

Consumer prices: final data

June 2017

In June 2017, the Italian consumer price index for the whole nation (NIC) decreased by 0.1% on monthly basis and increased by 1.2% compared with June 2016, down from +1.4% in May 2017. The flash estimate was confirmed.

In June, the lower growth of the annual rate of change of All items index was mainly due to the prices of Unprocessed food (+1.4%, from +3.8% in May) and Non-regulated energy products (+2.9%, from +6.8% in the previous month), partly offset by the increase of the prices of Services related to transport (+4.1% from +3.2% in May).

Therefore, excluding energy and unprocessed food, core inflation increased by +0.9% (0.2 percentage points higher than in May), while inflation excluding energy was +0.9% (0.1 percentage points lower than in the previous month).

The annual rate of change of prices of Goods was +0.9% (down from +1.6% in May) and that one of prices of Services was +1.5% (up from +1.4%). As a consequence, the inflationary gap between Services and Goods was positive again (+0.6 percentage points).

The decrease on monthly basis of All items index was mainly due to the prices of Unprocessed food (-1.9%), especially fresh fruit and fresh vegetables, and Non-regulated energy products (-1.6%), whose effects are partially balanced by the increase of the prices of Services related to transport (+1.1%).

Prices of Grocery and unprocessed food decreased by 0.7% on monthly basis and increased by 0.7% on annual basis (from +1.6% in the previous month).

In June 2017, the rate of change of Italian harmonized index of consumer prices (HICP) decreased by 0.2% compared with the previous month and increased by 1.2% with respect to June 2016 (the annual rate of change observed in the previous month was +1.6%). The flash estimate was confirmed.

In June core inflation, measured by Italian HICP, was +1.0% (up from 0.8% in May) and inflation excluding energy, food, alcohol and tobacco was +1.0% (from +0.9% in May), while inflation excluding Energy slowed (+1.0% from +1.1% in the previous month).

In June 2017, the Italian harmonized index of consumer prices at constant tax rates (HICP-CT) decreased by 0.1% compared with the previous month and increased by 1.3% with respect to June 2016 (0.1 percentage points higher than HICP). Therefore, the difference between HICP and HICP-CT growth rates¹ – which incorporates the effects of changes in indirect taxes occurred in the last twelve months – was negative.

In the first half of 2017, the recovery of inflation, measured by Italian HICP, was spread across all the population subgroups defined according to their consumption expenditure level.

Specifically, in the first quarter of 2017, inflation rates varied in a range between +1.5% of the first subgroup (20% of the households with the lowest equivalent expenditure) and +1.2% of the last subgroup (20% of the households with the highest equivalent expenditure). In the same period, headline inflation, as measured by HICP, increased by 1.3%.

In the second quarter 2017, inflation continued to rise for both the first subgroup (+1.7%) and the last one (+1.6%). In the same period, headline inflation, as measured by HICP, increased by 1.6%.

ITALIAN CONSUMER PRICE INDICES. June 2017, (base 2015=100)

	INDICES June 2017	June-17 May-17	June-17 June-16
Italian consumer price index for the whole nation (NIC)	101.1	-0.1	1.2
Italian harmonized index of consumer prices (HICP)	102.0	-0.2	1.2

¹ The difference between the rates of change of HICP and HICP-CT 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.

TABLE 1. ITALIAN CONSUMER PRICE INDEX FOR THE WHOLE NATION (NIC), BY ECOICOP DIVISION. June 2017, weights, indices and percentage changes (base 2015=100)

DIVISIONS	Weights	Indices	June-17 May-17	June-17 June-16	May-17 May-16	June-16 May-16
Food and non-alcoholic beverages	164,968	101.5	-0.8	1.0	1.9	0.1
Alcoholic beverages, tobacco	32,019	102.0	0.0	-0.2	0.2	0.4
Clothing and footwear	73,620	100.8	0.0	0.4	0.4	0.0
Housing, water, electricity, gas and other fuels	107,280	100.2	0.0	3.0	3.0	0.0
Furnishings, household equipment and routine household maintenance	72,371	100.3	0.0	0.0	0.0	0.0
Health	86,870	100.6	0.0	0.2	0.3	0.1
Transport	139,331	101.9	0.2	3.0	3.7	0.8
Communication	26,125	97.0	-0.8	-2.9	-3.1	-1.0
Recreation and culture	78,409	100.3	-0.1	0.3	0.5	0.1
Education	12,119	100.0	0.0	-0.9	-0.9	0.0
Restaurants and hotels	114,864	103.6	0.4	2.2	1.9	0.1
Miscellaneous goods and services	92,024	101.1	0.1	1.0	0.9	0.0
ALL ITEMS	1,000,000	101.1	-0.1	1.2	1.4	0.1

TABLE 2. ITALIAN CONSUMER PRICE INDEX FOR THE WHOLE NATION (NIC), BY TYPES OF PRODUCT. June 2017, weights, indices and percentage changes (base 2015=100)

SPECIAL AGGREGATES	Weights	Indices	June-17 May-17	June-17 June-16	May-17 May-16	June-16 May-16
Food including alcohol:	175,273	101.4	-0.8	0.9	1.8	0.1
Processed food including alcohol	105,071	100.5	0.1	0.6	0.4	-0.1
Unprocessed food	70,202	102.7	-1.9	1.4	3.8	0.4
Energy:	84,456	98.2	-0.8	4.5	6.5	1.1
Regulated energy products	41,439	98.1	0.0	6.2	6.1	-0.1
Non-regulated energy products	43,017	98.6	-1.6	2.9	6.8	2.1
Tobacco	21,714	102.9	0.0	-0.3	0.3	0.6
Non energy industrial goods:	254,637	100.4	-0.1	-0.1	-0.2	-0.2
Durable goods	84,846	100.2	-0.2	-1.0	-1.0	-0.2
Non-durable goods	66,173	100.3	-0.1	0.2	0.3	0.0
Semi-durable goods	103,618	100.5	-0.2	0.4	0.3	-0.3
Goods	536,080	100.4	-0.5	0.9	1.6	0.2
Services related to housing	77,003	101.4	0.1	0.6	0.6	0.1
Services related to communication	19,445	98.9	-0.1	0.1	-0.1	-0.3
Services related to recreation, including repair and personal care	176,824	102.6	0.3	1.5	1.6	0.4
Services related to transport	76,089	104.1	1.1	4.1	3.2	0.2
Services - miscellaneous	114,559	101.0	0.0	0.5	0.5	0.0
Services	463,920	102.1	0.3	1.5	1.4	0.2
ALL ITEMS	1,000,000	101.1	-0.1	1.2	1.4	0.1
All items excluding energy and unprocessed food (Core inflation)	845,342	101.4	0.2	0.9	0.7	0.0
All items excluding energy, food, alcohol and tobacco	718,557	101.5	0.2	1.0	0.8	0.0
All items excluding energy	915,544	101.4	-0.1	0.9	1.0	0.0
Grocery and unprocessed food	198,287	101.1	-0.7	0.7	1.6	0.2

TABLE 3. ITALIAN HARMONIZED CONSUMER PRICE INDEX (HICP), BY ECOICOP DIVISION. June 2017, weights, indices and percentage changes (base 2015=100)

DIVISIONS	Weights	Indices	June-17 May-17	June-17 June-16	May-17 May-16	June-16 May-16
Food and non-alcoholic beverages	175,240	101.6	-0.8	1.0	2.0	0.2
Alcoholic beverages, tobacco	34,015	101.9	-0.1	-0.2	0.2	0.3
Clothing and footwear	85,400	110.0	-0.1	0.4	0.4	-0.1
Housing, water, electricity, gas and other fuels	114,100	100.3	0.0	3.0	3.0	0.0
Furnishings, household equipment and routine household maintenance	77,035	100.5	0.2	0.0	-0.2	0.0
Health	43,047	101.9	0.0	0.9	0.9	0.0
Transport	147,915	101.9	0.2	3.0	3.7	0.8
Communication	27,786	97.1	-0.8	-2.9	-3.1	-1.0
Recreation and culture	62,346	100.6	0.0	0.5	0.7	0.2
Education	12,885	100.0	0.1	-0.8	-0.9	0.0
Restaurants and hotels	122,115	103.7	0.4	2.2	2.0	0.2
Miscellaneous goods and services	98,116	101.5	0.1	1.0	0.9	0.0
ALL ITEMS	1,000,000	102.0	-0.2	1.2	1.6	0.2
All items at constant tax rates	1,000,000	102.0	-0.1	1.3	1.6	0.2

TABLE 4. ITALIAN HARMONIZED CONSUMER PRICE INDEX (HICP), BY SPECIAL AGGREGATES. June 2017, weights, indices and percentage changes (base 2015=100)

SPECIAL AGGREGATES	Weights	Indices	June-17 May-17	June-17 June-16	May-17 May-16	June-16 May-16
Food, alcohol and tobacco:	209,255	101.6	-0.7	0.8	1.7	0.2
Processed food (including alcohol and tobacco)	117,212	100.9	0.0	0.4	0.4	0.0
Unprocessed food	92,043	102.5	-1.6	1.3	3.4	0.4
Energy:	89,782	98.3	-0.8	4.6	6.4	1.0
Electricity, gas, solid fuels and heat energy	48,159	98.1	0.0	5.6	5.5	-0.1
Liquid fuels and fuels and lubricants for personal transport equipment	41,623	98.7	-1.7	3.2	7.6	2.5
Non-energy industrial goods:	263,440	103.8	-0.1	0.3	0.3	-0.1
Durable goods	80,863	101.0	0.1	0.0	-0.2	-0.1
Non-durable goods	64,613	101.6	0.1	0.9	0.8	0.0
Semi-durable goods	117,964	107.3	-0.2	0.4	0.2	-0.4
Goods	562,477	102.0	-0.4	1.2	1.7	0.1
Services related to housing	81,849	101.3	0.1	0.6	0.6	0.1
Services related to communication	27,786	97.1	-0.8	-2.9	-3.1	-1.0
Services related to recreation, including repairs and personal care	166,219	103.0	0.4	1.8	1.8	0.4
Services related to transport	80,722	104.1	1.1	4.1	3.3	0.3
Services - miscellaneous	80,947	100.9	-0.1	0.5	0.6	0.0
Services	437,523	102.1	0.3	1.4	1.3	0.2
ALL ITEMS	1,000,000	102.0	-0.2	1.2	1.6	0.2
All items excluding energy and unprocessed food (Core inflation)	818,175	102.5	0.2	1.0	0.8	0.0
All items excluding energy, food, alcohol and tobacco	700,963	102.7	0.2	1.0	0.9	0.1
All items excluding energy	910,218	102.5	0.0	1.0	1.1	0.1

TABLE 5. ITALIAN HARMONIZED CONSUMER PRICE INDEX (HICP) BY POPULATION SUBGROUPS
2016 - Q1-Q2 2017, percentage changes (a) (base 2015=100)

ALL ITEMS	2016	2016		2017	
		Q3	Q4	Q1	Q2
1st group	-0,5	-0,5	-0,1	1,5	1,7
2nd group	-0,3	-0,3	0,1	1,5	1,7
3rd group	-0,1	0,0	0,1	1,5	1,6
4th group	0,0	0,2	0,2	1,4	1,6
5th group	0,1	0,0	0,3	1,2	1,6
HICP	-0,1	-0,1	0,2	1,3	1,6

(a) The previous base year was 2005=100. The m/m-12 rates of change of HICP were calculated using a time series rebased on 2015 as reference year.

TABLE 6. REVISIONS OF CONSUMER PRICE INDICES. June 2017, indices and percentage changes (base 2015=100)

	Flash estimates			Final data		
	INDICES	RATES OF CHANGE%		INDICES	RATES OF CHANGE %	
	June 2017	<u>June-17</u> May-17	<u>June-17</u> June-16	June 2017	<u>June-17</u> May-17	<u>June-17</u> June-16
Italian consumer price index for the whole nation (NIC)	101.1	-0.1	1.2	101.1	-0.1	1.2
Italian harmonized index of consumer prices (HICP)	102.0	-0.2	1.2	102.0	-0.2	1.2

For more details please refer to the Italian version

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Contact person:

Maria Assunta Scelsi (scelsi@istat.it)

Istat – Italian National Institute of Statistics
Via Cesare Balbo 16 – 00184 Rome, Italy
phone +39 06 4673.2795

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 year².

Reference base year for NIC and HICP

The NIC indices are expressed with 2015=100 as a reference base year³.

The HICP are calculated and published with 2015=100 as a reference base, as established by the EU Regulation 2015/2010 of the European Commission of 11 November 2015.

Classification for consumer expenditure, basket of goods

Classification of consumption so far used for HICP, NIC and FOI is the international classification ECOICOP (European Classification of Individual Consumption by Purpose), whose hierarchical structure has 4 levels of disaggregation: Divisions, Groups, Classes of product and Subclasses of product.

Since the final data of January 2016, Istat has been adopted the classification ECOICOP, annexed to the new European framework regulation on harmonised indices of consumer prices and the house price index, (2016/792), that introduced an additional level of detail, the subclasses of product. Anyway, in 2011 Istat introduced two disaggregation levels: product sub-classes and consumption segments.

The 2017 basket for the Italian consumer price index for the whole nation (NIC) and for blue and white-collar households (FOI) is made up of 1,481 elementary products, which are grouped into 920 products and into 405 product aggregates. (1,476 in 2016 grouped into 901 products and 400 product aggregates).

TABLE 1. CLASSIFICATION NIC AND FOI INDICES. Year 2017

Year 2017
12 expenditure divisions
43 product groups
102 product classes
229 product sub-classes
302 consumption segments
405 product aggregates
920 products
1,481 elementary products

² 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.

³ The FOI indices are expressed with 2015=100 as a reference base year, too.

The 2017 basket for the Italian harmonized index of consumer prices (HICP) is made up of 1,498 elementary products, which are grouped into 923 products and then into 409 product aggregates (1,484 in 2016 grouped into 906 products and 404 product aggregates)⁴.

Segments of consumption are the most disaggregated level for which NIC indices referring to the entire national territory are disseminated. For HICP indices, the level of detail of the dissemination is that of the product classes, but during 2017, it is expected that of the product subclasses. FOI national indices are disseminated at level of expenditure divisions. At local level (geographical area, region, province), NIC indices are published up to the product groups and FOI indices, just at provincial level, up to the divisions.

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 types of product), 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 Eurostat⁵.

All indices and data are available and published on Istat data warehouse, [I.Stat](#), inside the theme "Prices" and subtheme "Consumer prices". In addition to indices at national level, NIC indices at provincial, regional and macro area level and FOI indices at provincial level are published too.

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 HICP⁶. This method, also used for the NIC⁷, is applied to the product groups and classes *Fruit, Vegetables, Clothing and Footwear*.

The European Regulation defines as *seasonal product* that one consumers may not purchase in certain periods of the year (at least one month), or they may purchase in modest or insignificant volumes. 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 defined a monthly calendar for the whole 2017, which establishes, in a given month, when each specific product belonging to the above mentioned 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 when 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.

⁴ The difference between the two baskets is due to two elements: on one hand in the HICP basket (but not in the NIC/FOI one), contribution to the NHS for pharmaceutical products, specialist practices and services of medical analysis (six items) are included; on the other hand in the NIC/FOI basket (but not in the HICP one), Games of chance are included.

⁵ 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?TargetUri=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 Istat statistics, inside the theme "Prices".

⁶ It has been adopted starting from data referred to January 2011.

⁷ It is used for FOI indices, too.

Survey geographical basis, rate of coverage and frequency of data collection

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 addition to these two ways, an administrative source is used too, that is the database of fuel prices of Ministry of Economic Development.

Local survey

In 2017 the geographical basis of the survey is made up of 80 municipalities (18 regional capitals and 61 provincial capitals) – which participate in the indices calculation for all the product aggregates of the basket – and of other 16 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 83.7%.

Concerning the basket subset including local tariffs and some local services – whose weight on the NIC basket is equal to 6.0% – with the participation of the other 16 municipalities, the coverage of the survey, measured in terms of provincial resident population, is 92.4%.

Central survey

In 2017 price quotes collected each month directly by Istat are 137,500, of which:

✓ 137,000 via web, also using *web scraping techniques*, or collecting data from different providers. The main data providers for the central price data collection are the following:

- Italian Customs Agency, for Tobacco products and games of chance;
- Italian Association of Concessionaries Highways and Tunnels (Aiscat), for motorway tolls;
- Farmadati, for pharmaceutical products;
- Italian Association of Publishers (AIE), for prices of school books;
- Specialized magazine “Quattroruote” for prices quotes of cars and second hand cars;
- Sanguinetti Editore, for prices of cars, motorcycles and motorbikes, caravans and motorhomes;

✓ about 500 price quotes directly collected using the data by Insurance Companies.

An important news in *central survey* is that of *Housing insurance services* whose prices, monthly collected by insurance company, refer to protection against most risks connected to property, such as fire, theft and other damages.

The percentage of products observed directly by Istat calculated according to the weight assigned to each product within the NIC is 23.6% in 2017 (as in the previous year).

Administrative sources

In 2017 automotive fuels price indices (the weight on the basket is 3.7%) are calculated using the data base supplied by the Ministry of Economic Development, that collects prices for these products. 76,000 price quotes are monthly used to estimate inflation and they come from about 13,596 fuel stations on the territory, that is 69.3% of the ones active and present in Ministry database.

The 13,596 fuel stations cover the entire national territory and they are located in the different geographical areas as it follows: 3,600 in the North-West; 3,200 in the North-East; 3,000 in the Centre; almost 2,400 in the South and about 1,400 in the Islands.

Frequency of data collection

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; gas in cylinder and heating oil);
- collecting three prices for month for the hotel bedroom referring to the first three Saturday of the month;

- 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:

- 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 and magazines;
- from the 9th to the 15th day of each month for daily newspapers;
- on each day of the month for touristic, recreational and cultural services (fun parks entrance ticket, bathing establishment, ski lifts, etc.).

Concerning the data base supplied by the Ministry of Economic Development, automotive fuel prices applied on the first and the tenth working day of each month are used to compile consumer price indices.

Weighting structure

In Table 1 the weighting structure for the year 2017 of NIC and HICP is reported.

TABLE 1. WEIGHTS USED FOR CALCULATING CONSUMER PRICE INDICES. BY EXPENDITURE DIVISION. Year 2017, percentage values

EXPENDITURE DIVISIONS	WEIGHTS	
	NIC	HICP
Food and non-alcoholic beverages	16.4968	17.5240
Alcoholic beverages. tobacco	3.2019	3.4015
Clothing and footwear	7.3620	8.5400
Housing. water. electricity. gas and other fuels	10.7280	11.4100
Furnishings. household equipment and routine household maintenance	7.2371	7.7035
Health	8.6870	4.3047
Transport	13.9331	14.7915
Communication	2.6125	2.7786
Recreation and culture	7.8409	6.2346
Education	1.2119	1.2885
Restaurants and hotels	11.4864	12.2115
Miscellaneous goods and services	9.2024	9.8116
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**)⁸ 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 it 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, for 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.

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 in 2015=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 described⁹. 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:

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

■ 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:

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

⁸ 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>.

⁹ The expressions and the rounding rules described for NIC are also carried out for FOI.

■ 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:

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

■ 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:

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

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:

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

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

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 $i=2 \dots t$ 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

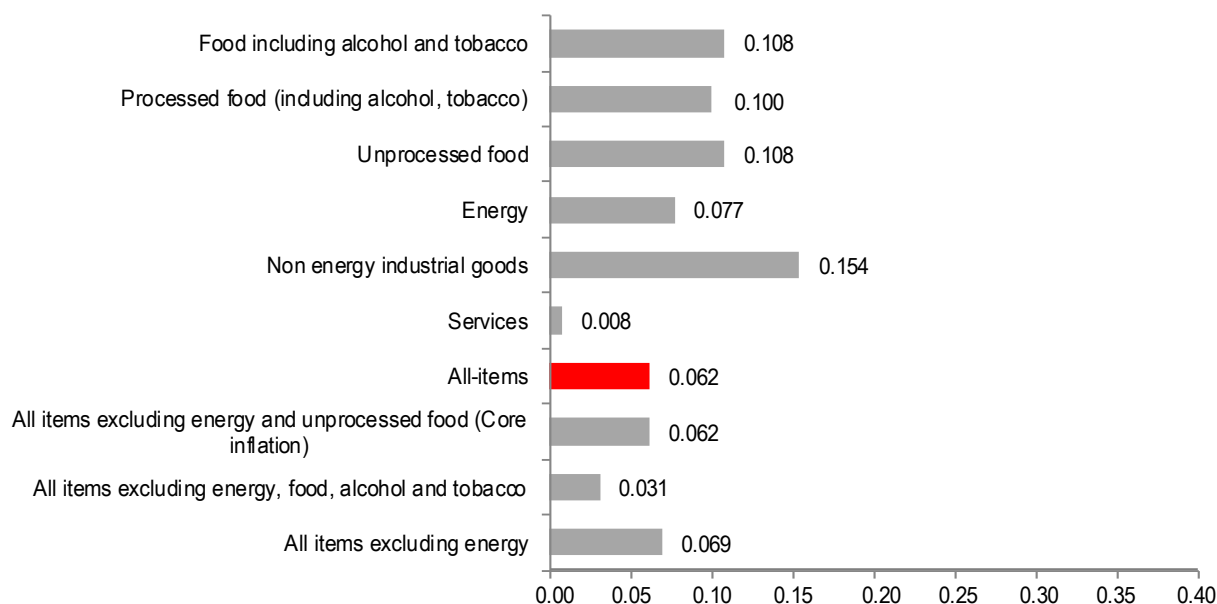
Table 2 compares the flash estimates and the final HICP annual rates of change for the same reference month. Over the last thirteen months, the maximum difference between the flash estimate – all items and the HICP – all items annual rates of change was +0.3 in January 2017. Over the same period, with reference to the main special aggregates, the maximum differences between the flash estimate and the final HICP annual rates of change concerned Food, alcohol and tobacco (+1.1 recorded in January 2017), Processed food (including alcohol, tobacco) (+1.2 in January 2017), Unprocessed food (+0.9 in January 2017), Energy (+0.6 in February 2017) and Non energy industrial goods (+0.5 in January 2017). The highest frequency of revisions for Non energy industrial goods (10 months out of 13) are mainly due to the seasonal 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
June 2016-June 2017, percentage values (base 2015=100)

Special aggregates		Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17
Food including alcohol and tobacco:	Flash	0.5	0.9	1.0	0.4	0.1	0.5	1.1	1.2	3.5	2.7	1.9	1.8	0.8
	HICP	0.5	0.9	1.0	0.4	0.1	0.5	1.0	2.3	3.6	2.7	1.9	1.7	0.8
Processed food (including alcohol, tobacco)	Flash	0.5	0.5	0.4	0.5	0.3	0.5	0.5	-0.7	0.6	0.7	0.5	0.5	0.4
	HICP	0.5	0.5	0.4	0.5	0.3	0.5	0.5	0.5	0.6	0.7	0.5	0.4	0.4
Unprocessed food	Flash	0.5	1.4	1.9	0.3	-0.2	0.5	1.8	3.6	7.4	5.2	3.8	3.4	1.2
	HICP	0.6	1.4	1.9	0.4	-0.2	0.5	1.8	4.5	7.4	5.4	3.8	3.4	1.3
Energy	Flash	-7.5	-6.9	-6.4	-3.4	-3.5	-2.9	-2.0	2.6	4.2	4.5	7.5	6.4	4.6
	HICP	-7.5	-6.9	-6.4	-3.3	-3.5	-2.9	-2.0	2.7	4.8	4.6	7.4	6.4	4.6
Non energy industrial goods	Flash	0.4	0.2	0.4	0.4	0.3	0.2	0.3	0.0	0.4	-0.4	0.3	0.2	0.3
	HICP	0.5	0.2	0.2	0.3	0.3	0.3	0.4	0.5	0.1	0.0	0.2	0.3	0.3
Services	Flash	0.5	0.8	0.6	0.6	0.2	0.6	0.9	0.6	1.0	1.1	1.8	1.3	1.4
	HICP	0.5	0.8	0.6	0.6	0.2	0.5	0.9	0.6	1.0	1.1	1.8	1.3	1.4
All-items	Flash	-0.3	-0.1	0.0	0.1	-0.1	0.1	0.5	0.7	1.6	1.3	2.0	1.5	1.2
	HICP	-0.2	-0.2	-0.1	0.1	-0.1	0.1	0.5	1.0	1.6	1.4	2.0	1.6	1.2
All items excluding energy and unprocessed food (Core inflation)	Flash	0.5	0.6	0.5	0.5	0.2	0.5	0.7	0.1	0.7	0.6	1.2	0.8	0.9
	HICP	0.5	0.6	0.4	0.5	0.2	0.5	0.7	0.5	0.6	0.7	1.2	0.9	1.0
All items excluding energy, food, alcohol and tobacco	Flash	0.5	0.5	0.5	0.4	0.2	0.4	0.7	0.3	0.7	0.5	1.3	0.9	1.0
	HICP	0.5	0.5	0.4	0.4	0.2	0.4	0.7	0.5	0.7	0.6	1.3	0.9	1.0
All items excluding energy	Flash	0.5	0.6	0.7	0.4	0.2	0.5	0.8	0.5	1.4	1.0	1.4	1.1	0.9
	HICP	0.5	0.6	0.6	0.4	0.2	0.5	0.9	0.9	1.3	1.1	1.4	1.1	1.0

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 rates of change 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 Non energy industrial goods (0.154 percentage points) and Food including alcohol and tobacco (0.108 percentage points) have recorded the highest MADs.

FIGURE 1. MEAN ABSOLUTE DEVIATION BETWEEN FLASH ESTIMATES AND HICP ANNUAL RATES. June 2016-June 2017, 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 117 out of 130 estimates.

TABLE 3. FLASH ESTIMATE PREDICTION CAPACITY OF THE DIRECTION OF INFLATION MEASURED BY HICP
June 2016-June 2017

Special Aggregates	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17
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 61 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 16 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. As soon as indices are calculated for aggregate products for which prices are collected directly by ISTAT, product aggregate 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, product aggregate indices are generally¹⁰ calculated applying to the indices of the previous month, the monthly rate of change of the regional product aggregate indices. The latter are calculated using data of municipalities which participate in the flash estimate, as follows:

$${}_R I_h^{m,a} = \sum_{i \in R} \left(\frac{{}_i \pi}{\sum_{i \in R} {}_i \pi} \right) \cdot {}_i I_h^{m,a}$$

where ${}_i I_h^{m,a}$ is the elementary index of product aggregate 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 product aggregate indices of all municipalities are compiled, regional and, then, national indices are calculated (by product aggregates, by upper aggregates and for all items).

If all municipalities of a certain region are not included in the flash estimate, the product aggregate indices of this region are calculated applying to the indices of the previous month, the monthly rate of change of national product aggregate 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 product aggregate 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 product aggregate h in the region R on the national household consumption expenditure for the same product aggregate.

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

¹⁰ For some product aggregates – 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.

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, in 2015, an actual sample of about 16,000 households¹¹.

For each subgroup, the weights are estimated by modifying the HICP weight at the level of classification corresponding to the aggregate of product¹², on the basis of the share of the expenditure devoted by the target group of households to the purchase of the products in each aggregate of product, 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 aggregates of product was mainly obtained at level of subclass (in 204 cases). 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..

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 2015=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 2017, figure 2 shows that the share of expenditure for food (including alcohol and tobacco), energy goods and Services related to housing 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 these components 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 recreation, culture and personal care, Services related to transport and Services miscellaneous increase together with the increase of the level of total expenditure.

¹¹ 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.

¹²For the year 2017 in Italian HICP classification scheme, aggregates of products are 409.

FIGURE 2. HARMONIZED INDICES OF CONSUMER PRICES. WEIGHTS OF THE SPECIAL AGGREGATES INDICES FOR POPULATION SUBGROUPS (per million). Year 2017

