

How to compute a Consumer Price Index in the context of the Covid-19 crisis ?

Definitive estimate-July 2020

The health crisis and the lockdown measures in the context of the Covid-19 crisis have important impacts on the measures of short term statistics such as the Consumer Price Index (CPI).

On the one hand, **in order to preserve price collectors but also consumers and salesmen, INSEE adjourned the collection of prices by INSEE collectors in physical outlets from 16 March to 15 June.** These prices collected on the field are only one data source among others used to compute the CPI; however, they represent more than four tenth of the CPI, in terms of consumption share.

On the other hand, CPI aims to describe an average measure of price changes for all the purchased items. The basket of products is renewed yearly but it remains fixed during a year; the slow changes in the consumption structure ensure that this basket fixity is globally neutral on the inflation measure. **The Covid-19 crisis disrupted deeply and suddenly the household consumption structure during the lockdown** either because the consumption was prevented by the impossible move of households (transport, tourism), or because outlets were closed (the implementing order of 15 March 2020 related to measures for the struggle against the Covid-19 spreading defined the first necessary outlets that were allowed to remain opened during the lockdown), or because confronted to the crisis, the households decided to adapt their consumption habits (food, for instance). Since the end of the lockdown, the 11 May, some outlets have remained closed and some consumption habits have still been different from what they were before the lockdown.

In compliance with [Eurostat guidelines](#), shared with the different European countries, INSEE carried out new collection methods and adapted imputation methods.

This note aims to explain to users to which extent the Covid19-crisis still impacts the quality of the inflation measure for July 2020.

1 – How to measure inflation when whole parts of the consumption disappear? An alternative consumer price index.

During the lockdown, some consumption segments simply disappeared (shows, tourism, restaurants, hairdresser, cars, guiding lessons...) either because these activities were not allowed according to the implementing order of 15 March 2020 related to measures for the struggle against the Covid-19 spreading, or because households adapted their consumption. Since the end of the lockdown, the 11 May, reopening of outlets has been progressively authorized and the structure of the consumption has got closer to what it was before the lockdown.

The consumer price index which is a fixed-basket index (a Laspeyres-type index) uses a fixed consumption structure, updated each year. The assumption is that this structure slowly evolves and is usually true. But it does not fit the huge shock that occurred on consumption structure during the health crisis.

In compliance with [the methodological guidance note of the compilation of the HICP in the context of the Covid-19 crisis](#) by Eurostat,

- The CPI remains a fixed-basket index and the weights for each consumption segments remain unchanged (that is to say the one observed for the year 2019): for instance, whereas the household fuel expenditures decrease with the lockdown, the fuel weight remained the one observed before the health crisis.
- When a consumption segment is not transacted any more, its price cannot be observed; the sub-index is consequently imputed (i) either with the price changes of a similar product or of the nearest higher aggregate (ii) or with the all-item index, (iii) or scarcely, in duly justified circumstances, by carrying forward the last observed price. Moreover, when the price of a product follows a highly seasonal pattern, the imputation reproduces the past seasonality.

This consumer price index that is consistent with the past habits of consumption enables to describe the inflationary / deflationary pressure in the economy, in particular the scarce drop in the fuel prices during the lockdown. However, it could be quite far from the consumer feelings who, because of the health crisis, were no more able or no more eager to purchase some products. For that reason and in order to illustrate the consequences of this major shock on household consumption, alternative price indices were built. Contrary to the CPI that is a chained Laspeyres-type index (built on the past structure of the consumption, yearly updated), these indices use the current structure of the consumption (the April, May or June structure¹).

In order to compute such indices, the nowcasting exercise carried out by INSEE since the health crisis complete with now available business indicators for April and May was used. Although the exercise was performed at a lower detailed level than the one used for CPI weights, it enables to illustrate what inflation should have been with a consumption basket purchased in April, May, or June 2020².

According to this exercise, fuel consumption dropped sharply in April and sharpened progressively meanwhile as well as transport services and accommodation and catering services whose recovery was however less marked; food consumption was contrariwise one of the few products whose consumption was maintained during the lockdown. Therefore, the consumption structure during the lockdown has a higher weight for food and a smaller weight for fuel, transport and accommodation services whose volatile prices have often a high contribution to the monthly change in prices. In June, the service weight was still lower to what was observed in 2019 but that of manufactured products was higher, due to a correcting effect.

By using the consumption structure observed in April 2020 (*figure 1*), the measured price change in metropolitan France would have been more dynamic in April 2020 than that measured by the CPI (+0.3% against a stability measured by the CPI); the sharp fall in fuel prices in April had a lesser impact on the alternative index since its weight was lower in the April 2020 consumption. This gap between the price changes measured with the CPI and the alternative index have reversed since May: using the consumption structure observed in May 2020, prices would have risen by 0,1% in May (against +0.2% measured with the CPI); using the consumption structure observed in June 2020, prices would have been stable in June (against +0.1% measured with the CPI) and would have risen by 0.2% in July (against +0.4 measured by the CPI). Service prices were indeed more dynamic than the all-item index (because of transport services) whereas services were less purchased in June 2020 than in 2019.

1 Three alternative indices were computed; each one describes, for the whole period, the inflation that would be observed if the consumption structure would have been the one observed in April 2020 (respectively in May or June 2020). These three indices were not chained one with the other (which would have allowed to produce an index representative of the current consumption of the month). Indeed, monthly chaining causes a chain drift in indices and is not recommended by the index theory. This is why CPI is chained yearly.

2 The consumption basket for July 2020 is not known yet.

The gap between the indices is however also the consequence of seasonality effects: all these indices are not seasonally adjusted and their seasonality is different because of the different weight of highly seasonal products as airfares or tourism.

The year-on-year change in prices enables to take into account seasonality effects: the CPI increased by 0.8% in July year on year, after +0.2% in June, +0.4% in May and +0.3% in April whereas the index built from the June 2020 consumption structure increased by 1,0% in July after +0.4% in June, 0.6% in May and April. However, this gap was important even before the health crisis when the true consumption structure was nearer from that used for the CPI (*figure 2*).

To conduct a consistent analysis and to take into account seasonality effect, we should compare the change in the yearly price evolution for each index: with the CPI, the year-on-year change in prices decreased by 0.6 point between February and July 2020 (from +1.4% in February to +0.8% in July 2020) as with the index that uses the June 2020 consumption structure (from +1.6% in February to +1.0% in July. Diagnostic on the evolution in inflation is similar whether considering the CPI or index using the June consumption structure because the consumption structure in June came back nearer to what it was in 2019.

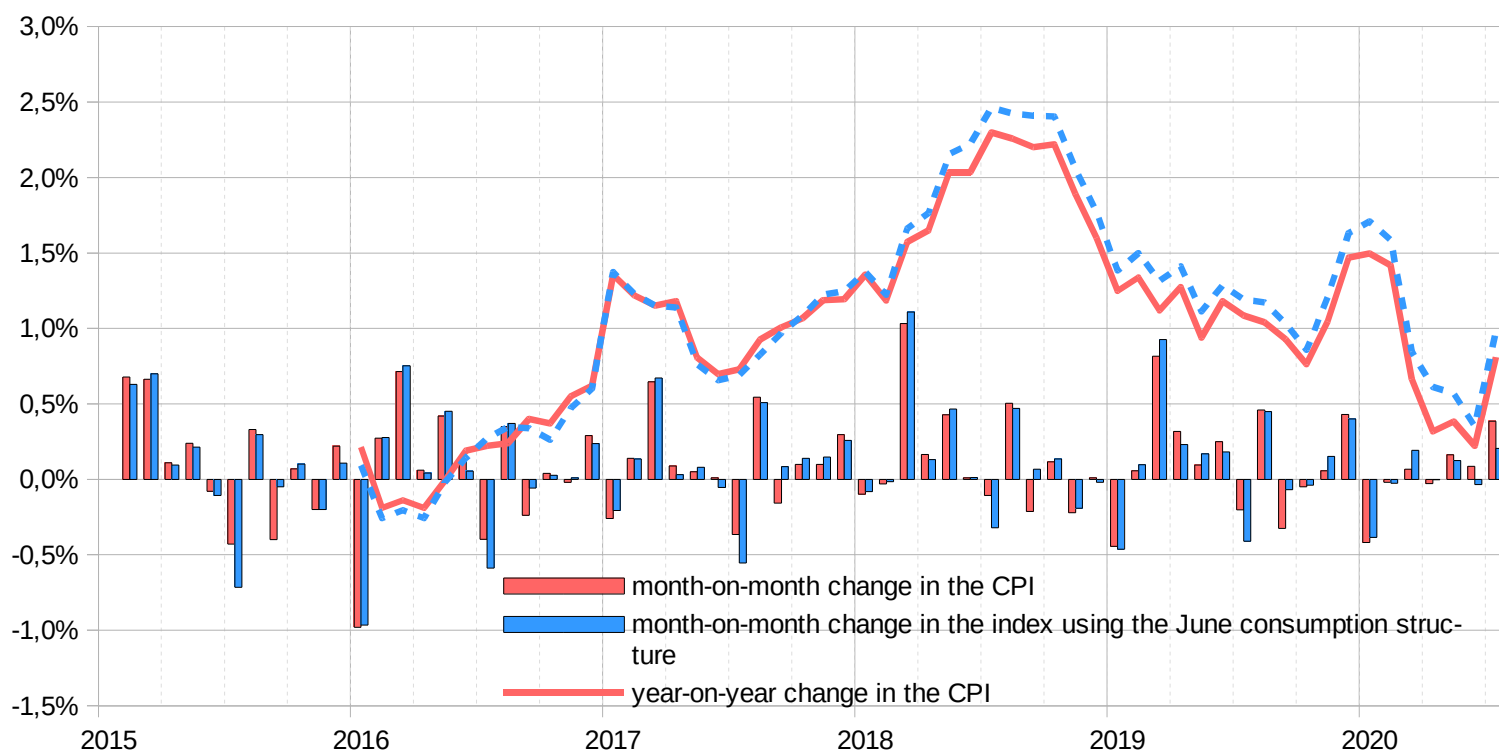
Figure 1: The Consumer Price Index and alternative indices using the consumption structure observed in April, May or June 2020 (annual and monthly rate)

	Monthly rate					Annual rate					
	March	April	May	June	July	February	March	April	May	June	July
CPI	0.1%	0.0%	0.2%	0.1%	0.4%	1.4%	0.7%	0.3%	0.4%	0.2%	0.8%
Alternative indices											
April 2020 structure	0.0%	0.3%	0.2%	-0.3%	-0.1%	1.8%	1.3%	1.4%	1.4%	0.9%	0.9%
May 2020 structure	0.2%	0.1%	0.1%	-0.2%	0.0%	1.6%	0.9%	0.8%	0.8%	0.4%	1.0%
June 2020 structure	0.2%	0.0%	0.1%	0.0%	0.2%	1.6%	0.8%	0.6%	0.6%	0.4%	1.0%

Scope: metropolitan France

Lecture: If the consumption structure, from 2015 on, was that observed in June 2020, the month-on-month change in prices in June 2020 would have been +0.0% against +0.1% measured by the CPI (i.e. the 2019 consumption structure for 2020 indices, the year Y-1 structure for the year Y index).

Figure 2: The Consumer Price Index and an alternative index using the consumption structure observed in June 2020 (annual and monthly rate)



Scope: metropolitan France

Lecture: If the consumption structure, from 2015 on, was that observed in June 2020, the month-on-month change in prices in June 2020 would have been +0.0% against +0.1% measured by the CPI (i.e. the 2019 consumption structure for 2020 indices, the year Y-1 structure for the year Y index).

2 – INSEE price collectors have resumed the price collection in the outlets since 15 June 2020

Usually, about 160 000 prices are collected each month by INSEE's price collectors in physical outlets. This on-the-field collection represents more than four tenth of the CPI basket. It was adjourned from 16 March to 15 June, because of the Covid-19 crisis and INSEE tried to mitigate this adjournment by developing alternative data collection (online price collection, collection by phone, more use of scanner data). This change in methodology as well as the more limited number of collected prices may have had an impact on the precision of the consumer price indices from April to June 2020 (and to a lesser extent in March 2020).

In July 2020, these 160 000 prices were collected by price collectors on the field again (except in Guyana). This getting back to normal enables to measure with the usual precision the annual change in prices in July or the change in prices between March and July 2020. The monthly change in prices between June and July 2020 is, however, impacted because of the lower precision of the index in June. The change in the data sources (from online, phone collection and scanner data to on-the-field collection in July) may have also impacted the measure of the monthly change in prices between June and July 2020. However, it was treated

symmetrically³ to what was done in April 2020 when these alternative price collections were implemented first. It has therefore no impact on the annual change in prices in July 2020 or on the change in prices between March and July 2020.

This on-the-field price collection is particularly important for fresh food produces, food sold in other outlets than super and hypermarkets, clothing and footwear, furniture, sustainable goods, other manufactured products (except cleaning and maintenance products and articles for personal hygiene and beauty products), other services (hotel and restaurant, services provided by craftsmen, cleaning services, hairdressing, mechanic...). For the other segments of consumption, other data sources are usually used and were not impacted by the Covid-19 crisis (scanner data, online price collection, mandatory declarations or official tariffs...)

Finally, the share of imputation due to the Covid-19 is only 1% in the July all-item index after one quarter in June 2020; these imputations include both missing data due to the still ongoing adjournment of the price collection in Guyana (due to the health measures) and the remaining unavailability of some services (transport services, tourism, in particular). They did not take into account the usual imputation due to usual closure of outlets or usual products out of stocks.

Figure 3 : imputation rate due to the Covid-19 crisis, in terms of consumption share, according to the type of products, in %

	March	April	May	June	July
Food	12,3	43.2	40	27.3	0,2
Fresh food	21,1	57.3	58,7	45	0,2
Other food	10,8	40.8	36,8	24,3	0,2
Tobacco	0,5	1.3	1	0,4	0,1
Manufactured products	11,9	56.9	47,3	32,6	0,4
Clothing and footwear	13,1	71.1	68,6	47,2	0,8
Health products	5,8	24.8	25,1	18,8	0
Other manufactured products	13,2	61.5	48	32,7	0,4
Energy	0,9	6.7	5,5	2,8	0,0
Petroleum products	0,7	9.4	7,2	3,1	0
Services	9,6	44.7	41,7	23,6	2,3
Actual rentals and services for dwellings	0,1	2.8	0,8	0,8	5,6
Health services	0,0	1.8	1,8	1,7	0
Transports	8,8	46.3	36,4	25,2	14,3
Communications	0,0	0	0	0	0
Other services	14,7	66.8	63,3	35,1	0,9
All-item CPI	9,7	43,5	39,1	24,3	1,3
All-item HICP	10,5	47,1	42,0	25,9	1,4

Note: Here are only registered the imputations linked to missing data due to (i) a non-observation of prices because of the adjournment of the price collection in the physical outlets, because of the lockdown, (ii) the lack of transaction for some consumption segments in the context of the Covid-19 crisis (extraordinary closure of some outlets, for instance).

³ In particular, similar rules for quality adjustment were implemented in April and July such that if the change in data sources has an impact on the measure of the price change in April, it has a similar but opposite impact on July.

3 –The postponement of sales due to the Covid-19 crisis impacts the annual change in prices in July 2020

The Consumer price index tracks averaged changes in the prices over a given month. However, depending on the products, the price collection does not occur usually every day of the month. It is carried out according to different collection calendars defined in order to take into account different constraints. For instance, in order to collect a price in a given outlet, the opening days have to be taken into account; or in order to reflect properly the shift in the calendar of the sales⁴ or of the holidays, the collection calendar is adapted.

Because of these issues, prices taken into account for the July index that came from scanner data or from on-the-field price collection occurred from the 22 June to 17 July; prices for tourism were collected from 21 June to 17 July. Contrariwise, price collection for transport, health services or fuel was carried out during the whole month.

Summer sales, previously planned from 24 June to 21 July, were postponed because of the health crisis to 15th July up to 11 August. This postponement has an upward impact on the annual change in prices in July 2020 because price collection calendar included only 3 days of sales in July 2020 against 18 days in July 2019. In August 2020, it will include 12 days of sales against 7 in August 2019.

4 See https://www.insee.fr/en/statistiques/documentation/IPC_op%C3%A9rations%20changement%20ann%C3%A9e%202020_EN.pdf for a description of how the CPI calendar takes into account sales in 2020 and before