15 January 2016

Consumer price indices: final data

December 2015

In December 2015 the Italian consumer price index for the whole nation (NIC) held steady on monthly basis and rose by 0.1 with respect to December 2014 (the same annual rate of change observed in November 2015). The flash estimate was confirmed.

The average annual inflation rate for 2015, measured by NIC, slowed for the third consecutive year (+0.1%, from +0.2% registered in 2014), whereas excluding energy and unprocessed food, core inflation was the same as in 2014 (+0.7%).

The stability, in December, of the annual rate of change of All items index is due to the balancing of opposite thrusts: on the one hand to the speed-up of the annual growth of prices of Services related to recreation, including repair and personal care (+0.9%, from +0.6% in the previous month) and to the further reduction of the decline of prices of Non-regulated energy products (-8.7%, from -11.2% in November 2015), on the other hand to the reversal trend of prices of Services related to transport (-1.7%, from +0.6% in November) and to the slowdown of the annual growth of prices of Unprocessed food (+2.3%, from +3.2% in the previous month).

Excluding energy and unprocessed food, core inflation was +0.6% (down from +0.7 registered in the previous month); excluding only energy, the inflation was +0.7% (0.1 percentage points lower than that of November 2015).

The annual rate of change of prices of Goods was -0.1% (from -0.2 observed in the previous month) and the annual rate of change of prices of Services was +0.3% (down from +0.6% in November 2015). As a consequence, the inflationary gap between Services and Goods decreased by 0.4 percentage points with respect to November 2015.

Prices of Grocery and unprocessed food decreased by 0.3% on monthly basis and rose by 0.9% on annual basis (down from +1.3% in November 2015).

In December 2015 the Italian harmonized index of consumer prices (HICP) declined by 0.1% with respect to the previous month and increased by 0.1% with respect to December 2014 (from +0.2% in November 2015). The flash estimate was confirmed.

Core inflation measured by Italian HICP was 0.6%, down from +0.7% in November 2015. A decrease of two tenths of a percentage point was registered for the inflation calculated excluding energy, food, alcohol and tobacco (which was 0.4%, down from 0.6% in the previous month). Excluding energy, the inflation fell to 0.7% (from 0.8% in the previous month).

In December 2015, the Italian harmonized index of consumer prices at constant tax rates (HICP-CT) held steady compared with November 2015 and rose by 0.1 with respect to December 2014 (as the HICP). Therefore, as in the previous two months, the difference between HICP and HICP-CT growth rates – which incorporates the effects of changes in indirect taxes, occurred in the last twelve months – was zero. It should be noted that the difference between HICP and HICP-CT growth rates represents the upper limit of the impact of changes in indirect taxes occurred in the last twelve months on HICP, assuming their full and instantaneous pass-through on prices paid by consumers. The annual average rate of change of the Italian HICP-CT for 2015 held steady with respect 2014 year (it was -0.1% in 2014).

Starting from this release, Istat disseminates data of inflation measures for population subgroups in conjunction with the dissemination of the final consumer price indices respectively of December and June. The press release concerning these indicators of 21 July 2015 is therefore the latest available.

In the fourth quarter 2015 inflation measured by HICP, even if weak for all the different population subgroups, was lower for households with less purchasing power (+0.1% for the first group) and higher for households with greater spending power (+0.4% for the fifth group).

On average, in 2015, the HICP showed a slight deflation for households with less purchasing power (-0.2% and -0.1% respectively for the first and the second group), while, on the contrary, it resulted in a moderate growth for households with greater spending power (+ 0.4% for the fifth group).

ITALIAN CONSUMER PRICE INDICES
December 2015

	INDICES December 2015	Dec-15 Nov-15	Dec-15 Dec-14	2015 2014
Italian consumer price index for the whole nation (NIC) (a)	107.3	0.0	0.1	0.1
Italian harmonized index of consumer prices (HICP) (b)	120.1	-0.1	0.1	0.1

(a) Reference base year 2010=100; (b) reference base year 2005=100.

TABLE 1. ITALIAN CONSUMER PRICE INDEX FOR THE WHOLE NATION (NIC), BY COICOP DIVISION
December 2015, weights, indices and percentage changes (base 2010=100)

Divisions	Weights	Indices	Dec-15 / Nov-15	Dec-15 / Dec-14	Nov-15 / Nov-14	Dec-14 / Nov-14	2015 / 2014
Food and non-alcoholic beverages	165,266	109.1	-0.3	1.2	1.5	0.0	1.1
Alcoholic beverages. tobacco	32,606	114.8	-0.1	2.8	2.9	0.0	2.7
Clothing and footwear	70,229	106.4	0.0	0.5	0.5	0.0	0.4
Housing. water. electricity. gas and other fuels	115,963	114.5	0.0	-0.3	-0.4	-0.2	-0.8
Furnishings. household equipment and routine household maintenance	76,036	106.4	0.0	0.4	0.4	0.0	0.4
Health	84,390	101.5	0.0	0.4	0.4	0.0	0.4
Transport	138,039	109.9	-0.1	-3.3	-2.8	0.4	-2.7
Communication	25,408	85.9	0.9	0.2	-0.5	0.2	-1.1
Recreation and culture	78,524	102.4	1.0	0.6	0.1	0.5	0.2
Education	12,085	111.6	0.0	1.3	1.3	0.0	1.7
Restaurants and hotels	111,555	106.7	-0.3	1.1	0.9	-0.5	1.3
Miscellaneous goods and services	89,899	106.9	-0.2	0.0	0.2	0.0	0.2
ALL ITEMS	**1,000,000**	**107.3**	**0.0**	**0.1**	**0.1**	**0.0**	**0.1**

TABLE 2. ITALIAN CONSUMER PRICE INDEX FOR THE WHOLE NATION (NIC). BY TYPE OF PRODUCTS
December 2015. weights. indices and percentage changes (base 2010=100)

Special aggregates	Weights	Indices	Dec-15 / Nov-15	Dec-15 / Dec-14	Nov-15 / Nov-14	Dec-14 / Nov-14	2015 / 2014
Food including alcohol:	176,032	109.3	-0.4	1.1	1.6	0.1	1.0
Processed food including alcohol	107,365	108.9	0.0	0.4	0.4	0.0	0.4
Unprocessed food	68,667	109.8	-0.6	2.3	3.2	0.2	2.2
Energy:	93,467	112.1	-0.4	-5.5	-6.8	-1.8	-6.8
Regulated energy products	46,766	115.5	0.0	-2.0	-2.0	0.1	-2.6
Non-regulated energy products	46,701	107.8	-0.9	-8.7	-11.2	-3.6	-10.3
Tobacco	21,840	115.6	-0.2	3.7	3.9	0.0	3.6
Non energy industrial goods:	244,136	104.0	0.1	0.7	0.6	0.0	0.3
Durable goods	73,312	101.6	0.5	1.3	0.8	0.0	0.2
Non-durable goods	70,570	104.4	0.0	0.6	0.5	-0.1	0.7
Semi-durable goods	100,254	105.8	-0.3	0.4	0.6	-0.1	0.3
Goods	**535,475**	**107.1**	**-0.2**	**-0.1**	**-0.2**	**-0.3**	**-0.5**
Services related to housing	80,193	110.3	0.1	0.8	0.6	-0.1	0.3
Services related to communication	21,410	94.0	0.2	-0.1	-0.2	0.1	0.6
Services related to recreation, including repair and personal care	172,405	106.4	0.3	0.9	0.6	-0.1	0.9
Services related to transport	79,231	112.2	0.3	-1.7	0.6	2.6	0.3
Services - miscellaneous	111,286	106.5	-0.1	0.5	0.6	0.0	0.7
Services	**464,525**	**107.5**	**0.1**	**0.3**	**0.6**	**0.4**	**0.6**
ALL ITEMS	**1,000,000**	**107.3**	**0.0**	**0.1**	**0.1**	**0.0**	**0.1**
All items excluding energy and unprocessed food (Core inflation)	837,866	106.8	0.1	0.6	0.7	0.2	0.7
All items excluding energy. food. alcohol and tobacco	708,661	105.5	0.1	0.4	0.6	0.3	0.5
All items excluding energy	906,533	107.0	0.0	0.7	0.8	0.2	0.8
Grocery and unprocessed food	199,953	108.6	-0.3	0.9	1.3	0.1	0.8

TABLE 3. ITALIAN HARMONIZED CONSUMER PRICE INDEX (HICP). BY COICOP DIVISION

December 2015. weights. indices and percentage changes (base 2005=100)

Divisions	Weights	Indices	Dec-15 / Nov-15	Dec-15 / Dec-14	Nov-15 / Nov-14	Dec-14 / Nov-14	2015 / 2014
Food and non-alcoholic beverages	175,648	122.1	-0.4	1.2	1.5	-0.1	1.1
Alcoholic beverages. tobacco	34,691	138.0	-0.2	2.8	2.8	-0.1	2.7
Clothing and footwear	81,002	116.9	-0.1	0.4	0.6	0.1	0.1
Housing. water. electricity. gas and other fuels	123,585	134.1	0.1	-0.2	-0.4	-0.1	-0.8
Furnishings. household equipment and routine household maintenance	81,145	117.4	-0.1	0.3	0.4	0.0	0.4
Health	40,036	123.4	0.0	1.3	1.4	0.1	1.1
Transport	146,884	123.9	-0.1	-3.4	-2.9	0.5	-2.7
Communication	27,079	72.1	1.0	0.3	-0.4	0.3	-1.2
Recreation and culture	62,208	108.2	1.3	0.9	0.2	0.6	0.3
Education	12,876	125.9	0.0	1.3	1.3	0.0	1.8
Restaurants and hotels	118,779	117.8	-0.3	1.1	0.9	-0.5	1.3
Miscellaneous goods and services	96,067	122.8	-0.1	0.1	0.1	-0.1	0.1
ALL ITEMS	**1,000,000**	**120.1**	**-0.1**	**0.1**	**0.2**	**0.0**	**0.1**
All items at constant tax rates	1,000,000	118.2	0.0	0.1	0.1	0.0	0.0

TABLE 4. ITALIAN HARMONIZED CONSUMER PRICE INDEX (HICP). BY SPECIAL AGGREGATES

December 2015. weights. indices and percentage changes (base 2005=100)

Special aggregates	Weights	Indices	Dec-15 / Nov-15	Dec-15 / Dec-14	Nov-15 / Nov-14	Dec-14 / Nov-14	2015 / 2014
Food. alcohol and tobacco:	210,339	124.4	-0.4	1.4	1.7	-0.1	1.4
Processed food (including alcohol and tobacco)	119,118	126.4	-0.2	1.0	1.0	-0.2	1.0
Unprocessed food	91,221	121.5	-0.7	2.0	2.7	0.0	1.9
Energy:	99,620	128.5	-0.5	-5.4	-6.8	-1.9	-6.8
Electricity. gas. solid fuels and heat energy	53,595	134.3	0.1	-1.9	-1.9	0.1	-2.4
Liquid fuels and fuels and lubricants for personal transport equipment	46,025	120.9	-1.1	-9.5	-12.0	-3.8	-11.2
Non-energy industrial goods:	254,508	116.4	-0.1	0.8	0.9	0.0	0.6
Durable goods	73,885	113.1	0.1	1.2	1.0	-0.1	0.7
Non-durable goods	67,179	123.4	0.2	1.2	1.1	0.0	1.2
Semi-durable goods	113,444	115.0	-0.3	0.3	0.6	0.0	0.2
Goods	**564,467**	**120.6**	**-0.2**	**-0.1**	**-0.2**	**-0.3**	**-0.3**
Services related to housing	85,481	128.4	0.0	0.8	0.6	-0.2	0.3
Services related to communication	27,079	72.0	1.0	0.3	-0.4	0.3	-1.3
Services related to recreation. including repairs and personal care	161,508	118.9	0.3	1.0	0.7	-0.1	1.1
Services related to transport	83,871	130.7	0.3	-1.7	0.7	2.7	0.3
Services - miscellaneous	77,594	121.6	-0.1	0.4	0.5	0.0	0.7
Services	**435,533**	**119.2**	**0.2**	**0.3**	**0.6**	**0.5**	**0.6**
ALL ITEMS	**1,000,000**	**120.1**	**-0.1**	**0.1**	**0.2**	**0.0**	**0.1**
All items excluding energy and unprocessed food (Core inflation)	809,159	119.2	0.1	0.6	0.7	0.2	0.7
All items excluding energy. food. alcohol and tobacco	690,041	118.0	0.1	0.5	0.7	0.3	0.7
All items excluding energy	900,380	119.4	0.0	0.7	0.8	0.2	0.9

TABLE 5. ITALIAN HARMONIZED CONSUMER PRICE INDEX (HICP) BY POPULATION SUBGROUPS
2014-2015. Percentage changes (base 2005=100)

All-items	2014	2015	Q1	Q2	Q3	Q4
1°group	0.0	-0.2	-0.6	-0.2	0.1	0.1
2°group	0.0	-0.1	-0.4	-0.1	0.1	0.1
3°group	0.1	0.0	-0.4	0.1	0.1	0.1
4°group	0.2	0.0	-0.3	0.0	0.2	0.1
5°group	0.4	0.4	0.2	0.3	0.6	0.4
HICP	**0.2**	**0.1**	**-0.1**	**0.1**	**0.3**	**0.2**

For more detailed please refer to the Italian version
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Consumer Price Indices

Methodological note

The **Consumer Price Index for the whole nation (NIC)** is based on the consumption of the entire present population.

The **Harmonised index of Consumer Prices (HICP)**, calculated according to the EU regulations in force, is used for the comparison of inflation between Member States and as a key indicator for the monetary policy of the European Central Bank.

Consumer price indices are calculated using a chained Laspeyres formula, in which the basket of products and the weighting system are updated annually. Monthly indices for the current year are calculated with reference to December of the previous year (calculation base) and subsequently chained over the period chosen as a reference base in order to be able to measure price trends over a period of time longer than a year[1].

Reference base year for NIC and HICP

The NIC indices are expressed with 2010=100 as a reference base year[2].
The HICP, on the other hand, are calculated and published with 2005=100 as a reference base, as established by the Regulation (EC) no 1708/2005 of the 20th October 2005.

Classification for consumer expenditure, basket of goods

The classification of consumer spending adopted for the consumer price indices is the international COICOP (*Classification of Individual Consumption by Purpose*) whose hierarchical structure makes provision for three levels of disaggregation: *Divisions*, *Groups* and *Classes***.**

Starting from data referred to January 2011, the indices are calculated according to a more detailed classification scheme which takes into account, with some adjustments, the proposed revision of the COICOP classification currently being discussed in Europe for disaggregation levels lower than *Classes*. The classification scheme, which is adopted for the three consumer price indices published by ISTAT, is distinguished by two additional lower levels of disaggregation, *Product Sub-Classes* and *Consumption segments*. Consumption segments are represented by a sample of products or groups of products items, called *Representative items*. In 2015, there are 618 representative items (1,441 products) for NIC and 623 representative items (1,457 products) for the HICP.

As regards NIC, the indices are released with a level of detail that reaches 326 consumption segments; NIC indices by type of products (a classification of goods and services different from the COICOP), by regulated and non-regulated products and by purchase frequency are also calculated and released.

As regards HICP, the indices are published with a level of detail of the COICOP-HICP product classes, in accordance with the publication carried out by Eurostat for the HICP of single EU countries and for the HICPs calculated for the EU and the EMU; furthermore, HICP indices by special aggregates (**HICP-SA**) are released. HICP-SA indices are calculated using the same classification scheme and the same method adopted by Eurostat (therefore different from the method used for the calculation of NIC indices by type of products), in order to guarantee comparability among the Italian HICPs and the HICP of the other EU countries and the HICPs for the EU and the euro area produced by Eurostat[3].

All indices are published in I.Stat, the warehouse of statistics produced by ISTAT, inside the theme Prices, sub-theme Consumer prices (http://dati.istat.it/). In I.Stat, in addition to indices at national level, NIC indices at provincial, regional and macro area level and FOI indices at provincial level are published.

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[1] ISTAT calculates another index named Consumer Price Index for blue- and white-collar worker households (FOI) based on consumption of households whose reference person is an employee.
[2] The FOI indices are expressed with 2010=100 as a reference base year, too.
[3] HICP-SA indices have been released starting from data referred to February 2013.
The description of product classes which are included in the special aggregates is available on Eurostat web site at the following link:
http://ec.europa.eu/eurostat/ramon/nomenclatures/index.cfm?TargetUrl=LST_NOM_DTL&StrNom=HICP_2000&StrLanguageCode=EN&IntPcKey=&StrLayoutCode=.
The HICP-SA calculation method is described in the HICP Compendium which is downloadable at the following link: http://ec.europa.eu/eurostat/documents/3859598/5926625/KS-RA-13-017-EN.PDF/59eb2c1c-da1f-472c-b191-3d0c76521f9b?version=1.0.
Back series starting from January 2001 are published on I.Stat, the warehouse of statistics produced by ISTAT, inside the theme Prices (http://dati.istat.it).

Price collection and calculation method for seasonal product price indices

The method for collecting and calculating prices of seasonal products is in accordance with Regulation (EC) no 330/2009 of 22nd April 2009, which sets out minimum standards for dealing with seasonal products in the HICP[4]. This method, also used for the NIC[5], is applied to the product groups and classes *Fruit*, *Vegetables*, *Clothing* and *Footwear*.

The European Regulation defines as a *seasonal product* one which, during certain periods of the year (of at least one month), it may not be possible to purchase, or is purchased in modest or insignificant volumes by consumers. It also establishes that in a given month seasonal products are considered *in season* or *out of season*.

On the basis of this standard, ISTAT has defined a monthly calendar for the whole 2015, which establishes in a given month when each specific product belonging to the abovementioned product groups or classes must be considered *in season* or *out of season*. The adoption of a seasonality calendar entails that the local consumer price survey is carried out only in months in which the product in question is defined as *in season*, while prices of *out of season* products will be estimated on the basis of a method that is consistent with standards contained in the aforementioned European regulation.

Survey geographical basis and rate of coverage, temporal coverage

Data contributing to the compilation of monthly consumer price indices are traditionally collected in two distinct surveys: the local survey, carried out by Municipal Offices of Statistics, under Istat supervision and coordination, and the central survey, carried out directly by Istat.

In 2015 the geographical basis of the survey is made up of 80 municipalities (19 regional capitals and 61 provincial capitals) – which participate in the indices calculation for all the representative items of the basket – and of other 12 municipalities participating in the survey for a subset of products which includes local tariffs (water supply, solid waste, sewerage collection, gas for domestic use, urban transport, taxi, car transfer ownership, canteens in schools, public day nursery, etc.) and some local services (building worker, football matches, cinema, theatre shows, secondary school education, canteens in universities etc.).
Overall, the coverage of the index, measured in terms of resident population in the provinces with capitals participating in the survey for all items in the basket, is 83.5%.
Concerning the basket subset including local tariffs and some local services – whose weight on the NIC basket is equal to 6.8% – with the participation of the other 12 municipalities, the coverage of the survey, measured in terms of provincial resident population, rises to 91.9%.
In the consumer price survey, in 2015, there are more than 41,300 statistical units (including outlets, enterprises and institutions) where the price of at least one product is monitored, as well as around 8,000 dwellings for observing rents. 501,900 prices are sent monthly to Istat by Municipal Offices of Statistics each month.

Prices collected each month directly by Istat are 95,600; among these, about 13,000 are collected using web scraping techniques for consumer electronics products price collection on Internet. The percentage of products observed directly by Istat, calculated according to the weight assigned to each product within the NIC, is 23.1%. Prices are collected at central level for those products (for a total of 76 representative items):

- that do show no variability along national territory or are administered at national or regional level (i.e. tobacco, telephone services, prescription medicines, magazine and other periodicals, some transport services such as national and regional railway transport);
- that are technically too complex to be collected at territorial level because of continuous technology changes (i.e. consumer electronics);
- whose consumption is not strictly linked to the territorial areas (tourist services such as package holidays, bathing establishment etc.).

With regard to the local survey, price collection is carried out in the first fifteen working days:

- bi-monthly for products which show a strong temporal variability of their prices (fresh fruit and vegetables, fresh fish; transport fuels; gas in cylinder and heating oil);
- once a month, for the remaining products. For some goods or services, such as for example, water supply, town gas and natural gas, urban transport by bus and combined urban transport, taxi or tickets (contributions to NHS) for specialist practice, services of medical analysis laboratories and X-ray centres and other paramedical services, it is detected the price applied the 15th day of the month to which the index is referred.

Concerning the centralized survey, price collection is widely carried out once a month in the first fifteen working days. Hereafter the exceptions to the general rule:

[4] It has been adopted starting from data referred to January 2011.
[5] It is used for FOI indices, too.

- for some goods and services such as for example tobacco, games of chance, medicines, telecommunications services, regional railway transport, wagon lits, out of town bus services, out of town combined passenger transport, postal services, highway tolls, car transfer ownership, car overhaul, it is detected the price applied the 15th day of the month to which the index is referred;
- three times per month, according an annual calendar fixed at the beginning of the year, for national railway transport;
- bi-monthly for passenger transport by air, passenger transport by sea and inland waterway, local daily newspapers and magazines;
- on each day of the month for touristic, recreational and cultural services (fun parks entrance ticket, bathing establishment, ski lifts, etc.).

Weighting structure

In the table 1 the weighting structure for the year 2015 of NIC and HICP is reported.

TABLE 1. WEIGHTS USED FOR CALCULATING CONSUMER PRICE INDICES, BY EXPENDITURE DIVISION. YEAR 2015, percentage values

Expenditure divisions	*Weights*	
	NIC	HICP
Food and non-alcoholic beverages	16.5266	17.5648
Alcoholic beverages, tobacco	3.2606	3.4691
Clothing and footwear	7.0229	8.1002
Housing, water, electricity, gas and other fuels	11.5963	12.3585
Furnishings, household equipment and routine household maintenance	7.6036	8.1145
Health	8.4390	4.0036
Transport	13.8039	14.6884
Communication	2.5408	2.7079
Recreation and culture	7.8524	6.2208
Education	1.2085	1.2876
Restaurants and hotels	11.1555	11.8779
Miscellaneous goods and services	8.9899	9.6067
All items	**100.0000**	**100.0000**

Harmonized index of consumer prices at constant tax rates

The Harmonized Index of Consumer Prices at constant tax rates (**HICP-CT**)[6] is calculated as established by the Regulation (EC) no 119/2013 of the 11th February 2013. It measures the change of prices at constant tax rates. It follows the same computation principles as the HICP, but is based on prices 'at constant tax rates'.

Prices at constant tax rates are estimated cancelling out the effects due to changes in taxes in the current month compared to the tax rates system in force in December of previous year (calculation period base).

The taxes considered in the HICP-CT are those directly linked to final consumption. They are mainly VAT, excise duties and other taxes on some specific items (such as cars and insurance). Subsidies and taxes paid on intermediate stages (e.g. production, transportation) are not taken into account. In principle, fort the compilation of HICP-CT, all taxes should be included and kept constant; however, due to practical consideration, taxes which generate very small tax revenues may not be taken into account. In detail, according to recommendations reported in the Eurostat HICP-CT Manual, taxes which cover less than 2% of the total tax revenue can be excluded. On the whole, included taxes must cover a minimum of 90% total tax revenue. Therefore in the compilation of the Italian HICP-CT, taxes kept constant are the following: VAT, excise duties on tobacco and energy items (fuels, heating oil, gas, electricity, etc.), the main local surcharge on electricity and gas, tax for the public liability insurance and contribution to the National Health Service for transport means insurance. On the basis of National Accounts data taxes which cover less than 1% of the total tax revenue are excluded and, on the whole, taxes included cover almost 98% of total revenues carried out with taxes on final consumption.

[6] The HICP-CT has been released starting from data referred to March 2012. Back series starting from January 2002 are published on I.Stat, inside the theme Prices (http://dati.istat.it).

The HICP-CT covers the same goods and services as those covered by the HICP. The same weight structure is applied as for the HICP (Table 1). As HICP, it has expressed 2005=100 as a reference base year.

The HICP-CT provides a measure of the **theoretical impact** of changes of indirect taxes on the overall HICP inflation. It has to be emphasised that it does not provide an exact measure of this impact, rather an indication for its upper limit. In effect, the difference between HICP and HICP-CT growth rates points to the theoretical impact of tax changes on overall HICP inflation, assuming an instantaneous and full pass-through of tax rate changes on the price paid by the consumer.

It has to be pointed out that, during the year, the Italian HICP-CT **may be revised** following introduction of methodological changes required by indirect taxation system changes. Data become final in the next year to the reference one.

Indices rates of change calculation

Hereafter formulae for the calculation of monthly, annual and annual average rates of change for consumer price indices are described[7]. The HICP formulae apply also to HICP-CT. The first expression concerns calculation of rates of change between indices in the same reference base period:

- Monthly rate of change (**NIC, HICP**)

The monthly rate of change is the current month's index in respect to the previous month's index (with one decimal place), for example:

$$MOR\left(I_{Jan,2012};I_{Feb,2012}\right)=Round\left(\frac{I_{Feb,2012}}{I_{Jan,2012}}\times 100-100;\quad .1\right)$$

- Annual rate of change (**NIC**, **HICP**)

The annual rate of change is the current month's index in respect to the same month's index a year previously (with one decimal place), for example:

$$ANR\left(I_{Feb,2011};I_{Feb,2012}\right)=Round\left(\frac{I_{Feb,2012}}{I_{Feb,2011}}\times 100-100;\quad .1\right)$$

- Annual average rate of change (**NIC**)

The annual average rate of change is the current annual average index in respect to a previous annual average index (with one decimal place), for example:

$$AVR\left(I_{2011};I_{2012}\right)=Round\left(\frac{I_{2012}}{I_{2011}}\times 100-100;\quad .1\right)$$

- Annual average rate of change (**HICP**)

For the HICP, in a different way compared to NIC, the annual average rate of change is obtained directly from the monthly indices and therefore it is based on the unrounded annual average indices. This method, applied in compliance with Eurostat, guarantees international comparability of data. For example:

$$AVR\left(I_{2011};I_{2012}\right)=Round\left(\frac{\sum\left(I_{Jan,2012}+I_{Feb,2012}+\ldots+I_{Dec,2012}\right)}{\sum\left(I_{Jan,2011}+I_{Feb,2011}+\ldots+I_{Dec,2011}\right)}\times 100-100;\quad .1\right)$$

The following expression describes the calculation of monthly rate of change between indices expressed in different reference base year; it can be also used for the calculation of the annual rate of change and the annual average rate of change:

[7] The expressions and the rounding rules described for NIC are also carried out for FOI.

- Monthly rate of change - **Indices expressed in different reference base year**

$$MOR\left(I_{m,j}^{X_1}; I_{n,h}^{X_t}\right) = Round\left(\frac{I_{n,h}^{X_t}}{I_{m,j}^{X_1}} \times C\left(X_t; X_{t-1}\right) \times C\left(X_{t-1}; X_{t-2}\right) \times ... \times C\left(X_2; X_1\right) \times 100 - 100;\ .1\right)$$

where $I_{m,j}^{X_1}$ is the index, with one decimal place, of the month *m* year *j,* expressed in the more remote reference base X_1, $I_{n,h}^{X_t}$ is the index, with one decimal place, of the month *n* year *h,* expressed in the more recent reference base X_t, and $C(X_i; X_{i-1})$ with $i=2,\ldots,t$ are the splicing coefficients between contiguous reference bases. These coefficients are equal to the annual average index of the year corresponding to the new reference base expressed in the previous base, divided by 100. They are as many as base changes have been carried out during the considered period.

Flash estimates of HICP: accuracy and computation methodology

Flash estimate of Italian HICP (and NIC) are usually published on the last working day of the reference month according to the Eurostat release calendar of HICP Flash estimate for euro area. Final data are generally published around 13 days later.

The aim of the inflation flash estimates is to provide a timely information on inflation, predicting as accurately as possible the final HICP (and NIC) annual rate of change released about two weeks later. The analysis of their revisions represents an important tool to evaluate the correct balancing between the two quality dimensions, timeliness and accuracy.

Totally in line with the Eurostat Statistics Explained on Inflation – methodology of the euro area flash estimate, this section analyses the accuracy of the Italian HICP flash estimates and describes the methodology used in their computation.

Accuracy of flash estimates

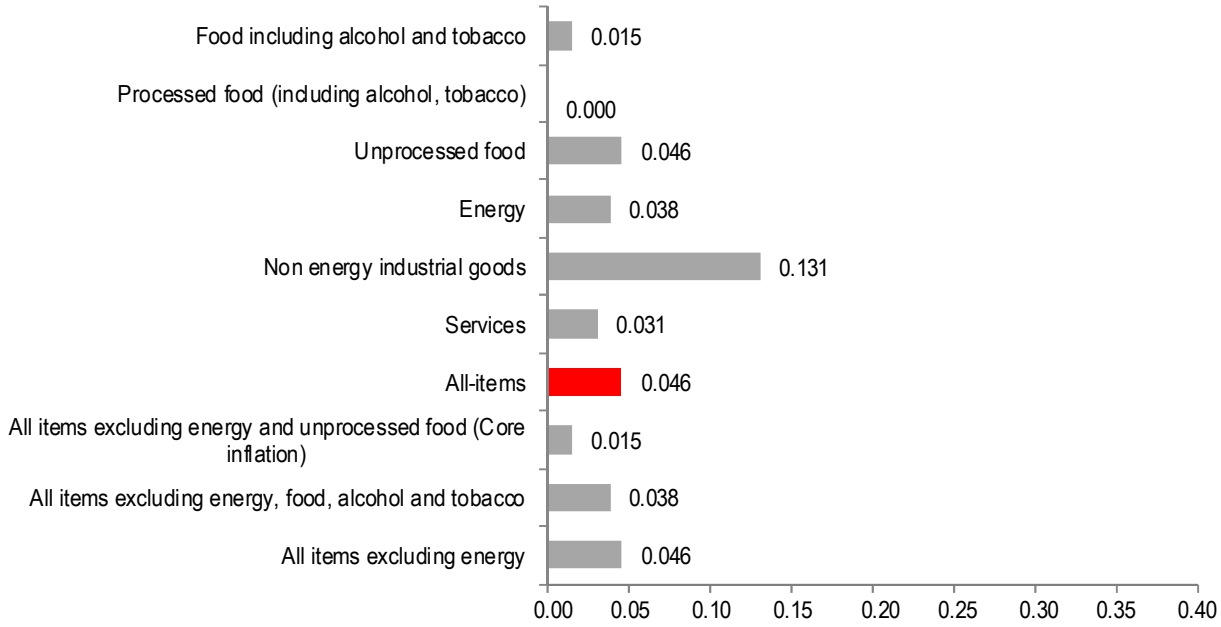
Table 2 compares the flash estimates and the final HICP annual rates for the same reference month. Over the last thirteen months, the maximum difference between the All items flash estimate and the HICP annual rate was 0.1. Over the same period, with reference to the main special aggregates, the maximum differences between the flash estimate and the final HICP annual rate concerned Energy (0.5 in April 2015) and Non energy industrial goods (0.3 and 0.5 respectively recorded in January and August 2015). The highest differences for Non energy industrial goods together with the highest frequency of revisions (9 months out of 13 months) are mainly due to the sales dynamics of Clothing and footwear, for which the partial information available has a higher impact on the flash estimate and therefore it turns out to be less accurate.

TABLE 2. FLASH ESTIMATES AND HICP ANNUAL RATES FOR THE ALL-ITEMS AND MAIN SPECIAL AGGREGATES. DECEMBER 2014-DECEMBER 2015, percentage values (Base 2005=100)

Special aggregates		Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15
Food including alcohol and tobacco:	Flash	-0.3	0.0	1.2	1.5	1.5	1.5	1.5	1.1	1.3	1.7	2.1	1.6	1.4
	HICP	-0.3	0.0	1.2	1.4	1.5	1.5	1.5	1.1	1.3	1.7	2.1	1.7	1.4
Processed food (including alcohol, tobacco)	Flash	-0.1	0.1	0.9	1.0	1.0	1.1	1.0	1.0	1.0	1.0	1.1	1.0	1.0
	HICP	-0.1	0.1	0.9	1.0	1.0	1.1	1.0	1.0	1.0	1.0	1.1	1.0	1.0
Processed food	Flash	-0.7	-0.1	1.6	1.9	1.9	2.0	1.8	1.4	1.7	2.8	3.6	2.6	1.9
	HICP	-0.7	-0.2	1.6	1.9	1.9	2.0	1.8	1.4	1.8	2.7	3.5	2.7	2.0
Energy	Flash	-5.3	-9.1	-8.4	-6.5	-5.9	-5.7	-5.8	-5.4	-6.4	-7.6	-7.7	-6.8	-5.4
	HICP	-5.3	-9.1	-8.4	-6.5	-6.4	-5.7	-5.8	-5.4	-6.4	-7.6	-7.7	-6.8	-5.4
Non energy industrial goods	Flash	0.3	0.4	0.6	0.3	0.6	0.7	0.9	0.9	1.1	0.3	0.9	0.8	0.8
	HICP	0.4	0.1	0.6	0.5	0.6	0.8	0.9	0.8	0.6	0.5	0.8	0.9	0.8
Services	Flash	0.8	0.3	0.7	0.4	0.3	0.5	0.5	0.7	0.7	0.9	1.0	0.5	0.3
	HICP	0.9	0.4	0.7	0.4	0.2	0.5	0.5	0.7	0.7	0.9	1.0	0.6	0.3
All-items	Flash	**-0.1**	**-0.4**	**0.1**	**-0.1**	**0,0**	**0.2**	**0.2**	**0.4**	**0.5**	**0.2**	**0.3**	**0.1**	**0.1**
	HICP	**-0.1**	**-0.5**	**0.1**	**0.0**	**-0.1**	**0.2**	**0.2**	**0.3**	**0.4**	**0.2**	**0.3**	**0.2**	**0.1**
All items excluding energy and unprocessed food (Core inflation)	Flash	0.6	0.4	0.9	0.5	0.4	0.7	0.8	0.9	1.1	0.8	1.0	0.7	0.6
	HICP	0.6	0.4	0.9	0.6	0.4	0.7	0.8	0.9	1.0	0.8	1.0	0.7	0.6
All items excluding energy, food, alcohol and tobacco	Flash	0.7	0.5	0.9	0.3	0.3	0.7	0.7	1.0	1.1	0.7	1.0	0.6	0.5
	HICP	0.7	0.5	0.9	0.4	0.3	0.7	0.7	1.0	1.0	0.8	0.9	0.7	0.5
All items excluding energy	Flash	0.5	0.4	1.0	0.6	0.7	0.8	0.8	0.9	1.2	1.0	1.3	0.8	0.7
	HICP	0.5	0.3	1.0	0.7	0.6	0.8	0.9	0.9	1.1	1.1	1.3	0.8	0.7

The Mean Absolute Deviation (MAD) provides another way to measure accuracy. It is calculated as the average of the absolute differences between the flash estimate and the final HICP annual rate over the last thirteen months. Figure 1 shows the MAD for the all-item index and the main special aggregates. Over the last thirteen months, the Non energy industrial goods component has recorded the highest MAD (0.131 percentage points).

FIGURE 1. MEAN ABSOLUTE DEVIATION BETWEEN FLASH ESTIMATES AND HICP ANNUAL RATES. DECEMBER 2014-DECEMBER 2015, percentage points



The direction of inflation is correctly predicted if both the flash estimate and the final one show increasing (declining or no changing) annual rates of change with respect to those ones calculated in the previous month. There are three possible outcomes for the comparison of the direction of inflation:

- the flash estimate correctly predicts the direction of inflation, so the predicted rise, decline or no change in inflation is confirmed by final data (denoted by 🟢);
- the flash estimate wrongly predicts the direction of inflation, namely it predicts an increase when there is a decrease or vice versa (denoted by 🔴);
- the flash estimate points to an increase or a decrease but the final annual rate of change remains unchanged; or the flash estimate predicts no change in inflation but the final figure points to an increase or a decrease (denoted by 🟡).

Over the last thirteen months, the flash estimate accurately predicted the inflation direction in 119 out of 130 estimates.

TABLE 3. FLASH ESTIMATE PREDICTION CAPACITY OF THE DIRECTION OF INFLATION MEASURED BY HICP. DECEMBER 2014-DECEMBER 2015

Special Aggregates	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15
Food including alcohol and tobacco:	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢
Processed food (including alcohol, tobacco)	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢
Unprocessed food	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢
Energy	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢
Non energy industrial goods	🟡	🟡	🟢	🟢	🟢	🟢	🟢	🟡	🔴	🟢	🟢	🟡	🟢
Services	🟡	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢
All-items	🟢	🟢	🟢	🟢	🟡	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢
All items excluding energy and unprocessed food (Core inflation)	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢
All items excluding energy, food, alcohol and tobacco	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟡	🟢	🟢	🟢	🟢
All items excluding energy	🟢	🟢	🟢	🟢	🟡	🟢	🟡	🟢	🟢	🟡	🟢	🟢	🟢

Computation methodology of flash estimates

For the Italian HICP (and NIC) flash estimate compilation, each month,

- prices collected at local level by around 60 municipalities (out of 80) are used. Out of these municipalities, there are the 38 municipalities which calculate the preliminary local consumer price indices and publish them independently, at the same time of Istat national CPI and HICP release. Data collected by the other 12 municipalities participating in the survey for a subset of products (local tariffs and some local services) are not used; these data are used for the compilation of final indices;
- all prices collected directly by ISTAT (via internet and other sources) are used. These prices refer to 76 representative items which cover 21.4% (according to their weights) of the Italian HICP basket (23.1% of the NIC one).

As soon as indices are calculated for representative items for which prices are collected directly by ISTAT, representative item indices for the municipalities, which participate in the flash estimate of inflation rate, are compiled. For the other municipalities, which do not participate in the flash estimation, representative item indices are generally[8] calculated applying to the indices of the previous month, the monthly rate of change of the regional representative item indices. The latter are calculated using data of municipalities which participate in the flash estimate, as follows:

[8] For some representative items – among others, rents and local tariffs such as water supply, solid waste, sewerage collection, urban transport services by road – for the municipalities that do not participate in the flash estimation, indices are estimated by carrying forward the price of the previous month. The adoption of this different estimation technique is due to the fact that the evolution of prices in the other municipalities of the same region is not considered a satisfactory proxy.

$$ {}_{R}I_{h}^{m,a} = \sum_{i \in R} \left(\frac{{}_{i}\pi}{\sum_{i \in R} {}_{i}\pi} \right) \cdot {}_{i}I_{h}^{m,a} $$

where ${}_{i}I_{h}^{m,a}$ is the elementary index of representative item *h* at municipality level *i* of the reference month *m* of year *a* and $\frac{{}_{i}\pi}{\sum_{i \in R} {}_{i}\pi}$ is equal to the share of resident population in the municipality *i* of region *R* on the total resident population of the region.

As soon as representative item indices of all municipalities are compiled, regional and, then, national indices are calculated (by representative items, by upper aggregates and for all items).

If all municipalities of a certain region are not included in the flash estimate, the representative item indices of this region are calculated applying to the indices of the previous month, the monthly rate of change of national representative item indices. The latter are calculated using data of regions which participate in the flash estimate, as follows:

$$ I_{h}^{m,a} = \sum_{R=1}^{20} \left(\frac{{}_{R}\pi_{h}}{\sum_{R=1}^{20} {}_{R}\pi_{h}} \right) \cdot {}_{R}I_{h}^{m,a} $$

where ${}_{R}I_{h}^{m,a}$ is elementary index of representative item *h* at regional level of the reference month (*m*) of year (*a*) and $\frac{{}_{R}\pi_{h}}{\sum_{R=1}^{20} {}_{R}\pi_{h}}$ is equal to the share of household consumption expenditure for the representative item *h* in the region *R* on the national household consumption expenditure for the same representative item.

Once representative item indices of all regions are compiled, national indices are calculated (by representative items, by upper aggregates and for all items).

Inflation measures for population subgroups

The consumer price indices by population subgroups are “satellite” indices of the Harmonized index of consumer price (HICP): they are computed starting from the same basic information used for the HICP (i.e. the same basket of products and the same price elementary data) by modifying the system of weights used for their calculation.

Five subgroups have been identified by sorting households on the basis of the amount of equivalent expenditure (that is calculated taking into account the size of each household) and then dividing them in 5 subgroups of the same size so that in the first group there are the households with the lowest level of expenditure and in the last group those with the highest level of expenditure. For each of the previous groups, different weighting schemes were estimated.

The indices of five subgroups share the set of basic information (basket of products and price elementary data) and the methodology of Italian HICP but they differ with one another for the system of weights used for their calculation. Specifically, the estimates of the system of weights for the five subgroups are based on the data derived from Household Budget Survey (HBS), which involved about 28,000 households every year[9].

For each subgroup, the weights are estimated by modifying the HICP weight at the level of classification corresponding to consumption segments[10], on the basis of the share of the expenditure devoted by the target group of households to the purchase of the products in each consumption segment, with respect to the whole population.

For that purpose, it has been necessary to define a link between the HBS data and the basket of products used for the calculation of the HICP. The link between the HBS elementary expenditure data and HICP consumption segments was in some cases straightforward (for example, for food items). In other cases it was necessary to make a link at a more aggregated level of expenditure data (as for durable goods, assistance, education) in order to maintain the significance of estimates related to each subgroup. As a result, the HBS elementary expenditure data were merged into about 90 expenditure groups and then linked to the HICP consumption segments. In more details, for approximately half of these groups the link was one-to-one (about 30% of cases) or one-to-two (around the 21% of cases); in approximately 28% of cases it was necessary to make a link with five or more consumption segments.

The all-items consumer price indices by population subgroups, as well as the indices of the special aggregates, were calculated from January 2005, with reference base year 2005=100, consistently with the HICP. The dissemination of these indicators, twice a year, enlarge the statistical information on the temporal dynamics of consumer prices allowing an evaluation of the effects of inflation on specific subgroups of population, identified according the total expenditure level of the households.

Regarding the weights, estimated for the compilation of indices for 2015, figure 1 shows that the share of expenditure for food and energy goods is inversely correlated with the level of total expenditure. In more details, with reference to the households of the first group of the distribution (i.e. the 20% of those with the lowest equivalent expenditure), the weights of food and energy goods are significantly higher than the corresponding weights in the Italian HICP and more than double as compared to the weights estimated for the households of the last group (the 20% of population with the highest equivalent expenditure).

At the opposite, the incidence on the households’ expenditure of Non-energy industrial goods, Services related to transport, Services miscellaneous and, to a lesser extent, the incidence of the Services related to recreation, culture and personal care increase together with the increase of the level of total expenditure.

[9] Until the estimation of 2015 weights (based on 2013 HBS data), it has been taken into account the information coming from the HBS survey design previous to the new one presented by Istat on the 8th of July 2015. The results of the new sampling design and the new data collection methodology will be used as basis for the estimation of the HICPs of population subgroups starting from 2016.

[10] In Italian HICP classification scheme, consumption segments are 325.

FIGURE 1. HARMONIZED INDICES OF CONSUMER PRICES. WEIGHTS OF THE SPECIAL AGGREGATES INDICES FOR POPULATION SUBGROUPS (per million). YEAR 2015

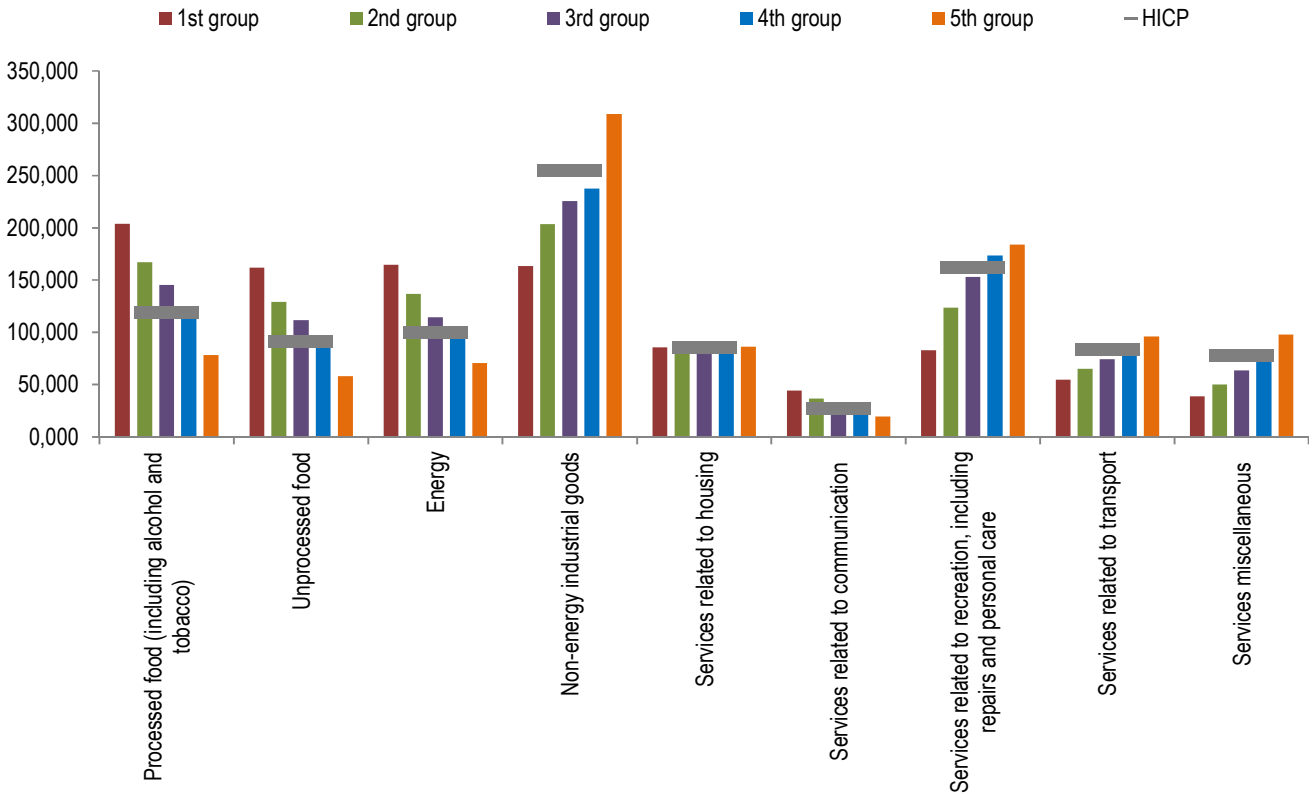


Table 1 shows the index of dissimilarity between the weights structures of the five subgroups and the one of the HICP, for year 2015. Notably, as in the previous years, the weights structure of the fourth group proved to be the closest one to the structure of the HICP.

TABLE 1. DISSIMILARITY INDEX CONCERNING THE DISTRIBUTION OF HICP WEIGHTS FOR POPULATION SUBGROUPS. Year 2015

	1st group	2nd group	3rd group	4th group	5th group	HICP
1st group	0.00					
2nd group	0.13	0.00				
3rd group	0.21	0.09	0.00			
4th group	0.29	0.17	0.09	0.00		
5th group	0.44	0.33	0.25	0.17	0.00	
HICP	0.30	0.18	0.10	0.05	0.15	0.00