



STATISTICS

## Special Series on COVID-19

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# CPI Weights and COVID-19 Household Expenditure Patterns

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The COVID-19 pandemic has caused a dramatic shift in household expenditure patterns, and some have argued that the CPI weights should be updated to reflect these changes in expenditure patterns. This note explains why it would not be appropriate to adjust the CPI weights at this time and proposes alternative measures that compilers can develop to understand the impact the COVID-19 expenditure patterns are having on the aggregate price level.

## I. INTRODUCTION

Lockdowns, risk-avoidance behavior, and the temporary/permanent loss of income have all contributed to sharp shifts in expenditure patterns during the COVID-19 pandemic. In a number of advanced economies, readily available data on credit and debit card transactions and sales data from businesses show generally similar patterns of expenditure changes during the pandemic.<sup>1</sup> Travel and transport, restaurants, some health services, personal care services, cultural and sports events, and some clothing items suffered sharp declines in demand. In contrast, after the initial jump due to stockpiling, spending on food either settled back to its pre-pandemic level or increased as households spent less on restaurants and cafes and more on food consumed at home. Finally, expenditures on rent and utilities have also been affected. In some cases, governments provided temporary subsidies to reduce rent and utility payments, while in other cases, more time at home resulted in increased expenditure on utilities such as electricity and water.<sup>2</sup>

Given these rapid changes in both the expenditure patterns and the prices of goods and services, many CPI users are asking whether CPI compilers should update the weights used to compile the CPI and its sub-aggregate indices. For a more in-depth analysis see Reinsdorf (2020) [COVID-19 and the CPI: Is Inflation](#)

<sup>1</sup> For examples of analyses of changing spending patterns during the pandemic, see Andersen et al. (2020) for Denmark, Carvalho et al. (2020) for Spain, Chronopoulos et al. (2020), and Hacıoglu et al., (2020) for the United Kingdom, and Cavallo (2020) for the United States. For a discussion on products affected by stockpiling, see Statistics Canada (2020).

<sup>2</sup> Hacıoglu et al. (2020) report a modest decline in payments of recurring bills for services such as electricity and water. Unpaid bills may account for this decline. Rent and utility bills that are due but not paid should still count as expenditures for CPI weight purposes.

## II. SHOULD COUNTRIES UPDATE THEIR CPI BASKET TO REFLECT COVID-19 HOUSEHOLD EXPENDITURE PATTERNS?

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The consumer price index is designed to measure the relative change in the price of a **representative** basket of goods and services from one period to the next. Prices are collected for a set of **representative** varieties and the prices of these varieties are tracked through time, usually at monthly intervals. The prices of the detailed varieties are aggregated to form elementary indexes. These elementary indexes are then aggregated to successively higher levels using expenditure weights to form the ‘all-item’ level. The expenditure weights are based on data (usually survey data) collected from a **representative** sample of households. The weights reflect the (generally) annual expenditure of an “average” or “composite” household on each item included in the basket.

“**Representativity**” is part of the nature of the consumer price index and in many ways is what makes the CPI credible and useful for broad fiscal and monetary policy. Because the CPI weights are based on the experience of an “average” or “composite” household, it does not necessarily reflect the experience of any single family or individual. For example, a basket of goods and services for seniors is quite different from the basket for students. Families with no children have a different basket than families who have children. When constructing the CPI basket of goods and services, seniors, students, families with children and families without children, as well as all other households, are combined into a single composite household.

In the same way that we construct a CPI for an average or composite household we also construct a CPI to measure price change during normal or representative economic conditions. While the COVID-19 pandemic is anything but normal, large economic shocks have occurred in the past (often on a national rather than global scale). Hurricanes, earthquakes, war, and political unrest can all cause significant shifts in household expenditure patterns and changes in prices. Ad hoc adjustments to CPI weights have not been made to reflect changes in expenditure patterns during these events because doing so would go against one of the key underpinnings of the CPI – that it anchors itself to representativity and normalcy. There are several reasons why it is not advisable to adjust or update the CPI basket and weights to reflect pandemic expenditure patterns.

First, as a general principle, CPI weights are fixed for a defined period of one, two, or more years. The CPI sub-indices are aggregated using weights reflecting the household consumption expenditure patterns from a household expenditure survey or the national accounts. Most national statistical offices (NSOs) follow a regular schedule for updating index weights. When the weights are updated, they are kept fixed throughout the period. While COVID-19 has affected expenditure patterns, current expenditure data are not available, and ad hoc weight adjustments are not consistent with the fixed basket approach used as the basis for compiling consumer price indices.

Second, the accuracy of the CPI over the longer run would be put at risk by chaining the index to bring in weights that reflect pandemic expenditure patterns. As a general rule, chaining at a sub-annual frequency tends to result in a chain drift problem over intervals as short as a year. Chain drift occurs because information contained in items’ price histories is lost when the index is chained to bring in new weights, and repeated chaining causes these losses to accumulate. Suppose, for example, that every item has the same fixed interval between price increases, with the timing of the increases staggered across products. If the weights shift frequently, items may tend to have a high weight when it is time for a price increase, causing upward chain drift, or they might tend to have a high weight when they are in between price increases, causing downward chain

drift.<sup>3</sup>

Furthermore, the pandemic is a particularly inopportune time to introduce sub-annual chaining. Sharp swings in expenditure patterns, such as those caused by rapidly changing conditions during the pandemic, exacerbate the risk of chain drift. Moreover, at least a partial return to the sort of expenditure pattern seen before the pandemic can be foreseen.

Third, the IMF's Statistics Department developed a [CPI business continuity note](#) that provides guidance on how to treat prices and indexes that are missing due to the temporary closure of those outlets deemed nonessential. When following this advice to compile the CPI, the index not only reflects current price changes, but also implicitly reflects the impact that changes in expenditure patterns caused by the pandemic have had on the existing basket. In many countries, a significant number of outlets have shut down temporarily, such as restaurants, hair salons, clothing stores, etc. In these cases, there are no prices to collect and expenditures are not being made. When a CPI compiler is unable to collect prices for a given variety, the [CPI Manual](#) recommends imputing the missing prices using the short-term relative change in the available collected prices of similar varieties within the elementary aggregate. If an entire index is missing, such as clothing, either the next level up in aggregation or the All Items index is used to impute for the missing index. When using the All Items index to impute for missing indexes, the All Items index is compiled using only those sub-component indexes for which prices were collected. The short-term relative change at the All Items level is then used to impute for the missing indexes. The All Items index is then compiled using the imputed and collected subcomponent indices. This practice implicitly reweights the index because the headline, All Items index reflects the price change of the sub-component indices for which prices have been collected.

This is best illustrated using an example. Consider a CPI that consists of three categories of products; **Food**, **Personal Services**, and **Other Products**. Assume that because of the pandemic all Personal Service establishments (e.g. hair salons, nail salons, . etc....) were forced to close for the months of March 2020 and April 2020, while varieties within Food and Other Products could still be purchased. Since Personal Service establishments were forced to close for two months, prices were not collected for the months of March 2020 and April 2020 (neither were expenditures made). Because the entire index is missing, it is recommended to use the movement from a higher-level category to impute a price. In this case, the all item level index would be calculated using the weights and collected prices of the two available categories – Food and Other Products. The short-term relative change at the All Items level would then be used to impute the price change for Personal Services in March and April. In effect, what happens is the expenditure weight associated with Personal Services is implicitly redistributed to the Food and Other Products categories. This reflects the fact that consumers did not have the opportunity to purchase personal services in March and April.

**TABLE 1. Example – Implicit Reweighting, Index February = 100**

Product	Weight	February	March	April
Food	25%	100	110	120
Personal Services	15%	100	<b>106.5</b>	<b>109.4</b>
Other Products	60%	100	105	105
<b>Total</b>		100	106.5	109.4

Source: Author's Calculation

<sup>3</sup> Another drawback of chaining at a sub-annual frequency is the potential for inconsistency between the component indexes and the all-items CPI. See the CPI manual (2020) for more information <https://www.imf.org/en/Data/Statistics/cpi-manual>

Finally, as a practical matter, updating CPI weights in a one to two-month time frame and respecting the high-quality precision required by the CPI would not be feasible. Given the considerable time required to collect and process survey data on consumer expenditures to arrive at a set of annual weights<sup>4</sup> means that expenditure surveys cannot be used for weights that reflect current, or nearly current, expenditure shares. Alternative data sources, such as credit card and payments data, perhaps supplemented by data on merchants' sales by product category, would allow a rapid estimation of higher-level expenditure patterns for updating the weights of the major components of the basket. However, the lack of product detail in these data sources and the prevalence of cash transactions in some countries can lead to inaccuracies in the categorization of expenditures and makes updating of the relative weights within each major component impossible if compilers want to achieve the quality standards associated with the CPI.

To summarize, it is not recommended to change the weights of the CPI to conform to pandemic expenditure patterns. The available information on pandemic expenditure patterns is incomplete, and the potential improved relevancy of the monthly changes in the CPI during the pandemic would come at the cost of an inaccurate measure of inflation over the longer run. Furthermore, as the risk of infection recedes, consumer spending could largely return to its pre-pandemic pattern, making the existing CPI weights once again relevant with no need for an intervention.

Expenditure patterns in many countries, especially developing economies, change over time and more frequent updates— as recommended in the CPI manual— will ensure reliable, representative CPI weights. The pandemic may result in more long-term changes in expenditure patterns. For example, increased numbers of people working from home either permanently or more frequently will impact expenditure patterns. Instead of buying business attire, expenditure on sport shirts and casual wear will increase. These, and other possible changes, underscore the importance of updating index weights as frequently as possible. However, the frequency of weight updates depends upon the availability of expenditure data (i.e. more frequent household expenditure surveys).

### **III. ARE THERE ANY INDICATORS THAT CAN BE DEVELOPED TO ESTIMATE THE IMPACT COVID-19 IS HAVING ON OVERALL PRICE LEVEL?**

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While it is not recommended to update CPI expenditure weights to reflect the COVID-19 expenditure patterns, this does not preclude NSOs from producing alternative aggregations of the CPI to highlight the different sources of price change during the pandemic. When compiling alternative aggregations of the CPI, the NSO should stress that these alternative aggregations are for analytical purposes only and do not replace the headline inflation measure. There should be a clear explanation of the purpose of these alternative aggregations and how these data can be used.

One example of an alternative aggregation is the Essential Products Consumer Price Index (EP-CPI) temporarily disseminated by Statistics South Africa during the country's lockdown<sup>5</sup>. The EP-CPI includes only the prices and associated weights of those items the government deemed essential. Approximately 20 per cent of the total basket is included in the EP-CPI. Data were disseminated weekly during the month of April 2020, but the EP-CPI was discontinued in May 2020 when the lockdown was lifted, and a far wider range of goods became available to consumers.

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<sup>4</sup> Annual weights (or weights based on expenditures measured over a 12-month period) are recommended to facilitate the capture of seasonal expenditure patterns.

<sup>5</sup> <http://www.statssa.gov.za/?p=13319>

Some countries developed inflation calculators that allow users to estimate the inflation they experience. Users select the groups of items that they currently purchase (e.g. food and non-alcoholic beverages, tobacco, alcoholic beverages, etc.), and the calculators compile an inflation rate using the weights and prices of the selected groups. The calculators reweight the current basket based on the user's selections. A user could select those groups of items purchased pre-pandemic and compare this with the groups of items currently purchased to illustrate how the pandemic has impacted the inflation they experience.

For those NSOs, such as the experimental analysis produced by Statistics Canada<sup>6</sup>, who have access to credit and debit card transaction data, as well as detailed retail sales data, a supplementary special index that temporarily adjusts expenditure weights during the pandemic could be produced to enhance the analysis of price change during the pandemic. Such an index would provide a useful perspective on current changes in the CPI, if the practical difficulties of estimating near-current expenditure patterns during the pandemic can be overcome. Also, after the pandemic, research on its possible effects on the measurement of inflation over the longer run would be useful. Cavallo (2020) provides some evidence on the possible impact of weights that reflect pandemic expenditure shares. These estimates have the character of a sensitivity analysis, as they are based on adjustments to the weights implied by the expenditure share changes seen in the US credit card data. Adjustments to the weights for these countries are illustrative only because the adjustments have been made based on US credit card data, and not data from the countries included in Table 2. US credit card transactions are not representative of actual changes of expenditure patterns in any of these countries. Adjusting the weights raises the growth of the CPI over the 12 months ending in April 2020 in ten countries, leaves the CPI virtually unchanged in one country, and decreases the growth of the CPI in six countries (Table 2). The average impact is +0.2 percentage points, and the conditional average given that the impact is positive is about 0.5 percentage points (applying the pandemic weights over a 12-month period tends to overstate the magnitude of the effect).

**TABLE 2. Effect of Adjusting CPI Weights for Changes in Expenditure Patterns during COVID-19 as measured with U.S. Credit Card Data (percentage change over 12 months ended April 2020)**

	CPI	CPI COVID-19 Adjusted- Weights	Difference
<b>Positive Effect</b>			
<b>Argentina</b>	44.67	45.10	0.43
<b>Brazil</b>	2.10	2.76	0.66
<b>Canada</b>	0.08	0.54	0.46
<b>Chile</b>	3.32	3.66	0.34
<b>France</b>	0.53	0.87	0.34
<b>Japan</b>	0.08	0.21	0.13
<b>Korea</b>	-0.02	0.33	0.35
<b>Turkey</b>	11.02	11.59	0.57
<b>Uruguay</b>	10.80	11.56	0.76
<b>United States</b>	0.35	1.06	0.71

<sup>6</sup> <https://www150.statcan.gc.ca/n1/pub/62f0014m/62f0014m2020010-eng.htm>

	<b>CPI</b>	<b>CPI COVID-19 Adjusted- Weights</b>	<b>Difference</b>
<b>Near-Zero Effect</b>			
<b>Spain</b>	0.00	0.01	0.01
<b>Negative Effect</b>			
<b>Germany</b>	0.89	0.80	-0.09
<b>Greece</b>	0.02	-0.26	-0.28
<b>Ireland</b>	-0.35	-0.59	-0.24
<b>Italy</b>	1.25	0.76	-0.49
<b>Netherlands</b>	1.11	0.77	-0.34
<b>United Kingdom</b>	0.87	0.81	-0.06

Source: Cavallo, 2020.