i,i\in r} {}_rw_i}$	
5. $\quad I_{t,0} = \dfrac{\sum\limits_{r} {}_rw \cdot {}_rI_{t,0}}{\sum\limits_{r} {}_rw}$	3. $\quad I_{t,0} = \dfrac{\sum\limits_{i} w_i \cdot I_{i;t,0}}{\sum\limits_{i} w_i}$

where,

$_c\overline{p}_{i,t}$ is the average price of the ith product in period t at the price collection centre level;

$_rI_{t,0}$ is the index of region r in period t;

$_c\alpha$ is the ('population') weight of the cth centre;

$_rw$ is the total expenditure weight of region r; $\quad _rw = \sum\limits_{i,i\in r} {}_rw_i$;

w_i is the expenditure weight of the ith product.

As can be seen from the formulas, expenditure weights are representative of each country's private consumption at a regional level in the case of Portugal and at a national level in the case of Bulgaria. Thus, the use of the Laspeyres formula (i.e., formula (1) in section 2.1.4) is

only applicable to the Portuguese CPI at the fourth step and the Bulgarian CPI at the third step.

2.2. Sampling procedures

2.2.1. General

As mentioned above, the Portuguese CPI is regionally stratified. The sample sizes are defined according to the regional structure of the index. The table below shows the sample sizes by region:

Table 2: Portuguese CPI sample dimension [1]

Regions	Weights in the National CPI	Number of prices	Number of outlets	Price/outlet ratios
North	33,2	26 920	4 054	7
Centre	15,7	15 840	2 105	8
Lisbon and Tagus Valley	40,2	26 795	4 031	7
Alentejo	4,3	9 368	1 048	9
Algarve	3,3	7 065	737	10
Azores	1,8	4 600	472	10
Madeira	1,5	2 561	277	9
Total	**100,0**	**93 149**	**12 724**	**-**

Source: INE (2003), *Indices of consumer prices*, 100=2002, nº 1.

The Bulgarian CPI is calculated as a weighted average of the elementary aggregate indices which are, in contrast to the Portuguese CPI, defined at a national level. The sampling sizes of four basic groups of goods and services are shown in the following table:

Table 3: Bulgarian CPI sample dimension

Basic groups of goods and services	Weights in the National CPI	Number of prices	Number of outlets	Price/outlet rations
Foods	40,9	13 646	953	14
Non-foods	27,6	12 256	2 068	6
Services	27,0	3 034	1 410	2
Catering	4,4	2 217	158	14
Total	**100,0**	**31 153**	**4 589**	**-**

Sources: NSI (2003), *www.nsi.bg*; unpublished data.

2.2.2. Locality sampling

In both countries, the sample of localities is drawn using non-probability (i.e. cut-off) sampling techniques, in which part of the target population is deliberately excluded from the sample using the population size of each locality as the cut-off variable.

The term 'locality' does not, however, mean the same thing in the Portuguese and Bulgarian CPIs. This happens because the target population is not stratified in the same manner in the two countries. While in Bulgaria the population of localities is subdivided into several NUTS III

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[1] 'Actual rents for housing' excluded.

district centres, the Portuguese CPI uses a more disaggregated stratification for the division of its target population which follows the political and administrative notion of 'municipality' [2].

At present, the Portuguese and Bulgarian CPIs include 41 'municipalities' and 27 district centres in their sampling framework, respectively.

2.2.3. Outlet sampling

In both countries, the sampled outlets are drawn using non-probability sampling techniques.

In Portugal, the sample of outlets is divided into nine types of establishments (e.g. supermarkets, discount stores, markets). Non-probability sampling techniques are used due to the lack of reliable and accurate sampling frames. At present, the Portuguese National Statistical Institute is studying the possibility of using the business register as a sampling frame for outlets. In this context, outlets are chosen based on the experience, intuition and knowledge of price collectors (and supervisors). The final decision on the inclusion of an outlet is, however, always taken centrally.

When replacing an outlet, price collectors are told to choose a new one, which has to be:

- as close as possible to the old outlet;
- as similar as possible to the old outlet in term of their sales values; and
- of the same type.

In Bulgaria, the total number of sampled outlets depends on the importance of the population at each district centre. The number of outlets is, therefore, determined proportionally to the population [3]. The sample is drawn in order to include the outlets with a large volume of retail sales and with a large variety of products. The main types of trade are covered, including supermarkets, general and specialised stores and co-operative markets. At present, the Bulgarian business register cannot be used as a sampling frame for the CPI. The main reason being that, as far as retail trade in concerned, the business register is not up-to-date enough.

The sample of outlets is judgmental, based on the selection of outlets made by price collectors and on the confirmation of the director of the relevant regional statistical office (RSO).

When replacing an outlet, price collectors are given instructions to select the establishment with the largest volume of retail sales supplying the missing product variety.

2.2.4. Product sampling

By and large, the sampling procedures that are followed in the compilation of the two indices are the same. This common approach to product sampling can be described as follows:

- definition of an initial product sampling framework using HBS results;
- use of alternative data sources for the definition of the exact characterisation of the sampled products (administrative data, privately-owned data bases, etc) , in addition to HBS data, where possible,;
- use of price collectors and supervisors' field experience when information from the HBS and other data sources is not enough for the definition and specification of the sampled products;

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[2] As can be seen in section 2.1.5., this type of stratification has, in Portugal, an implication in terms of CPI compilation: unlike in Bulgaria, in the Portuguese CPI average prices are compiled at the price collection centre level.
[3] This is a rule which is also followed in the Portuguese CPI.

- extraction of the sample using several non-probability sampling techniques (judgmental, cut-off, etc).

In light of these similarities, any differences in the sampling procedures of the two countries are more of degree than of kind. Thus, the main difference found is that in Portugal, samples are drawn using more external data sources than in Bulgaria. Conversely, sampling in Bulgaria is based much more on HBS information than in Portugal. This should come as no surprise, especially if we take into account the periodicity of the HBS in the two countries: continuous in Bulgaria and carried out every five years in Portugal.

In Portugal, the redefinition of the sample of products is done centrally and, before 2002, it was carried out every time there was new HBS data. With the adoption of a chained Laspeyres index, a new system was introduced in which the sample of products is updated every year: the use of additional data sources allows for the renewal of the index every year, while major sample revisions are done every five years.

In Bulgaria, the redefinition of the sample is done centrally on an annual basis through the use of a continuous HBS. However, in many cases, the given level of detail is not good enough for the definition of the products which are going to be included in the CPI basket. On these occasions, the experience of price collectors and supervisors is used to select the products.

3. PRACTICAL CPI COMPILATION ASPECTS

3.1. Price collection

3.1.1. Local price collection

In Portugal, most of the price collection is done at a regional level [4]. The total weight of locally collected prices in the CPI is 93.8%. Local price collection is carried out by approximately 104 price collectors spread out throughout the country [5]. In total, they collect around 93 000 prices in more than 12 700 outlets [6]. Prices are collected using paper collection forms specially designed for this task [7]. After this stage, price collectors save the collected data onto disks using laptops. The disks and the paper forms are then passed on to supervisors who, after a data quality check, send it to regional co-ordinators. Finally, the data is electronically sent out by regional co-ordinators to the central office.

In Bulgaria, most of the prices are also observed regionally [8]. The weight of locally collected prices is 83.6% in total CPI weight. Approximately 80 price collectors, located in 27 district centres, do the local price collection [9]. They collect more than 31 000 prices in more than 4 500 outlets.

Price collection is done with the help of paper collection forms. After the price collection stage, the typing and editing of the price data begins. The data is typed directly into RSO's software

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[4] The Portuguese National Statistical Office is a public institute with several regional statistical offices. In total, there are seven regional statistical offices. Five of them - North, Centre, Lisbon and Tagus Valley, Alentejo, Algarve – belong to the organigram of the institute. The remaining two - Madeira and Azores – are part of the Portuguese Public Administration and are autonomous. Although detached from the direct supervision of the National Statistical Institute, they follow the same procedures and work in close connection with the central office.

[5] The number of price collectors should be regarded as a maximum. Indeed, the number of price collectors varies from month to month. This happens mainly because of the existence of a quarterly rolling panel of price collection centres in the CPI. See section 3.1.3 and table 5 in section 3.1.5 for more information on this issue.

[6] Rents excluded.

[7] It goes without saying that the only exception to this rule is the price collection of rents. For this item, price collectors carry out computer assisted personal interviews. The price collection of rents is, however, done through a specific survey which is carried out parallel to the rest of the price collection.

[8] There are 28 regional offices within the NSI's structure.

[9] Two regional statistical offices are in charge of the price collection of the main district centre considered in the Bulgarian CPI: Sofia.

either by price collectors or technical assistants belonging to the regional statistical office's staff. At the end of this stage, the data is finally sent out electronically to the central office .

3.1.2. Central price collection

In Portugal, only the prices for used cars and telecommunication services are centrally collected. Taken as a whole, these products account for 6.3% of total CPI weight. The central price collection is done by staff at the central office using phone, internet, e-mail, fax or post. Complex prices are then derived using special Excel sheets. The derived complex price is then introduced for CPI calculation using software specifically developed for this purpose.

In Bulgaria, the weight of the centrally collected prices is 16.4%. Most of the centrally collected prices are regulated by government (electricity and heat energy prices, telecommunication services). These prices are collected by the staff at the central office. The regional statistical office in Sofia is responsible for the observation of the rest of the centrally collected prices such as aeroplane tickets, newspapers, package holidays, insurance and a few other goods and services.

On the whole, central price collection is carried out basically in the same way in both countries. In Bulgaria, as in Portugal, prices are collected from different sources in order to calculate a complex price which is then typed into the main CPI calculation software.

3.1.3. Frequency and timing of price collection

In both countries, the aim of price collection is to get an estimate of the month's average price change. This requirement, together with the different price variation associated with each product , define the price collection frequencies.

In Portugal, for some products whose prices are subject to higher instability, three observations per month are considered. This is the case for unprocessed food products such as vegetables, fruit and fish. Furthermore, products that, in the short term, show minor price variation are subject to a quarterly sample rotation of the price collection centres. Regulated prices and tariffs are among the products which are subject to this price collection sample rotation system. These are, however, closely monitored by central and regional offices so that, whenever there is a known change in the price of these products, all price collection centres will reflect it. A small number of goods and services, which traditionally undergo a price change once a year, are observed on a yearly basis (e.g. school attendance fees). The prices of the remaining products are observed on a monthly basis.

In Bulgaria, most of the prices are observed monthly. There are, of course, a few exceptions: weekly (air tickets and package holidays), quarterly (sewage/waste collection), twice a year (secondary, post-secondary and tertiary education) and yearly (insurance and some administrative fees). However, if there is any known change in the prices, this will be appropriately introduced into the index.

The distribution of the products according to their price collection frequency can be seen in the following table:

Table 4: Frequency of price collection in Portugal and Bulgaria

COICOP Division		More than once a month		Monthly		Quarterly		Twice a year		Once a year	
		P	**BG**	**P**	**BG**	**P**	**BG**	**P**	**BG**	**P**	**BG**
01	Food and non-alcoholic beverages	73	-	177	140	-	-	-	-	-	-
02	Alcoholic beverages and tobacco	-	-	26	13	-	-	-	-	-	-
03	Clothing and footwear	-	-	-	73	77	-	-	-	-	-
04	Housing, water, gas and other fuels	-	-	15	27	15	1	-	-	1	-
05	Furnishings, household equipment and routine maintenance of the house	-	-	22	57	61	-	-	-	1	-
06	Health	-	-	99	30	-	-	-	-	-	-
07	Transport	-	2	10	29	75	-	-	-	2	-
08	Communications	-	-	11	18	3	-	-	-	-	-
09	Recreation and culture	-	2	9	37	63	-	-	-	3	-
10	Education	-	-	-	2	7	-	-	4	-	-
11	Restaurants and hotels	-	-	13	40	3	-	-	-	1	-
12	Miscellaneous goods and services	-	-	-	36	44	-	-	-	1	3
00	**Total**	**73**	**4**	**382**	**502**	**348**	**1**	**-**	**4**	**9**	**3**

Sources: INE (2003), Consumer Price Index base 100 = 2002 – Methodological notes.
NSI (2003), unpublished data.

In Portugal, prices are collected during the 'last complete week of the month' (i.e. the closest week to the end of the month that has 5 weekdays and no public holidays). Thus, the length of the price collection period is 5 days. Exceptions to this rule include the collection of prices of some fresh food products belonging to COICOP groups 01.1.3 (Fish), 01.1.6 (Fruit) and 01.1.7 (Vegetables). For these products, prices are collected in the weeks which include the 5th and 15th of the month, as well as in the last complete week of the month. Another exception is the month of December, when price collection usually starts earlier due to the Christmas season [10].

In Bulgaria, the price collection period is longer than in Portugal. Prices are collected between the 5th and the 25th calendar day of the month, but not during the weekends and public holidays. Thus, the length of the price collection period is approximately 14 weekdays. Exceptions to this general rule also exist. Prices for the COICOP groups 07.3.3 (Passenger transport by air) and 09.6 (Package holidays) are collected during each week of the month and prices for groups 04.4.1 (Water supply), 07.3.5 (Combined passenger transport – Interurban transport) and 12.4 (Social protection) are collected in the last week of the month.

3.1.4. Price collection forms

As noted above, in Portugal, price collectors write down the prices on a paper price collection form (PCF). There is one PCF for each outlet. Each form contains the outlet's commercial name, its location, fiscal number and the identification of a contact-person.

Field codes for outlets, which have to be filled in by price collectors when the outlet is found closed (four codes for the different reasons for the outlet's closure are applied), are also available on the form. Additionally, product lists with all of the products and product specifications are also available on all paper forms. Special fields are also available for the characterisation of missing prices (four codes) and of price reductions (five codes for different types of reductions). The form does not, however, show any information on registered prices

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[10] The Easter season is also another exception.

in previous periods. These are made available only to supervisors who, usually, supply price collectors with this information in the form of additional lists.

In Bulgaria, PCFs are also used in price collection, but they are organised in a different way. There is a separate form for each product for the whole year. The same information for outlets is available as in the Portuguese PCF, but the specification of a particular product variety is written down by price collectors themselves. There is a separate field in the PCF for price collectors to write down the prices for each month throughout the year (this includes December of the previous year). Special codes are not used. In cases of outlet closure, missing prices, price reductions, etc, price collectors are instructed to write down all available information on the PCFs and to report such cases to the staff in charge of the CPI (either by e-mail or phone).

3.1.5. Organisation of field work and staff resources

In Portugal, the organisation of price collection is mainly done at a regional level. Field work and its direct supervision is carried out by each regional surveys unit (*núcleo de inquéritos*) which, in turn, work in close connection with the unit responsible for the CPI in that region [11]. Price collectors do not belong to the staff of the Portuguese National Statistical Office and they work on a part-time basis. The connection between price collectors and the regional supervision of the project is done through supervisors. Furthermore, the connection between fieldwork and the national supervision of the index is assured by regional CPI co-ordinators.

In Bulgaria, the bulk of price collection organisational work is also carried out at a regional level. Each RSO has a unit responsible for the CPI survey. Price collectors work in this unit and most of them have permanent contracts with RSOs. The unit is led by a CPI co-ordinator, responsible for the organisation of fieldwork and for the price collection of some products. CPI co-ordinators work under supervision and in close collaboration with the staff at central office. Although the connection between central office and price collectors is mainly done through CPI co-ordinators, direct contacts are also established when necessary. The Portuguese and Bulgarian organisational price collection structures are shown in the annex.

In Portugal, nearly 150 people contribute to the compilation of the CPI [12]. Of these, nearly 30% have co-ordination or organisational responsibilities while the remaining 70% are price collectors. The table below presents some information on the staff numbers by region. These figures were taken from a small survey that was carried out for the purposes of this paper.

Table 5: CPI staff numbers by region (Portugal)

Region	Number of people working on CPI [1]	Number of supervisors	Number of price collectors [2]
North	2	7	32 – 23
Centre	1	6	13
Lisbon and Tagus Valley	6 [3]	8	34 – 20
Alentejo	2	3	11
Algarve	1	2	7 – 5
Azores	2	0	4
Madeira	3	1	3
Total staff	**17**	**27**	**104 [4]**

Notes: [1] Number of staff at regional units responsible for the co-ordination of the CPI.
[2] On average. Some of the answers were given in the form of a 'maximum – minimum' interval of employed price collectors.
[3] Number of staff at central office. The Lisbon and Tagus Valley region is the only one in which the IPC project has not been fully decentralised. In this region, price collection is done under the supervision of the regional surveys unit but its regional co-ordination is done by staff at the central office.

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[11] The only exceptions being the Azores and Lisbon and Tagus Valley regions. In the Azores region the organisation of field work is done directly by the regional unit responsible for the CPI. The Lisbon and Tagus valley is the only one in which decentralisation has not been fully accomplished. The regional co-ordination of the Lisbon and Tagus Valley CPI is assured by the central office.

[12] This figure should be seen as the total number of people that contribute to the compilation of the CPI throughout a year. Indeed, the number of people working in the CPI project is not always the same and some monthly fluctuations in the staff number exist. This variability is mainly caused by the existence of a quarterly rolling panel of price collection centres which was mentioned in section 3.1.3.

The figures reflect the relative importance of each region. Thus, the Lisbon and Tagus Valley and the North regions – which account for the biggest weights in the CPI - employ more supervisors and substantially more price collectors than other regions.

The Azores region is the only one that has no supervisors. This has to do with the different price collection structure adopted in this region, in which field work is directly supervised by the unit responsible for the CPI.

The survey also gave information on other important aspects of regional CPI co-ordination. The number of other statistical projects dealt with by regional co-ordinators is an example. These go as far as 13 (Alentejo) or 12 (Azores) and the average time spent by regional co-ordinators on the CPI range from 9% in the Alentejo to 50% in the Algarve region.

In Bulgaria, around 90 people work on the CPI survey. Nearly 36% of them are responsible for the national supervision of CPI work and for the regional organisation of fieldwork (this covers the staff at NSI and all CPI co-ordinators in RSOs). The remaining 64% are price collectors.

The CPI staff in half of the regional offices is also occupied with other statistical surveys. On average, 89% of the working time of the staff working at these regional offices is spent on the CPI survey.

Despite the above-mentioned figures, the number of price collectors in Bulgaria is not adequate regarding the many and important tasks done by price collectors (e.g., the collection of prices, data editing and validation, product/outlet replacements, the selection of products and outlets for price observation during the annual re-sampling, etc).

In Portugal, two main developments are planned in this area. Firstly, the conclusion of a new manual on price collection is envisaged for this year. This manual will be an important tool for training. Secondly, a revision of the products with central price collection is likely to be done up until the end of 2003. Additional administrative data sources are presently being analysed with the purpose of lightening the burden imposed on local price collection and price collectors.

Bulgaria could improve its price collection process in several ways. Firstly, by reorganising the price collection form (which could be organised in a similar way as in Portugal), namely with the introduction of codes for outlet closure reasons, missing prices and price reductions. The introduction of such codes could improve the feedback channel that already exists between price collectors and the central office. Secondly, by studying the optimisation of the price collection period and, last but not least, by starting to document the price collection process.

3.2. Quality adjustments

3.2.1. Portugal

All of the procedures dealing with quality adjustments are established centrally. Quality adjustments are, however, carried out either at a central or regional level, depending on the information obtained during the price collection period. Apart from some quantity adjustments, price collectors do not adjust the prices they collect. However, they choose the replacement products and thus make quality judgements. In Portugal, the process for making decisions on quality adjustments is pretty standard and is applied in the same way to all products.

When replacing an old product by a new replacement product, price collectors are instructed to:

- Choose not only the most similar product, but also the one that accounts for a substantial amount of sales value in the outlet; and,

- Ask for the price that the new replacement product had in the previous month.

Most of the adjustments made are implicit. Explicit quality adjustments have only been recently introduced into the CPI/HICP compilation process. The currently used implicit methods are:

- direct price comparison, where it is judged that the difference in quality is negligible;
- overlap, where the prices of both the old and replacement product are available in the previous period; and
- bridged overlap (i.e. 'overlap with class-mean imputation'), where the price of the new product is not available in the previous period.

The explicit technique 'option pricing' is used to deal with quality changes of personal computers. This method is applied when information on the market prices of the product's characteristics, which are at the root of the difference between models, is available. Adjustments are made in order to correct the base price of the elementary aggregate in which there was a quality adjustment.

In Portugal, two main developments are envisaged in this area. Firstly, a new manual on quality adjustments is being developed. This manual is expected to be finished by the end of this year. Secondly, the use of the option pricing quality adjustment method is likely to be extended to other products (such as cars) and will be used more often in the near future.

3.2.2. Bulgaria

The treatment of changes in quality is one of the subjects in which the Bulgarian CPI team has been working on over the last few years.

The revision of the Bulgarian index allows for the introduction of new samples on an annual basis. This procedure helps to avoid 'within the year' replacement situations and the problems arising from a change in the quality of a product. .

Price collectors are instructed to price the same product variety throughout the year. If a particular variety disappears, they are told to choose the most similar one in quality. In most cases, the replaced and replacement varieties are directly compared. In a few particular cases, however, where the difference between the two varieties is significant, the overlap method is applied (overlap with class-mean imputation whenever there is the need for an estimate of the price of the replacement variety). The staff at the central office makes these quality adjustments. Price collectors do not make quality adjustments and are instructed to report to the central office all the cases in which considerable changes in quality occur.

A number of steps could be made towards the further improvement of the quality adjustment practices in Bulgaria. Perhaps most importantly of all, a study on the possibility of creating a more effective quality adjustment identification and reporting system could be carried out either at a national or regional level. On this basis, the staff at the Bulgarian statistical office could also consider and test several quality adjustment methods and decide which ones to apply in practice.

The quality adjustment processes of the two countries are shown in the annex.

3.3. Data quality checks

3.3.1. Portugal

In Portugal, most of the data editing work is carried out at a regional level. Clearly, the main idea is to have most of the errors identified, and preferably corrected, at a level as close as possible to price collection. Hence, as field work is organised at a regional level, data cleaning and validation work is mostly done at that level.

Collected prices are subject to several data quality checks. These are located at the following steps of the CPI compilation process:

- during and shortly after price collection;
- before the first CPI calculation;
- after the first CPI calculation.

In the first step, price collectors and supervisors carry out the first data quality checks. These are normally done using lists of the prices observed in previous periods. A first automatic data check is also done when price collectors transcribe the prices from paper price collection forms onto disks using special software installed in laptops. Supervisors receive these disks and carry out further checks, deciding which price variations need to be further investigated in the first place (i.e. if there is the need for cross-checking).

After the final data has been saved onto disks, the second set of data quality checks begin. Prices are imported into the CPI calculation software and a number of automatic checks are performed. These aim at seeing if the imported prices are in accordance with the target sample (e.g. if they have the same number of price and outlet observations).

In the third and final step, data quality checks are performed after the first regional and national CPI calculation. These are the only ones that are carried out both at a regional and a central level. At this stage of the data validation process, attention is given to extreme or strange index variations. All the relevant information written down by price collectors on price collection forms is also analysed. Changes in prices that are totally or partially influenced by a change in quality are also checked[13]. Exchange of information between the various hierarchies of the CPI production pyramid is also carried out. Special attention is given to tariffs and regulated prices.

3.3.2. Bulgaria

In Bulgaria, data quality checks and validation work is distributed more evenly between local and regional statistical offices. In this sense, the Bulgarian data editing process is based more on central quality checks than the Portuguese system.

The data validation process at regional offices can be divided into two stages. The first one takes place during the entering of the collected prices into the computer system. For each product variety there is a price change limit recorded on the system. If the price change of the particular product variety exceeds this limit, an indication appears on screen as well as on the corresponding price check lists. These computer-generated indications help to avoid technical mistakes during the data processing phase and provide a first warning of any significant price change detected. The second stage takes place after the data has been typed into the CPI system. At this phase, price levels and monthly price changes are checked and validated by CPI co-ordinators at regional statistical offices. Price collectors have to give relevant explanations for any detected significant price change and, if necessary, prices are cross-checked in outlets.

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[13] In most cases, regional statistical offices do this work. They decide if there is the need for a quality adjustment or not. The role of the central office is to monitor this process and to have a final say on the pertinence of the chosen method.

The validation of the data in the central office is done after the first index calculation. The prices are checked and validated by 3 people at the CPI division. Data quality checks fall into the following types of validation:

- 'relevant' index change validation;
- fresh products price change validation;
- product specification change validation.

In the first validation type, several check lists are created. These contain information on price levels, monthly outlet and product variety price change (both for the current and the previous month), elementary aggregate indices, sub-indices and the all-items index. In addition to this, lists with minimum/maximum price changes are also created in Excel. Unusual price changes are carefully examined with the help of price collectors (when appropriate). Price series from the beginning of the year up until the month being analysed are also sometimes used as additional information.

At the second validation stage, the prices and price changes of fresh products are subject to additional validations. Firstly, the number of registered prices for each product is analysed using special lists ('seasonal lists'), where fresh products are listed according to the months of the year, showing when they are 'in' or 'out' of season. Secondly, price changes are checked, using the information on price levels and price changes. Finally, it is decided which prices are to be accepted/rejected.

The third and final stage deals with the cases in which there is a change in the specification of the product variety. As mentioned in section 3.2.2. on quality adjustments, these changes are reported by price collectors to the staff at the central office.

In addition to the above-mentioned checks, other price validations are also carried out. Examples include the cross-checking of tariffs and regulated prices.

3.4. Dissemination of CPI information

3.4.1. General

Both countries release their CPIs at approximately the same time. In Portugal, this is done on the tenth working day after the end of the index reference month [14]. In Bulgaria, CPI data is normally released in the week containing the tenth of the month that follows the index reference month. The CPI is released according to pre-announced dates, which are available on the websites of the two national statistical institutes (*www.ine.pt* and *www.nsi.bg*) [15].

In Bulgaria, the CPI is released to the media through regular press conferences and the Bulgarian Information Agency. In Portugal, the CPI is sent to the media via fax and e-mail. No regular monthly press conferences exist. These take place only when major methodological changes occur.

3.4.2. Press release, publication, Internet and other

In both countries, the dissemination of the CPI information is based on the same dissemination sources:

- monthly press releases;
- monthly publications;
- the internet.

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[14] Except at times of major index revisions and base year changes. On these occasions, the index is released later than usual.
[15] In the case of Portugal, press release dates are published on a monthly basis, whereas, in Bulgaria, a whole calendar year is covered in one release.

The Portuguese press release comprises a small amount of text with an analysis of the monthly main price changes, methodological notes and a section containing tables with figures on the CPI, HICP and other indexes derived from the CPI (such as the Core Inflation Index). The text is supported with various graphs and tables. A shorter version is also available in English. The monthly analysis of the data is focused on the year-on-year rate of change, the only exception being the press notes released at the beginning of each year, which are more focused on the annual average rate of change.

The Bulgarian press release is less comprehensive than the Portuguese press release. The former only reports the most important CPI figures and information on the so-called 'price index for a small basket' (an index with the most important goods and services for the bottom 20% lower-income households). The Bulgarian press release focuses on the month-on-month CPI rate of change.

In Portugal, CPI data is published in a specific publication, whereas, in Bulgaria, the CPI is published alongside other statistics in the 'Statistical Journal'. The Bulgarian publication is bilingual (Bulgarian/English). The Portuguese publication is only available in Portuguese.

In terms of contents, the Portuguese publication is more exhaustive than the Bulgarian one. Brief methodological notes, a monthly report on price movements and tables with CPI and HICP data are included in the Portuguese publication. When major methodological changes occur, detailed methodological notes are also published.

The Bulgarian publication has several tables and figures, a long time series on the all-items CPI (1995=100) and recent data, disaggregated by various levels, for different reference periods. However, no text analysing the main price changes is included.

The following information is available on the Portuguese website:

- monthly CPI data for the last 2 years: monthly index, month-on-month, year-on-year and annual average rates of change;
- monthly HICP data for the last 2 years: monthly index, month-on-month, year-on-year and annual average rates of change;
- CPI data taken from the monthly publication: analysis, tables and charts (in spreadsheet format) from December 1996 onwards;
- CPI data for the Lisbon and Tagus Valley region, data from the publication: analysis, tables and charts (in spreadsheet format) from January 2000 to December 2001;
- Press releases from January 1998 onwards;
- CPI methodology (in Portuguese [16]).

The following information is available on the Bulgarian website:

- CPI time series (1995=100) from May 1990 - present;
- CPI triangle-tables for each year, by months (the previous December and each month of the current year=100);
- price index for small basket triangle-tables for each year, by months (the previous December and each month of the current year=100) from 2002 onwards;
- Press releases for the current year (only the tables, without text);
- Content of the consumer basket with the corresponding weights (from 1999 onwards);
- CPI methodology (updated each year from 1999 onwards);
- Content of the basket with corresponding weights for calculation of PISB (from 1999 onwards);
- Price index for small basket methodology.

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[16] An English version is being prepared.

The described information is available in Bulgarian. CPI triangle-tables and CPI methodology are also available in English.

In addition to the above-mentioned sources, Bulgaria also publishes an annual report containing detailed information on the CPI. The text is illustrated with different charts and tables. It also contains information on the HICP (Member States, Acceding Countries and Candidate Countries). This annual report is part of a bigger publication ('Bulgaria – socio-economic development') containing the main socio-economic indicators of Bulgaria.

In both countries, CPI data is also published in annual statistical office publications. The 'Statistical Yearbook of Portugal' (in Portuguese/English) publishes detailed sub-indices (divisions, groups and classes) for the current year for Portugal, the Mainland, the Azores and Madeira islands and retrospective data for the last three years with a breakdown by division.

In Bulgaria, CPI data is also available in the 'Statistical Yearbook of Bulgaria' (in Bulgarian/English), 'Statistical Reference Book' (in Bulgarian) and 'Statistical Reference Book of the Republic of Bulgaria' (in English).

Both offices provide a wide range of services on ad-hoc requests for a fee. Special tabulations with unpublished data may be obtained on CD, diskette or paper. Different kinds of phone/fax/e-mail services are produced as well.

3.4.3. Rounding rules

In general, indices and rates of change are published rounded up to one decimal place in both countries. The only exception to this rule being that, in Bulgaria, its long time series (1995 = 100) is published rounded up to two decimal places.

The two countries follow, however, different rounding practices regarding the calculation of the CPI and aggregation stages. In Portugal, in order to minimise the loss of accuracy when rounding up the index results, the following steps are followed:

- for the compilation of the average prices of the base year and the calculation of the average prices for each centre and region, six decimal places are considered;
- for the compilation of the elementary indices, four decimal places are considered;
- for the compilation of the sub-indices and the all-items index – which are obtained through the aggregation of the elementary indices mentioned above – four decimal places are considered;
- the rates of change are calculated, based on indices which are rounded up to one decimal place.

In Bulgaria, all indices and rates of change are calculated from non-rounded data. The following procedures are, thus, followed:

- for the calculation of the base prices and the average national prices, five decimal places are considered;
- for elementary aggregate indices, sub-indices at each level of aggregation and for the all-items index, full decimal places are used;
- the different rates of change are calculated from the indices with full decimal places.

3.4.4. Confidentiality and access to data

In both countries, individual information on outlets, products and brands are, in light of actual legal frameworks, under statistical secrecy and is not subject to publication. This does not mean, however, that non-published CPI data cannot be made available in some cases (e.g.

for research purposes). In any such cases confidentiality of individual data must be safeguarded.

4. COMPLEX GOODS AND SERVICES

4.1. Electricity

4.1.1. Portugal

In Portugal, the supply of electrical energy is subject to the tariffs and conditions laid down by the electricity sector regulator (ERSE).

The tariffs set by ERSE are two-component tariffs, comprising the following prices:

- the price for contracted power and for contracting, reading, invoicing and collecting (per month); and
- active energy prices (per 1 kWh).

The first component varies according to the contracted power class. However, active energy prices are differentiated in accordance to the tariff's period of time (hourly period). No regional price differences exist. Households can decide which tariff and power class they want to have.

HBS data on electricity is used in sampling the tariffs. Prices are locally collected using suppliers' price lists. The collection of prices is subject to the same system of quarterly sample rotation of price collection centres which was pointed out in section 3. However, if a price change occurs in the centres that are in the sample for that particular month, this change will also be attributed to all centres. The index for the whole country is obtained by weighting regional average prices with HBS regional expenditure weights.

4.1.2. Bulgaria

The Bulgarian electricity sub-index was recently redesigned in 2002 and subsequently in January 2003, when a new tariff structure was introduced.

Electricity prices in Bulgaria are centrally set by the government. The State Energy Regulatory Commission (SERC) is responsible for the regulation of the electricity energy prices. This institution provides information on the annual electricity consumption (discriminated by the month of the year) of private households. This information is used in the construction of weights at a very detailed level of disaggregation. At the class level, HBS data is used in the building of the weights.

Tariffs in Bulgaria are one-component tariffs. This means that the prices are set according to the quantity of consumed energy. There are no regional differences in the prices because the tariff is uniform for the whole country. The charged tariff varies according to the period of the day (peak and off-peak) and to the monthly consumption. Furthermore, different prices are set for winter and summer months and for the households that use central heating in winter and for those that do not use central heating. All the existing prices within the tariff are considered in the calculation of the electricity sub-index. Prices are collected on a monthly basis from the National Electricity Company (the only electric energy supplier in Bulgaria).

4.2. Cars

4.2.1 New cars

In Portugal, new cars' sales data, by cylinder class (power of the engine) and model, is used as a sampling frame. The data is received from the Association of Car Dealers in Portugal (ACAP). The sampling procedure goes through the following stages: firstly, car models are

split into two main groups: petrol and diesel cars. Secondly, car models are ordered by engine power and divided into 4 power classes for petrol cars and 2 power classes for diesel cars. Finally, within each power class the most-sold models are sampled. At present, the sample includes more than 20 car models. The data from the ACAP together with average prices by models is also used to detail the HBS data in the construction of the weights for the new cars' sub-index.

The prices are collected on a quarterly basis in Portugal with a rotation of the geographical centres. Every month one price per model is collected in the centre, which is in the sample for that particular month. The prices are registered by price collectors in selected outlets (car dealers).

In Portugal, if the particular model changes or disappears from the market, it is replaced by a new one. The replacement is primarily done based on the characteristics of the new model which have to be as similar as possible to the characteristics of the old model. The overlap method is, for the moment, the most used method in replacement situations [17].

In Bulgaria, the weight of the COICOP group 07.1 'Purchase of Vehicles' is relatively low. Only new cars are covered by the Bulgarian CPI. The sampling and price collection procedures go as follows. After preliminary consultations with experts and car-dealers, two car makes are chosen and, within each of them, one model (i.e. the most sold) is selected for pricing. Such consultations take place during the weight revision period in which re-sampling is done if found necessary. Prices are collected on a monthly basis in the largest cities from car dealers. A similar replacement procedure to the one which is used in Portugal is followed and the overlap method is also applied.

4.2.2. Second-hand cars

In Portugal, second-hand cars are sampled in a similar way to that of new cars. Six models distributed in four power classes are selected for price observation. Only 2-year-old petrol cars are covered. The prices are collected on a monthly basis from a magazine (*Guia do Automóvel*), which publishes a price list of second-hand cars, used as a price guide for dealers in Portugal. After the prices have been collected, they are entered into an Excel file, where a 12-month moving average price for each model is calculated. Then the average prices enter into the computer system, where the index is calculated. If the model disappears, a replacement is made and the overlap method is used to deal with quality differences.

In Bulgaria, second-hand cars are not covered in the index because the used-car market is still quite small and many cars are traded between households rather than through dealers. Despite that, a pilot survey on used cars has been carried out in the past. After some preliminary consultations with car dealers, two popular models were included in the experimental sample. The main source for second-hand car prices was found to be a monthly car magazine (in which dealers advertise their prices). Several problems were encountered in this pilot study. Firstly, there are no motor dealers' association or Bulgarian car price guides. Secondly, it is not always possible to find the prices for the chosen models. Thirdly, prices are often not comparable because of the extras included and the condition of the cars. It is planned to keep on investigating the available data sources and improving the sampling and price collection procedures.

4.3. Telecommunication services

4.3.1. Weighting system

In the Portuguese CPI, the weighting system for the telecommunication sub-index is derived from HBS data, complemented with other sources for specific sets of the basket. The final result is a complex price determined by other modalities influencing the price levels (period of

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[17] The application of the option pricing and hedonic regression methods is presently being analysed.

the weekday/weekend, length of the call, price discounts, etc.). These modalities are based on the market structure on turnover figures for determining market shares in the data available from National Authority for Communications (ANACOM) and on consumers' preferences.

In Bulgaria, the main source for the construction of the telecommunication sub-index weights is the HBS. The HBS data is also further combined with additional sources in order to obtain more detailed weights. The data from NSI communication statistics on the annual revenues from sales to the population is used to split the weight for calls between fixed line and mobile phone operators. Furthermore, the data concerning the distribution of the traffic from the Bulgarian Telecommunication Company (the only fixed line operator in Bulgaria) is used to detail the weights through the different services. There is no reliable information to detail the weights for mobile phone services.

The breakdown of the Portuguese and Bulgarian sub-indices are shown in the annex.

4.3.2. Sampling

Over the last five years, the telecommunications' market structure has evolved from a monopoly to a market competition situation in Portugal.

Despite the number of active providers of fixed line telephone services, the market concentration in Portugal is still high: one single company is responsible for approximately 90% of the national fixed line traffic and for 72% of the international fixed line traffic. This company is included in the sample for price observation of both national and international fixed line telephone calls. In addition, one more operator is selected for the observation of the prices for international fixed line calls. Almost all of the existing tariffs, offered by these two companies, are included for price observation.

There are three companies operating in the Portuguese mobile phone services market and all of them are covered in the index. The price items are chosen in terms of its turnover in each provider.

In Bulgaria, as was previously mentioned, the only provider of fixed line telephone services is the Bulgarian Telecommunication Company (BTC) and is thus the only company to be included in the CPI sample. The estimates made by BTC marketing experts are used for the selection of the items for price observation and the most popular/most sold approach is applied.

At present, the mobile phone services market is supplied by three companies. However, the market is dominated by only one of these companies. This company is selected for the survey of mobile services' prices. The selected mobile phone operator advises the statistical institute on the most preferable and used tariff plan. This kind of expertise is used for later tariff selection.

4.3.3. Price collection

In both countries the prices for telecommunication services are collected on a monthly basis. The reference period for prices corresponds to the complete month, meaning that the price used for computing the index corresponds to a monthly average price. In both countries, price collection is managed centrally. In Portugal, prices are collected using price lists and Internet sites from providers, information from ANACOM and in case of doubt, direct contacts with the providers are also made. In Bulgaria, the prices are collected directly from providers.

In Portugal, prices are collected according to the modalities considered: kind of service and provider, whereas, in Bulgaria, prices are only collected according to the kind of service. This happens because of the specific features of the fixed line telephone services market and because of the approach used in the sample selection of the mobile phone operators.

4.3.4. Complex price calculation

Complex prices are average prices, which include all tariffs with corresponding weights, if available. If the weights are not available, a geometric mean is applied.

In both countries, complex prices for each service are calculated with special software (xls-files) outside the main CPI computer software system. These prices are then typed into the main CPI compilation software.

In Portugal, apart from the tariffs, some other components are used when complex prices for fixed line telephone calls are calculated. These include the:

- average length of calls;
- distribution of the calls during a week (weekday/weekend, peak and off-peak hours);
- distribution of the calls according to their length in seconds and, where relevant;
- distribution of the consumers by normal and reduced prices and type of reductions.

The complex price for each mobile phone service is computed as a weighted average of a set of prices for similar items and the weight resulting from the turnover of each provider composed with its market share. Each price collected before entering into the main software is subject to a preliminary treatment in order to be converted into the representative price of the overall population and transactions.

In Bulgaria, average prices are calculated only in cases where detailed weights are available. In most cases a geometric mean is applied.

5. OTHER INDICES

5.1. The Harmonised Index of Consumer Prices

In both countries, the HICP is regarded as the best indicator for international comparisons and price stability measurement purposes and, in light of this idea, does not replace national CPIs.

While the HICP is seen to be the most appropriate price index for the purposes of (macro) economic analysis, national CPIs are, in this context, regarded as being the most suitable available indicator for the purposes of private and governmental uses such as index linking of wages, rents and other contractual payments.

Portugal, as a Member State of the European Union (EU), compiles and publishes its HICP on a monthly basis. Bulgaria, as a Candidate Country, produces its HICP in close compliance with EU legislation but, for the time being, does not publish it.

The compilation methodology of both national indices have undergone significant developments over the last few years, aligning themselves more closely to the rules followed by the HICP. National CPIs represent, in the two countries, the basic building block in the HICP compilation process.

In Portugal, the HICP is built upon the elementary indices of the Portuguese national CPI using a different weighting structure which includes the expenditure of non-residents. This expenditure is estimated on the basis of a survey on the expenditure of non-residents and on National Accounts data.

In spite of all the difficulties, Bulgaria has made substantial efforts to implement the HICP standards and has already achieved a close compliance with EU legislation. However, there are still some problems to solve in order to meet all the harmonisation requirements. The main difficulties revolve around the implementation of the HICP's domestic concept in the index, the construction of the 'net' insurance weights and the full implementation of quality

adjustment methods. At the moment, the Bulgarian HICP and the national CPI are exactly the same.

5.2. Other

Besides the CPI and the HICP, a core inflation index (CII) and a so-called 'Price Index for a Small Basket' (PISB) are also calculated and disseminated in Portugal and Bulgaria respectively.

In Portugal, the CII is compiled excluding unprocessed food and energy products from the all-items CPI. The primary objective of this index is to capture the 'core' or underlying inflation pressures in the economy by eliminating some of the CPI components which are most likely to be affected by (temporary) external shocks.

In Bulgaria, the PISB measures the average price change of a basket of 100 goods and services which are important for the 20% lower-income households. The calculation procedure of the index is identical to that of the CPI. The purpose of the PISB is to provide information for the analysis of social and economic changes within the country and for the lower-income group of households.

SUMMARY AND CONCLUSIONS

There is no difference between the index definition of the two countries. Both CPIs are defined as inflation and not as cost-of-living indicators.

In both countries, the data taken from HBS is the main primary source for the CPI weight compilation. However, although additional data sources are widely used in combination with HBS information, this is only done in a few particular cases in Bulgaria.

The two CPIs are presently compiled using a chained Laspeyres-type index formulation with annual links. In Bulgaria, this functional form has been applied from the outset of CPI production (i.e. 1990). In Portugal, however, the adoption of such an index formulation is fairly recent, with its introduction at the time of the last major CPI revision (i.e. 2002).

The most significant differences between the Portuguese and Bulgarian CPIs stem from the different (spatial) stratification of the two indices: regional in Portugal and national in Bulgaria. Due to this, in Portugal, elementary aggregates are defined at regional level, whereas in Bulgaria they are defined at a national level.

The two indices use different formulas for the calculation of their elementary aggregates. Furthermore, the aggregation process itself is slightly different, with more stages in the case of Portugal than in the case of Bulgaria. In Portugal, regional as well as national indices are calculated. In Bulgaria, no regional weights are used and only indices for the whole country are compiled.

On the whole, the sampling procedures that are followed in the compilation of the two indices are the same. Locality, outlet and product samples are mainly drawn on the basis of HBS and other additional data sources and on non-probability sampling techniques (cut-off, judgmental, etc). The main difference found is that, in the Portuguese CPI, product samples are drawn using more external data sources than in the Bulgarian CPI. This should come as no surprise, especially if we take into account the periodicity of the HBS in the two countries: continuous in Bulgaria and carried out, on average, on a quinquennial basis in Portugal.

There are a few differences in the way price collection is organised in the two countries. In Portugal, products which in the short term show marginal price variations, are not observed in all price collection centres at the same time. For these products, the collection of prices is subject to a quarterly sample rotation of the price collection centres. In Bulgaria, such a system does not exist and most of the prices are collected on a monthly basis. Furthermore, the price collection period is shorter in Portugal than in Bulgaria. Leaving aside all particularities of price collection (collection of fresh fruit and vegetables prices, collection of centralised prices, etc), the length of the price collection period is around five weekdays in Portugal and around fourteen weekdays in Bulgaria.

Portugal has more experience in the field of quality adjustments. In Portugal, quality adjustments have been used in a systematic way since 1997. Moreover, explicit quality adjustment methods have recently been introduced. In Bulgaria, the problem of quality change has only been dealt with in a more comprehensive way for a few years.

Both countries apply similar validation procedures. The greatest difference comes from the way validation work is organised. While in Portugal most of the data validation work is concentrated at a regional level, in Bulgaria validation work is distributed more evenly between national and regional offices.

Dissemination of the CPI data is done in a similar way in both countries. Nevertheless, some differences exist. In Bulgaria, CPI results are presented at regular monthly press conferences, whereas in Portugal, this only happens when major changes in CPI methodology occur. Another difference worth mentioning is that, with the exception of the press releases that are published in January of each year, stress is given to year-on-year rates of change whereas in Bulgaria, press releases tend to be focused on month-on-month rates of change.

The electricity sub-indices in these two countries are complied in a similar manner. The only significant difference appears in the way prices are collected: locally in Portugal; centrally in Bulgaria.

In both countries the weights of the elementary aggregates included in the telecommunication index are constructed in a similar way. Basically, it consists of combining the HBS data with information from additional sources taken from various reliable sources (electricity market supervision authorities, electricity companies, etc). In Portugal, more detailed weights are used than in Bulgaria. This essentially happens because of the existence and availability of more detailed data in Portugal. Portugal and Bulgaria follow different approaches in sampling companies and tariffs. In Portugal, almost all the companies and tariffs are selected for price observation, whereas in Bulgaria, only those that are considered the most representative are selected. In both countries, prices for telecommunication services are centrally collected and complex prices are computed out of the main software for price calculation.

The sub-indices for cars are constructed in different ways in these two countries. This is partly due to the specific car market features that the two countries exhibit but also to data availability issues.

Overall, it is possible to say that the differences between the two indices are more of degree than of kind. Both indices have undergone substantial redesign over the past few years and can be considered as being of a good quality. Recent changes in the two CPIs have mainly been driven by HICP developments. Portugal has participated in the HICP harmonisation process from the outset. The Bulgarian CPI could, therefore, profit from this experience and future co-operation between the two countries could be based on this premise. Co-operation in the field of quality adjustment, for example, would be a good starting point.
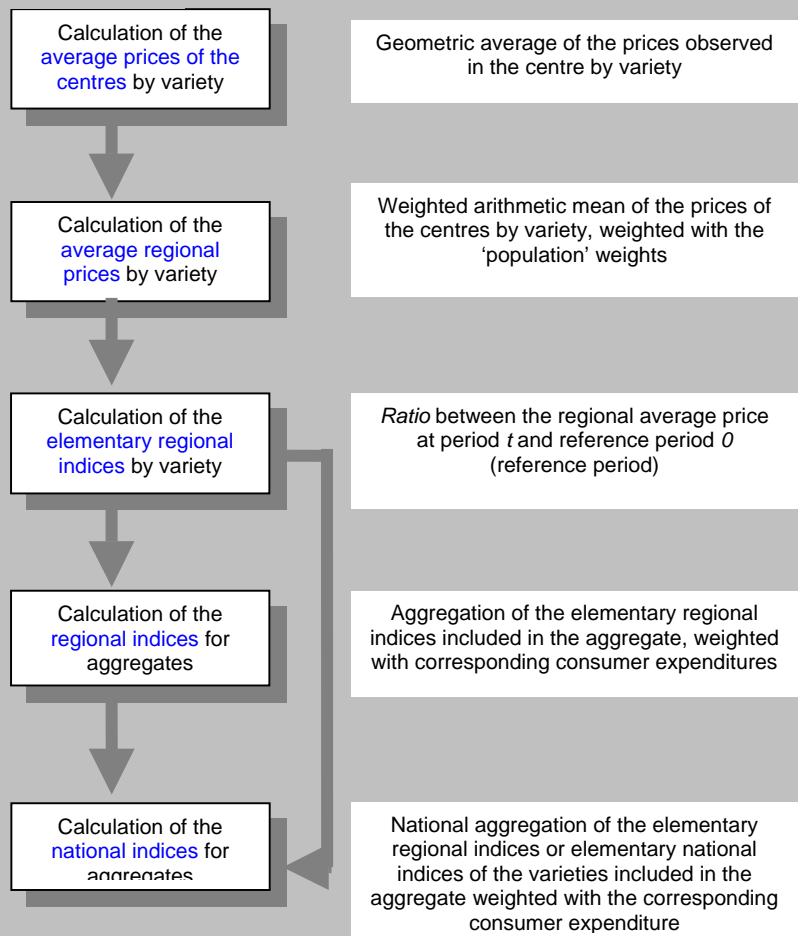
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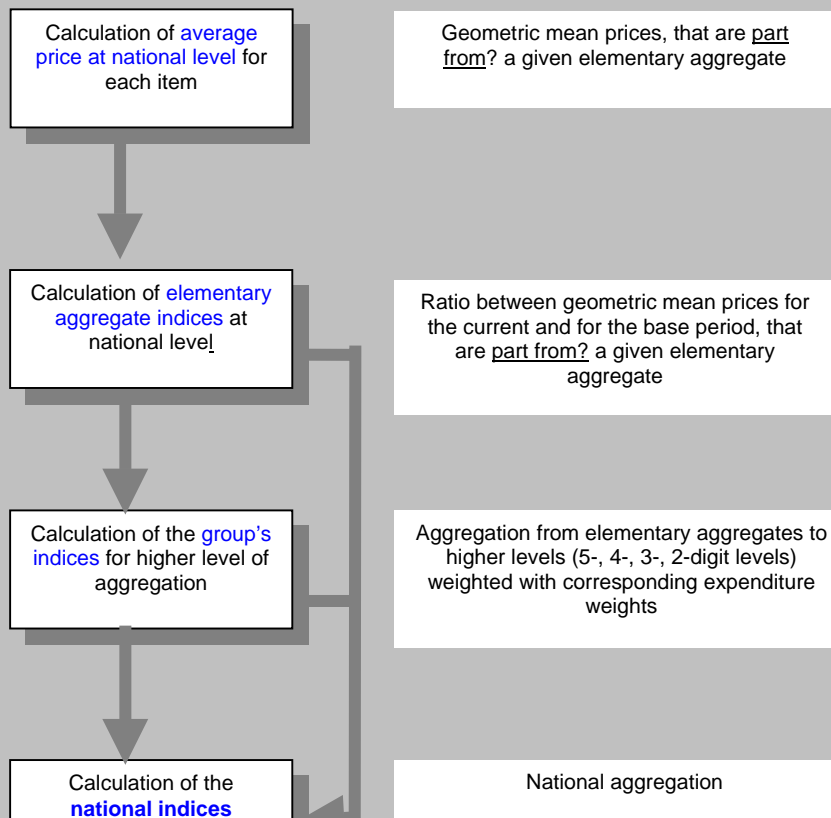
ANNEXES
Calculation stages of the Portuguese and Bulgarian CPIs

PORTUGAL

Calculation of the average prices of the centres by variety	Geometric average of the prices observed in the centre by variety
Calculation of the average regional prices by variety	Weighted arithmetic mean of the prices of the centres by variety, weighted with the 'population' weights
Calculation of the elementary regional indices by variety	*Ratio* between the regional average price at period *t* and reference period *0* (reference period)
Calculation of the regional indices for aggregates	Aggregation of the elementary regional indices included in the aggregate, weighted with corresponding consumer expenditures
Calculation of the national indices for aggregates	National aggregation of the elementary regional indices or elementary national indices of the varieties included in the aggregate weighted with the corresponding consumer expenditure

BULGARIA

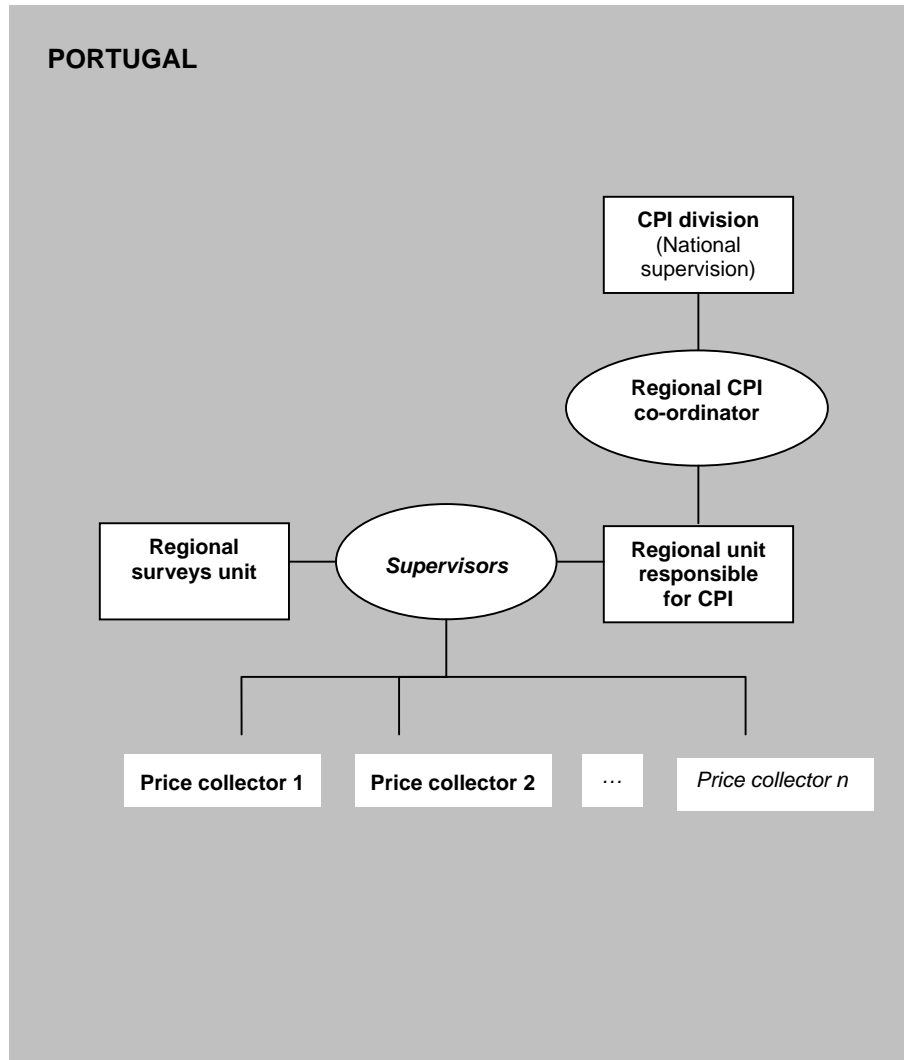|	
Calculation of average price at national level for each item	Geometric mean prices, that are part from? a given elementary aggregate
Calculation of elementary aggregate indices at national level	Ratio between geometric mean prices for the current and for the base period, that are part from? a given elementary aggregate
Calculation of the group's indices for higher level of aggregation	Aggregation from elementary aggregates to higher levels (5-, 4-, 3-, 2-digit levels) weighted with corresponding expenditure weights
Calculation of the **national indices**	National aggregation

Price collection organisational structures

Quality adjustments in the Portuguese and Bulgarian CPIs
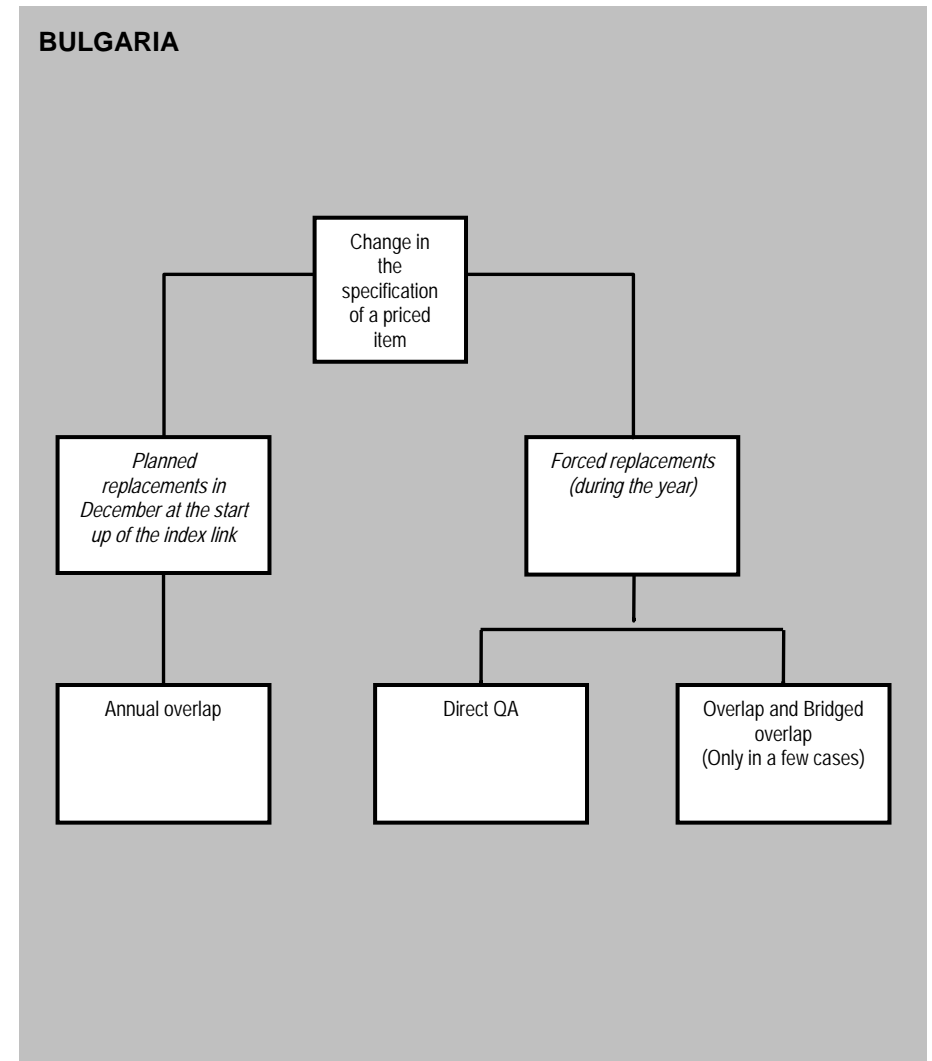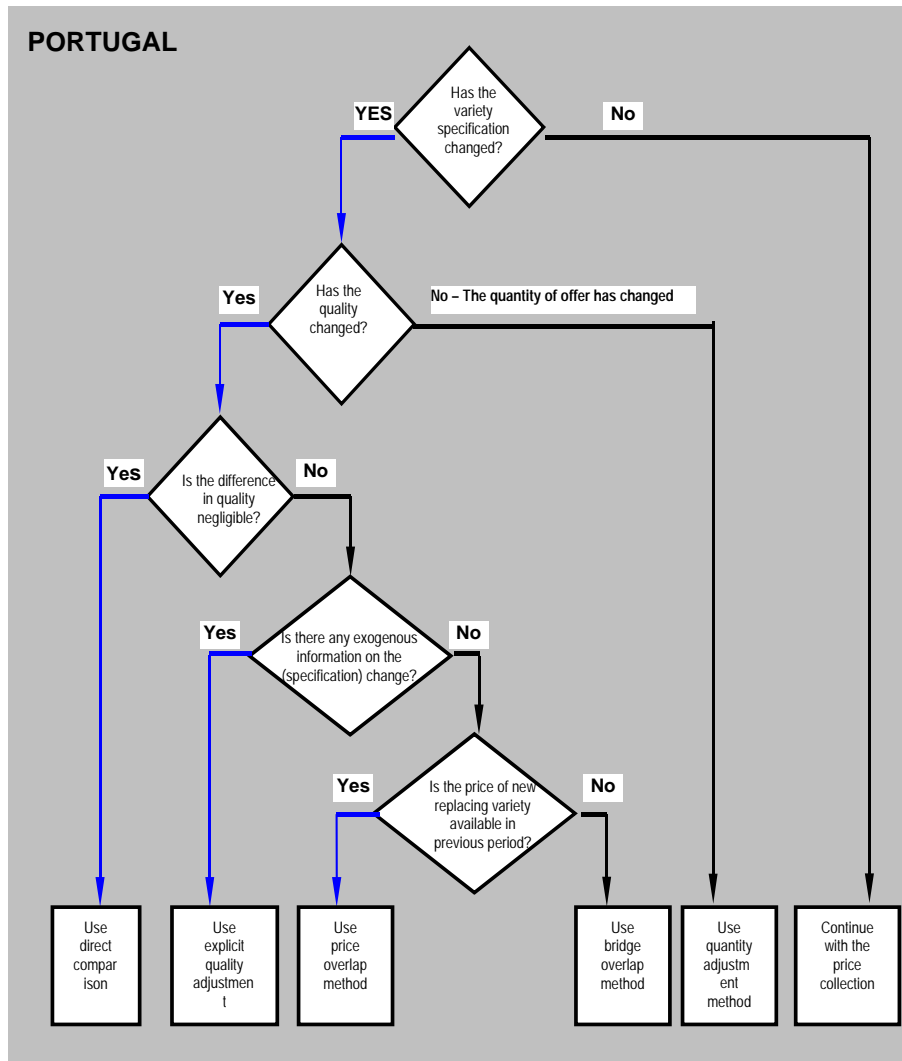
Breakdown of the telecommunication sub-index

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