



## Methodological information – Impact of COVID-19 on the compilation of the consumer price indices in May 2020

### Summary

The extensive restrictions on public life to contain COVID-19 also affected the calculation of the consumer price index for May 2020 as much as in April 2020. Furthermore, part of the prices could not be collected as usual and was therefore replaced or imputed. Different methods and approaches were used to compensate for the survey failures and to limit their impact on the inflation rate.

This document provides detailed information on the principles, approaches and methods used to compensate for missing price reports and the extent of the updates required. It allows users of consumer price statistics to better assess the index quality and interpret the development of the individual sub-indices, as well as assess their impact on the overall index.

In total, measured by their weight, around 17,5% of the prices to be collected for goods and services for private consumption were affected by survey failures in May (after 26% in April) and had to be imputed using internationally accepted methods.

For the main expenditure group "Food and non-alcoholic beverages" (11.2% weight in the CPI basket of goods), the price survey was completely replaced, since scanner data provided a good, alternative data source and could replace physical price collection in food shops and drugstores.

Among the most affected expenditure groups was "restaurants and hotels" (12.3% CPI weight), for which a share of approximately 88% of the prices had to be imputed due to the closure of businesses.

Other particularly affected, important groups were "recreation and culture" (11.3% weight; 42% imputed prices) and "education" (1.2% weight; 47% imputed prices).

Questions regarding the topic are answered in the Directorate for Economics, Statistics Austria:  
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## **1 COVID-19 challenges and approaches to creating the consumer price index**

Explanations of the structure of the survey, the principles of the survey and the challenges that COVID-19 posed for consumer price statistics can be found in the document "Impact of COVID-19 on the calculation of the consumer price index in April 2020", which is available on the homepage Statistics Austria at [www.statistik.at](http://www.statistik.at)> Statistics> Economy> Prices> Consumer Price Index> Further information.

## **2 Compensation of data collection failures through alternative price collection methods**

The restrictions on business activities due to the COVID-19 measures had hardly affected the price collection in March 2020, since the majority of the survey had already been completed on March 16, 2020. In April 2020, however, the planned price collections were in the week from 6-11 April 2020 and were therefore completely affected by the ordered business and operational closings. This affected also the price collection in May, where Restaurants and Hotels were still closed in the price collection week from 4.-8. May 2020. Restaurants reopened on 15th May, Hotels resumed business on 29<sup>th</sup> of May 2020.

### Switch to price collection via telephone or online research

As of May 2, 2020, all stores were able to reopen in compliance with various security measures. Nevertheless, as in April 2020, as far as necessary, regional price surveys in shops and businesses continued to be carried out online or by telephone in May.

Clothing stores, hairdressers, furniture stores and electrical retailers were reopened. Restaurants and accommodation facilities were still closed. These prices were therefore imputed to the CPI in May. Sports and cultural events were also not yet allowed to take place.

## **3 Imputation methods for unusual price reports and market failures**

Imputation procedures were used for CPI basket of goods codes/commodity groups for which no regular or compensatory prices could be collected. Imputation procedures are used in price statistics to prevent a distorting influence of missing prices on the price indices. The imputation methods for the calculation of the consumer price index in May 2020 described below are in line with

international standards<sup>1</sup> and Eurostat [RECOMMENDATIONS](#)<sup>2</sup>. Decisions about the application of imputation methods were based on predefined rules (see also diagram 1 on page 6).

The following imputation methods were applied:

**METHOD A: Imputation with price change rate within a code/CPI market basket position**  
*(Estimation based on available prices for the same product)*

This method was used when there were less than 50% of prices missing within one code/CPI basket commodity group. Missing prices were imputed by the applying the average rate of change of all non-missing prices within one code position.

**METHOD B: Carry forward of previous month's value**

For goods and services, which, based on an analysis of prices from previous years, show stable price patterns from April to May, prices from April were carried forward to May (in cases of more than 50% of prices were missing within the product group).

**METHOD C: Imputation with nearest higher aggregate**

For product groups where only few (<50%) or no prices were collected, the change rate of the nearest higher aggregate is used for data imputation. This way individual product groups are imputed based on price changes of similar goods (nearest higher aggregate: e.g. the price development of bananas is imputed using the rate of change of fruits).

**METHOD D: Imputation with overall index**

*(Estimation based on all reliable sub-indices – all item imputation)*

Instead of using the rate of change based on the nearest higher aggregate, the rate of change of the overall index is taken (compiled by using all reliable sub-indices that are not mainly relying on imputations). This method is used in cases where Method C is not appropriate, especially if:

- goods or services from the nearest higher aggregate differ too much from the goods or services within the product group to be imputed (e.g. imputing services with the price development of goods),
- the nearest higher aggregate consists of just one product code,
- all or most of the codes, forming the nearest higher aggregate, have been imputed already

**METHOD E: Imputation for seasonal patterns with a seasonal adjustment factor**

This method is used for goods and services that have a strong seasonal pattern. There are product codes and COICOP groups, such as package holidays and accommodation that show strong seasonal fluctuations in spring and autumn. Imputation methods A, B, C and D would disrupt the seasonal pattern in these cases, so that no seasonal price change would be visible in the current year in those months in which prices usually go up or down sharply. Expecting usual seasonal prices in May, this would underestimate the inflation rate in the current year and lead to an overestimation in the following year when the pattern reoccurs. To avoid this,

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<sup>1</sup> <https://statswiki.unece.org/display/CCD2/Compilation+of+CPI+in+times+of+COVID-19>

<sup>2</sup> All Eurostat Guidelines: <https://ec.europa.eu/eurostat/data/metadata/covid-19-support-for-statisticians>

the regularly measured rate of change from April 2019 to May 2019 is applied to the prices collected in April 2020, hereby maintaining the seasonal pattern.

Diagram 1 on page 6 displays the decision path and the rules applied for using the described imputation methods.

Diagram 1: Decision path for the treatment of CPI codes since April 2020 in the context of COVID-19

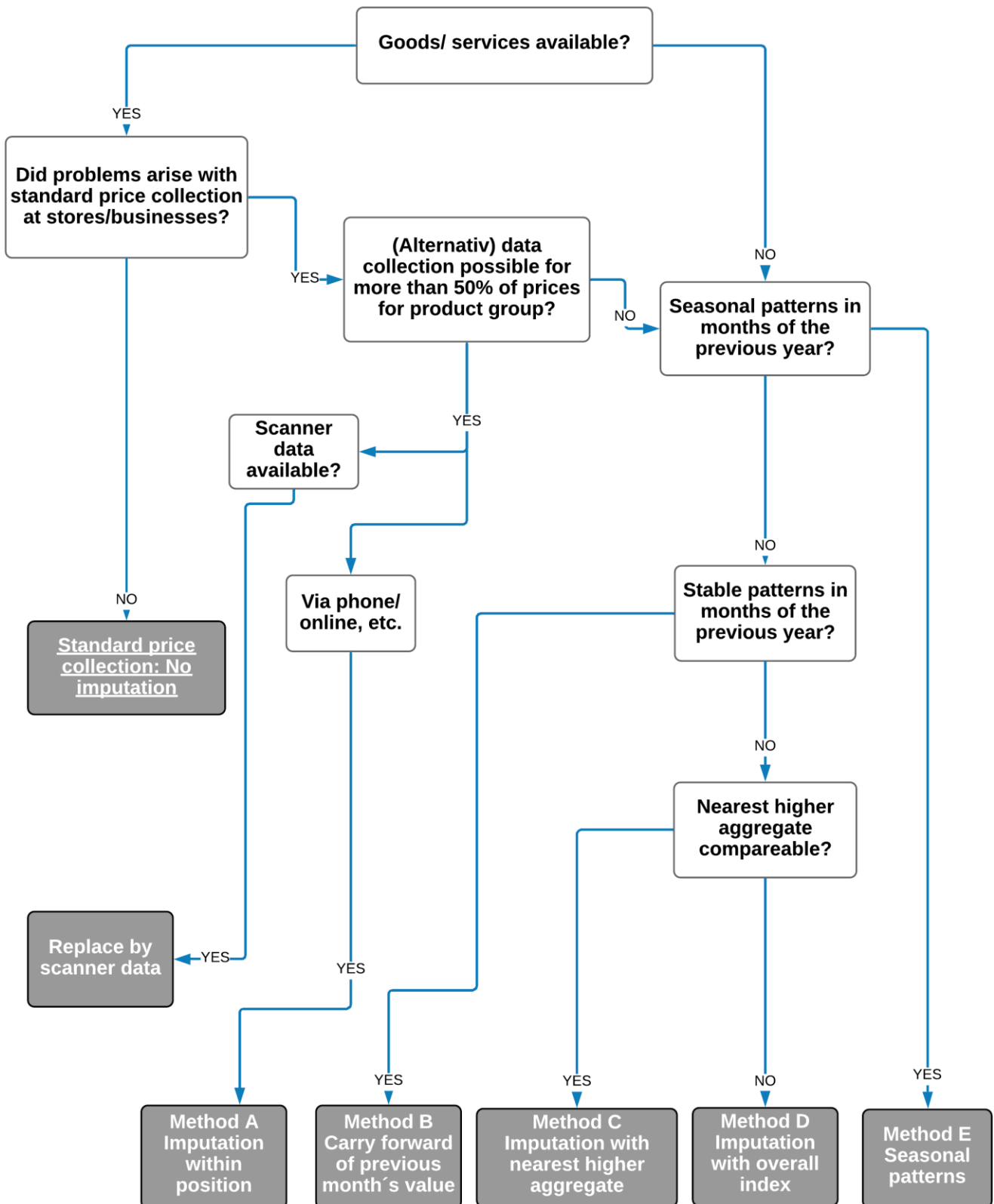


Table 1 lists the share of update methods used or the use of scanner data as an alternative data source for the shopping cart items in the 12 main CPI groups in May 2020.

Table 2 on the next page provides an overview of the individual codes for which the seasonal pattern was imputed (method E).

Table 1: share of weight of scanner data and imputation methods (All-item index and 12 main groups)

ECOICOP Main groups  MAY 2020	CPI weight	Scanner- data Share in index %	Share of weight of imputation methods in %					share in % on weight	
			A Available prices	B Carry forward	C Nearest aggregate	D Overall in	E Saison. Muster	Share of Imputations (A+B+C+D+E)	Collected Prices incl. Scanner
<b>GESAMT</b>	<b>100,00</b>	<b>15,0</b>	<b>0,4</b>	<b>0,7</b>	<b>0,8</b>	<b>10,5</b>	<b>5,0</b>	<b>17,5</b>	<b>82,5</b>
1 FOOD AND NON- ALCOHOLIC BEVERAGES	<b>11,18</b>	96,8	0,0	0,0	0,5	0,0	0,8	1,3	98,7
2 ALCOHOLIC BEVERAGES, TOBACCO AND NARCOTICS	<b>3,74</b>	43,0	0,0	0,0	0,0	0,0	0,0	0,0	100,0
3 CLOTHING AND FOOTWEAR	<b>4,88</b>	0,0	1,7	0,0	0,0	0,1	0,0	1,8	98,2
4 HOUSING, WATER, ELECTRICITY, GAS AND OTHER FUELS	<b>19,28</b>	0,0	1,3	0,0	0,0	0,0	0,0	1,3	98,7
5 FURNISHINGS, HOUSEHOLD EQUIPMENT AND ROUTINE HOUSEHOLD MAINTENANCE	<b>6,87</b>	11,2	0,1	0,0	0,0	0,0	0,0	0,1	99,9
6 HEALTH	<b>5,55</b>	1,3	0,0	0,0	0,0	1,6	0,0	1,6	98,4
7 TRANSPORT	<b>13,08</b>	0,0	0,0	0,0	0,0	0,1	3,7	3,8	96,2
8 COMMUNICATION	<b>2,07</b>	0,0	0,0	0,0	0,0	0,0	0,0	0,0	100,0
9 RECREATION AND CULTURE	<b>11,27</b>	4,6	0,5	0,9	0,0	14,5	26,2	42,1	57,9
10 EDUCATION	<b>1,19</b>	0,0	0,0	24,2	7,2	15,2	0,0	46,6	53,4
11 RESTAURANTS AND HOTELS	<b>12,33</b>	0,0	0,0	1,4	5,5	69,4	11,9	88,2	11,8
12 MISCELLANEOUS GOODS AND SERVICES	<b>8,56</b>	14,0	0,0	1,7	0,0	0,9	0,0	2,6	97,4
<b>GESAMT</b>	<b>100,00</b>	<b>15,0</b>	<b>0,4</b>	<b>0,7</b>	<b>0,8</b>	<b>10,5</b>	<b>5,0</b>	<b>17,5</b>	<b>82,5</b>

A more detailed version of Table 1 with shares of the various methods for all available CPI sub-indices (ECOICOP) during the course of the COVID-19 crisis is available as an Excel table:

[Table 3 - share of weight of scanner data and imputation methods](#)

*Table 2 – Seasonal Codes, for which Method E was applied (seasonal pattern imputation)*

<b>COICOP</b>	<b>Code</b>	<b>Description</b>	<b>Weight VPI 2020</b>
01.1.6.1	008400	Strawberries	0,04962
01.1.6.1	008800	Peaches	0,03865
07.3.2.1	072500	Overland bus	0,03300
07.3.3.2	072702	Air ticket, international	0,45326
09.4.1.2	084300	Tickets for cable cars, chair- and skilifts	0,47501
09.6.0.2	089700	Bus package tour, abroad	0,45536
09.6.0.2	089800	City trip (by plane)	0,12891
09.6.0.2	089900	Holiday package (by plane)	1,89245
11.2.0.1	096600	Hotel, 4*5*	0,19626
11.2.0.1	096900	Bed and breakfast (4*and 5* hotel)	0,50714
11.2.0.1	097000	Bed and breakfast (3* hotel)	0,19603
11.2.0.1	097100	Bed and breakfast (private, domestic)	0,05994
11.2.0.1	097400	Spa hotel	0,08563
11.2.0.2	097200	Holiday flat	0,15329
11.2.0.2	097300	Overnight stay abroad (apartment)	0,26513