CPI weights in light of the COVID-19 pandemic

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1. Introduction

As in many other countries, the COVID-19 pandemic hit Norway full force mid-March 2020. The Norwegian government put in place comprehensive national restrictions in an effort to prevent the coronavirus to spread: social distancing, working from home, shutting down non-essential in-person services and more. This resulted in non-availability of several services and an abrupt shift in consumer spending. This sudden shift in consumption starting March 2020 had implications for the compilation and calculation of the CPI in 2020, but also in the years to come[2].

The main objectives in this study has been analysis of the sudden change in consumer spending during 2020 and how it affected the Norwegian CPI. This paper documents the actions taken during 2020 and an analysis of the aftermath. The paper is structured as follows: Chapter 2 describes the challenges that occurred when the pandemic hit, with emphasis on the treatment of missing price observations for wider product[3] groups related to the COVID-19 pandemic. In chapter 3 the shift in consumer spending will be

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[2] The Norwegian CPI is closely linked to the European Harmonized Index of Consumer Prices (HICP). In the following, the challenges related to the CPI also applies to the HICP.
[3] In the following the term *product* will be used for goods and services

analysed, and a recalculation of weights for 2020 will be presented using final annual National Accounts (NA) data for private consumption in 2020. In chapter 4 an experimental recalculated CPI will be presented using the recalculated weights, and results will be analysed. In the end some concluding remarks.

2. CPI compilation during troubled times

2.1 The Norwegian CPI

The Norwegian CPI is defined as a measure of the change in the cost of purchasing a given set (a "basket") of consumption goods and services offered to Norwegian residents. The associated expenditure weight shares of the goods and services should reflect the relative importance of the good or service in the CPI basket. Both the composition of goods and services and their associated weight shares are updated annually in order to stay relevant to private consumption.

The Norwegian CPI is a so-called Lapseyres type index where weights are based on household final consumption expenditures from National Accounts (NA)[4]. More precisely, the Norwegian CPI is calculated by a Young formula where expenditure shares of period y-1 is held constant, and the price reference month is December of the previous year. As of January 2011, National Accounts (NA) replaced the Household Budget Survey (HBS) as the primary data source for weight information at sub-class and higher levels. At lower levels weight shares are derived from HBS, scanner data, other statistics, industry reports and other.

As the Lapseyres type/Young formula used in the Norwegian CPI indicates, CPI weights should reflect the household consumption expenditure pattern of the previous year[5]. The most recent NA data at the level of detail necessary for the compilation of CPI weights refer to the year two years prior to the year for which the weights will be used in the CPI. In normal pre-pandemic years, changes in expenditure have proved relatively small from

[4] A true Laspeyres price index implies using quantity data which relate to exactly the same period as the price reference period. The NO CPI uses December of previous year as the price reference month while the weights are based on a 12-month period, prior to December y-1.
[5] Annually chained Laspeyres type/Young formula

one year to another. In ordinary years it is therefore reasonable to assume that the consumption pattern in year y-2 is a good approximation of the consumption in year y-1. Thus, it has been regarded as unproblematic to use lagged NA data to update the weights. From 2011 to 2020, annual NA from year y-3 in combination with the growth rate in quarterly NA y-3 to NA y-2 was used to derive CPI weights. During 2020 however, Norway as many other countries, experienced an abrupt shift in the consumption pattern due to national and regional lockdowns and other restrictions related to the outbreak of the COVID-19 pandemic. The assumption of relatively small changes in consumption pattern between years no longer held. This had implications for the compilation of the CPI in year 2020, and also the years to come.

2.2 Year 2020 – the pandemic hit

The COVID-19 pandemic and its implications on consumption hit Norway full force mid-March 2020. The Norwegian government held a press conference 12th March 2020 concerning comprehensive national restrictions, affected immediately, in an effort to prevent the coronavirus to spread. In the initial phase of the outbreak the restrictions were quite limiting for all residents:

- Kindergartens and schools were forced to shut down and reallocate to remote online teaching
- Non-essential workers were forced to work from home where possible. For workers not able to perform work from home strict limitations on the number of persons were put in place
- Recreational, cultural and sports arrangements and services such as gyms, theatre, cinema and more were forced to closed.
- Non-essential in-person services such as hair dresser, personal trainers, nail saloons were forced to close
- The national border was closed for private international travel, and domestic travel was strongly advised against, thus air traffic, accommodation and restaurant services were heavily reduced

In effect these government restrictions resulted in an abrupt non-availability of several services and private consumption of these services fell sharply. The direct effects were a sudden fall in spending on non-essential in-person services, recreational and cultural services and also services related to travel. In addition, there were some indirect effects on the consumption pattern, shifting the consumption from out-of-house to in-house:

- Increased expenditure on groceries and takeout food at the expense of canteens, cafes, restaurants and bars
- Increased expenditure on the State Wine Monopoly for wine and liquor at the expense of restaurants and bars. The increase was also a result of closed national borders and the sudden halt of cross-border shopping in the neighbouring country Sweden in particular[6].
- Increased expenditure on consumer electronics and furniture, both likely a result of remote work and school
- Increased expenditure on recreational and sports activity goods, likely a result of closed gyms and the need to use the outdoors more

The direct and indirect effects of the government restrictions on consumption led to a general shift from expenditure on services to increased expenditure on goods.

2.3 CPI compilation 2020

The consequences of the restrictions put in place concerning private consumption naturally led to challenges for the CPI compilation in 2020. According to the Young formula, expenditure weights are fixed for the time period in question, in the Norwegian CPI this equals to one calendar year. This meant that even though consumption shifted abruptly due to the COVID-19 restrictions, the weights underlying the CPI were kept fixed during 2020. This was in line with international recommendations concerning the COVID-19 pandemic[7]. However, as certain goods and services in the CPI basket experienced close to zero consumption, alterations to the CPI compilation were needed. It is reasonable to

[6] Norway and Sweden share an extensive country border, and cross-border shopping in Sweden of especially groceries, alcohol and tobacco is common for Norwegian residents. The different tax schemas in combination with generally lower price levels in Sweden makes it beneficial for Norwegian residents

[7] See e.g. Eurostat (2020) and IWGPS (2020)

expect that goods and service experiencing close to zero consumption should not impact the measure of the CPI, i.e. the effects should be neutralized.

Neutralization – treatment of non-available, non-seasonal products

Three alternatives were discussed as to how to best neutralize the effects of goods and services that were no longer available for consumption, but still remained in the CPI basket.

1. Carry forward the last observed price observations for the elementary aggregate(s)
2. Omit the goods and services from the basket and recalculate the weights mid-year
3. Impute the missing price observations

Alternative 1, carry forward the last observed price method was dismissed as this is generally not a desired solution for missing price observation. It could be reasonable to believe that the prices would not change during the lockdown and therefore be justified as a method. However, carry forward the last observed price on a good or service would mean that we put emphasis, in this case a zero-percentage change, on a product that is not available. Including a zero-percentage change for the not available product would entail a bias in the month-to-month (period-to-period) index; if prices in general were increasing, carry forward the last observed price for the non-available products would cause a downward bias in the index. And likewise, carry forward would entail an upward bias if the prices in general were falling. In general, carry forward should only be used in if the prices are regulated or otherwise known not to change, see the Consumer Price Index Manual: Concepts and Methods (IMF et al., 2020), hereafter named the CPI manual.

The second alternative, omitting the goods and services from the basket and recalculate the weights, could be a viable option, however this is not in line with international recommendations nor the legal and conceptual framework of the HICP which the Norwegian CPI is closely related to[8].

[8] See Commission Implementing Regulation (EU) 2020/1148

In addition, changing weights in the midst of a crisis such as the COVID-19 pandemic is not necessarily straight forward. The shifts in consumption is challenging to monitor real-time, especially when the changes are sudden, sharp and unknow for the near future. In the initial phase of the pandemic restrictions were severe and applied to the entire nation. Later, the restriction could vary, both in scope, but also across regions. The capital city Oslo and other larger cities generally experienced tighter regulations than less populated areas in Norway, and restrictions would vary in intensity and time. This would make it challenging and time-consuming to recalculate weights, re-introduce product groups once restrictions lifted - possible multiple times - during the year. Also, changing weights entails chaining, and there is a higher risk of chain drift in the index if the weight shifts are substantial and price movements at the point of chaining fluctuates, which is plausible to be the case during a crisis, see Reinsdorf (2020). Given the above, the quality of the CPI could be compromised, and the option of recalculating weights mid-year was therefore dismissed.

The third option was to impute the missing price observations, a well-known method for treatment of temporarily missing products, see the CPI manual. A general method for imputing missing price observations is to calculate the average price change for the prices available in the elementary aggregate, or by calculating the average price change of targeted comparative varieties. The implicit assumption of imputing prices by similar products is that when a product is no longer available, consumers will substitute by similar products. However, in this particular case we were experiencing a non-availability of not only single price observations, but for wider product groups and also higher aggregate product groups. The non-availability of several products could not (easily) be substituted by similar products as they were also not available, therefore it seemed inadequate to impute by nearest higher aggregates. The decision was to impute by the highest aggregate, i.e. the all-items CPI, containing all reliable price indices.

The decision of using the all-items CPI as the imputation factor for the missing price observations was based on the assumption that the substitution for the non-available products were evenly distributed, in relative terms, on all the other consumer products available. In effect, this would give the same output as omitting missing products and recalculating the weights, however without causing bias to the indices. The solution was relatively easy to implement and also easy to monitor, and it made it possible to do

changes month-to-month according to the shift in restrictions and availability of products. However, one challenge remained: the treatment of missing price observations for seasonal products.

Neutralization – treatment on non-available, seasonal products

The treatment of missing price observations for products that did not show a pronounced seasonal pattern over time, were to impute by the all-items CPI. For products showing pronounced seasonality however other considerations were needed. The price movements for seasonal products are volatile, and by definition the variation repeats itself and occurs during the same time period every year. Hence, the absence of a seasonal price variation will affect the annual rate of change.

The challenge can be described by an example: Airfares for international travel inherit pronounced seasonality related to the summer vacation, winter - and fall break and the holiday seasons, and the price movements are generally substantial. The prices naturally increase with the increase in demand, and the increase normally occurs during the same time periods every year. If the price increase in percentage terms, in e.g. July year *y* was the same as July year *y-1*, the effects on the all-items CPI annual rate of change for July would be neutral. However, if the expected price increase were not to occur in July year *y* then the contribution to the annual rate of change for the all-items CPI would be negative. I.e. imputing the airfares for international travel by the all-items CPI during the summer months would contribute to pulling the inflation rate down, measured by the annual rate of change. This is in line with the findings in IWGPS (2020) and Lamboray et al. (2020).

Considering the annual rate of change, the imputation of seasonal products by the all-items CPI could severely affect the annual rate of change, which would make it difficult to interpret the results. The possible decline in inflation would not be a reflection of less price pressure in the economy, or that residents experience less inflation, but would merely be a result of technicalities. According to international recommendations the imputation of missing products should therefore not break the seasonal pattern of the

product[9]. Eurostat (2020) recommended the following two options for treatment of missing price observations for seasonal products:

1. Impute with the annual rate of change of all reliable price observations
2. Carry forward with a seasonal correction factor

In order to properly capture the seasonality of the indices in question, seasonal correction factors were obtained by estimating econometric models using X-13ARIMA-SEATS (U.S. Census Bureau), based on a minimum of 5-10 years of time series data. The computed seasonal component was used to estimate the monthly seasonal correction factor. Seasonal correction factors were calculated for the following product groups:

- Passenger transport by air, international flights
- Package holidays
- Accommodation services, hotels

It could be argued that imputing by a seasonal factor for products (here services) not available incorrectly affects the monthly rate of change. Imputing by a seasonal factor favours the annual rate of change at the expense of the monthly rate of change, therefore it was important to keep our user well informed of the chosen method and the implications it had on the indices for the affected months. The affected time periods and the chosen imputation methods for the affected indices were marked in the Statistics Norway Statbank data tables, and also noted in the monthly dissemination reports for the affected months.

3. Recalculating 2020 – Expenditure weight shares

3.1 Expenditure weight shares

It has been around three years since the first wave of the COVID-19 hit, and restrictions have been lifted in most countries. Comprehensive data on actual consumption during

[9] See for example Eurostat (2020), IWGPS (2020), UNECE (2021)

2020 by final NA is now available, thus making it possible to analyse the abrupt shift in consumption pattern during this period in relation to the CPI.

To analyse the shift in consumer expenditure in Norway in 2020 an alternative set of weight shares for the CPI 2020 were calculated using final NA 2020 figures for household consumption expenditure. The experimental recalculated weight shares will in the following be named *recalculated CPI weights*, while the actual weight shares used for computing the CPI in 2020 will be named *published CPI weights*.

Final NA 2020 figures were used to redistribute the CPI weights at COICOP level 1-4, creating the recalculated 2020 weights. The relative weight distribution at lower levels were kept fixed using the fixed relative distribution according to the published CPI weights in 2020. Thus, the recalculated weights on COICOP level 1-4 are based on actual 2020 consumption while the weight distribution on lower level aggregates are based on pre-pandemic information up until 2019. The latter part is a weakness in the analysis and could be explored further in subsequent analyses.

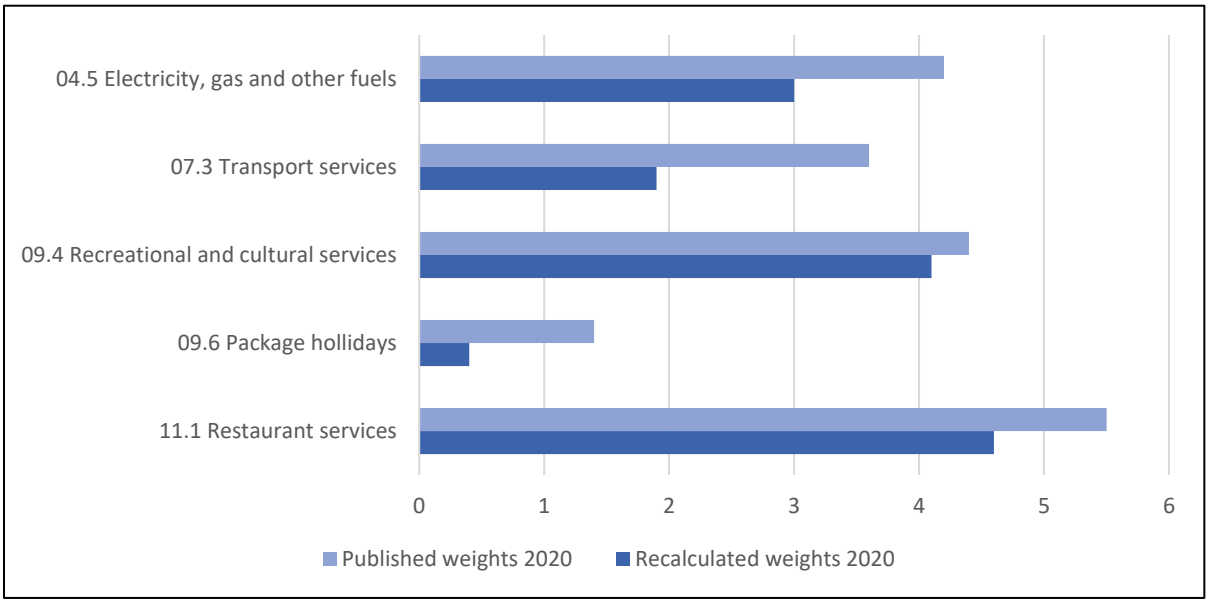
Changes in weight shares - what we didn't do

Comparing the published and recalculated weights for 2020 we clearly see the effects of the sudden shift in consumption that took place during 2020. As expected, we found large declines in expenditure for travel and leisure related activities in the recalculated weights. At 3-digit COICOP level we found the largest decreases in both percentage and absolute terms for group 09.6 Package holidays and 07.3 Transport services for the recalculated weights compared to the published weights. Both groups were severely affected by the pandemic and the government restrictions on travel both domestically and internationally. For transport services we found the largest drop in consumption for air fares, but also passenger transport by railway, road and sea experienced large decreases.

In addition, the government restrictions included keeping a one-meter distance between people and closing down in-person service of alcoholic beverages, in effect shutting down many restaurants and bars. Non-essential medical help and other in-person services were also forced to close. Also, recreational, sport events and cultural services with audience

were banned. As expected, comparing recalculated and published weights we found the larger deviations between published and recalculated weights for group 11.1 Restaurant services and 09.4 Recreational and cultural services.

Figure 1: Recalculated and published weights 2020, in percentage points. Selected series based on largest differences.



Source: Statistics Norway

The electricity market in 2020

One of the largest deviations between recalculated and published weights are found for group 04.5 Electricity, gas and other fuels. Electricity is the main energy source for Norwegian households, thus carry a large weight share in the CPI, and is also the main driver behind the difference in recalculated and published weights for 2020. The deviation is however not related to the pandemic. The deviation is rather a result of using lagged information about a current weather situation: Electricity is a volatile component in the CPI, highly affected by weather conditions. From the beginning of 2020 Norway experienced a record amount of precipitation, resulting in full water reservoir coverage and abundant amount of snow in the mountains that later would melt and re-fill the water reservoirs (NVE 2020). The weather condition lasted well into the fall keeping the prices

on electricity low during 2020. In addition, warmer climate than most years resulted in less use of electricity for heating during the fall and winter months.

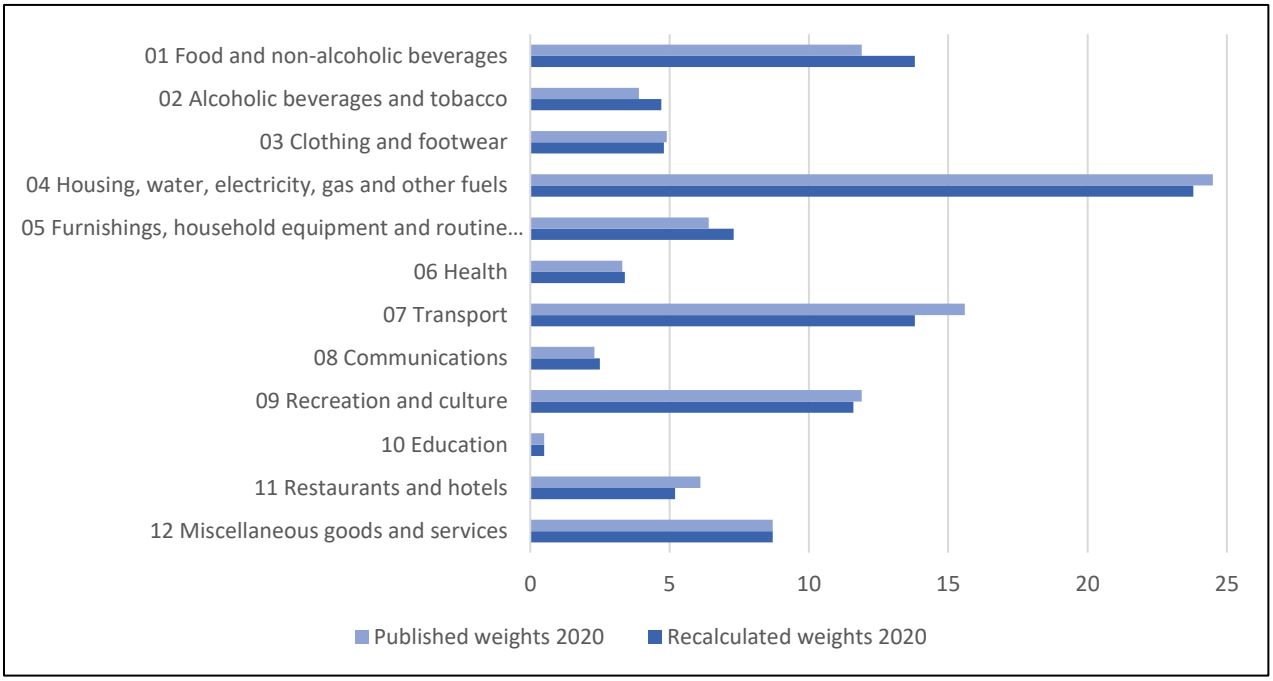
Full water reservoir coverage and less need for electricity resulted in less consumer expenditure on electricity than what was estimated at the time of compiling the weights for CPI 2020. It should be noted that it is not uncommon to deviate from expected to actual consumer expenditure on electricity, however for 2020 the deviation was more severe than most years.

Changes in weight shares – what we did do

The deviation between recalculated and published weights clearly show the effects of the restrictions and what we were no longer allowed to do, but they also show clearly what we actually did do during these pandemic months. In short, we stayed at home and did activities related to the residence. Most meals were made and consumed at home, including beverages, at the expense of restaurants, cafes and bars both domestically and international. This included also the cross-border grocery shopping in Sweden in particular, that experienced an abrupt halt. Another effect related to more cooking at home was a considerable increase in expenditure on kitchen appliances.

Apart from cooking, many homes also became offices, kindergartens, schools and the like, thus increased expenditure on IT equipment, but also on furniture such as chairs and desks. In addition, staying more at home also seemed to have increased the expenditure on home décor, household textiles and other refurbishing related activities.

Figure 2: COICOP divisions, recalculated and published weights 2020, in per cent.



Source: Statistics Norway

Food and non-alcoholic beverages

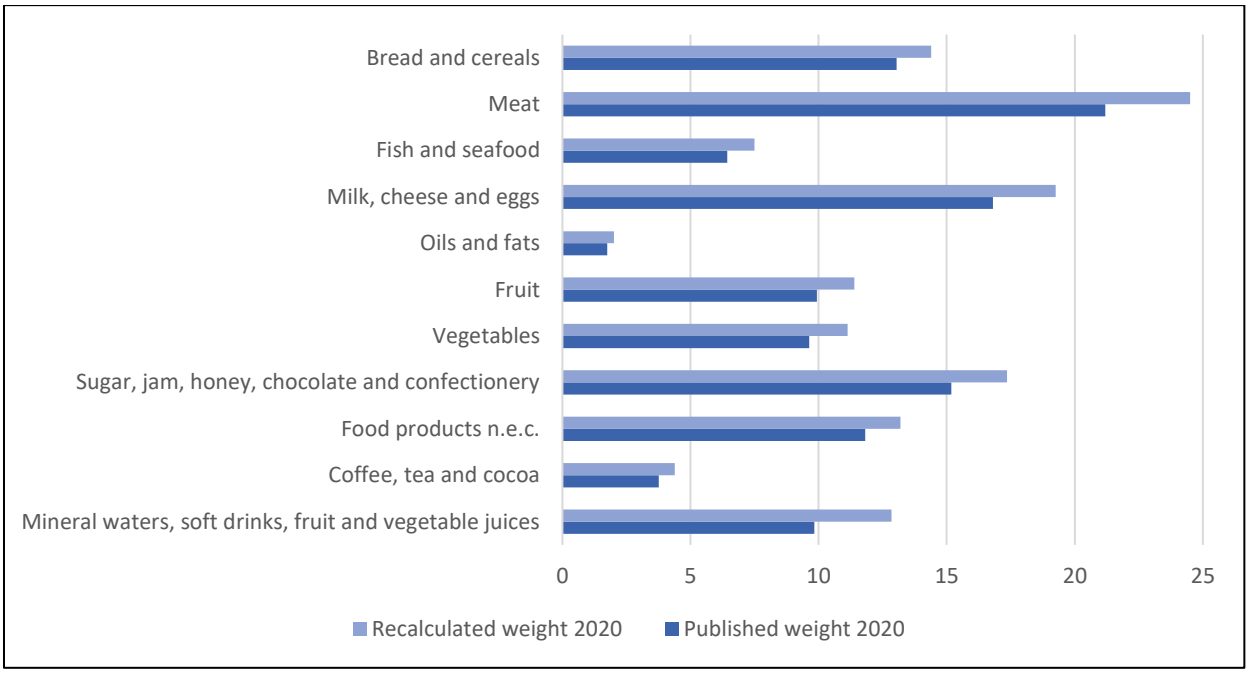
Comparing recalculated and published weights for 2020 we found one of the largest increases in weights for COICOP division 01 Food and non-alcoholic beverages, for reasons explained above. The index compilation of food and non-alcoholic beverages is entirely based on scanner data. According to regular weight update procedure weights at 4-digit COICOP are fixed according to the NA figures. Weights on lower level aggregates are distributed according to scanner data turnover information (prices and quantities) for a whole year[10]. For 2020 that meant using scanner data turnover information from 2019 to distribute weight shares at 5-digit COICOP and the lower level aggregates. According to the published weights, food and non-alcoholic beverages received a weight share of 11.9 per cent in 2020, while for the recalculated weights the weight share accounted to 13.8 per cent, a deviation of 1.9 percentage points.

Comparing the published and recalculated weights at 4-digit COICOP level for food and non-alcoholic beverages we found that the deviation for all sub-groups vary between 10-

[10] Scanner data is considered a comprehensive data source of information, but it should be noted that scanner data doesn't differentiate between private and public consumption, which could alter the results somewhat.

30 per cent, se figure 3. The largest deviation, in percent, is found for sub-group 01.2.2 Mineral waters, soft drinks, fruit and vegetable juices. The largest deviation in percentage points are found in 01.1.2 Meat and 01.2.2 Mineral waters, soft drinks, fruit and vegetable juices. For 01.2.2 we also find the largest deviation between published and recalculated weights in relative terms.

Figure 3: Sub-groups within COICOP 01 Food and non-alcoholic beverages, recalculated and published weights 2020, in per cent.



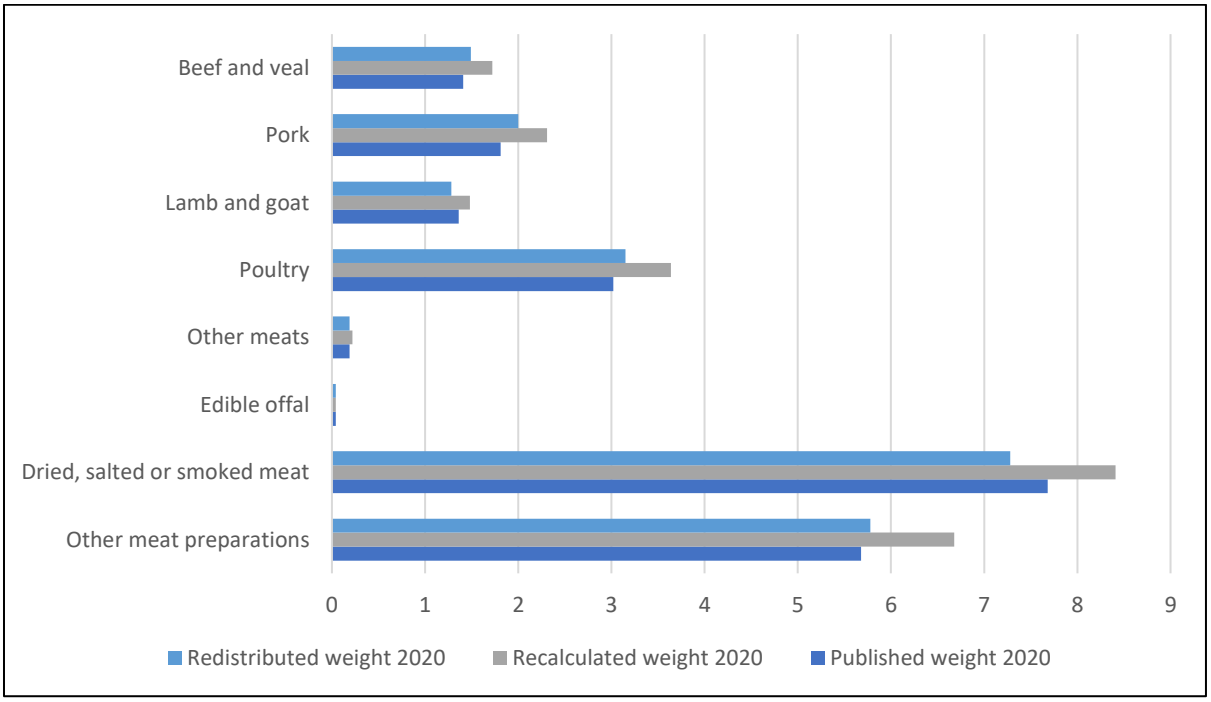
Source: Statistics Norway

As explained above, all sub-groups within COICOP division 01 showed increase when using recalculated weights, maybe not so surprisingly given the large increase in weight in general for COICOP division 01. Another interesting point is to look at the relative difference in the increases, i.e. to analyze what products showed the highest (lowest) increase in relative importance. To do so the weight shares at 4-digit COICOP level were kept fixed according to published weights 2020, and then the weight shares at lower level aggregates were analyzed with respect to the weight information present when compiling the published weights (scanner data turnover information for 2019), i.e. the published weights for 2020, and compare it to a new set of weights containing weight information

now available for 2020 (scanner data turnover information for 2020). The latter weight series will in the following be named *redistributed weights* 2020. Comparing redistributed weights 2020 and published weights 2020 show the difference between using 2020 vs. 2019 scanner data turnover information (respectively) for the distribution of weights at lower level aggregates. This gives insight into the relative change in consumption.

One of the sub-groups showing the largest increase in weights was COICOP 01.1.2 Meat. For meat we found that especially beef and veal, pork and poultry received the largest increase in weights when using recalculated weights. Looking at the redistributed weights for 2020 we find that, even though the weights increased, the relative importance of lamb and goat, and dried, salted and smoked meat fell.

Figure 4: 5-digit COICOP in sub-group 01.1.2 Meat, weight shares, in per mille.

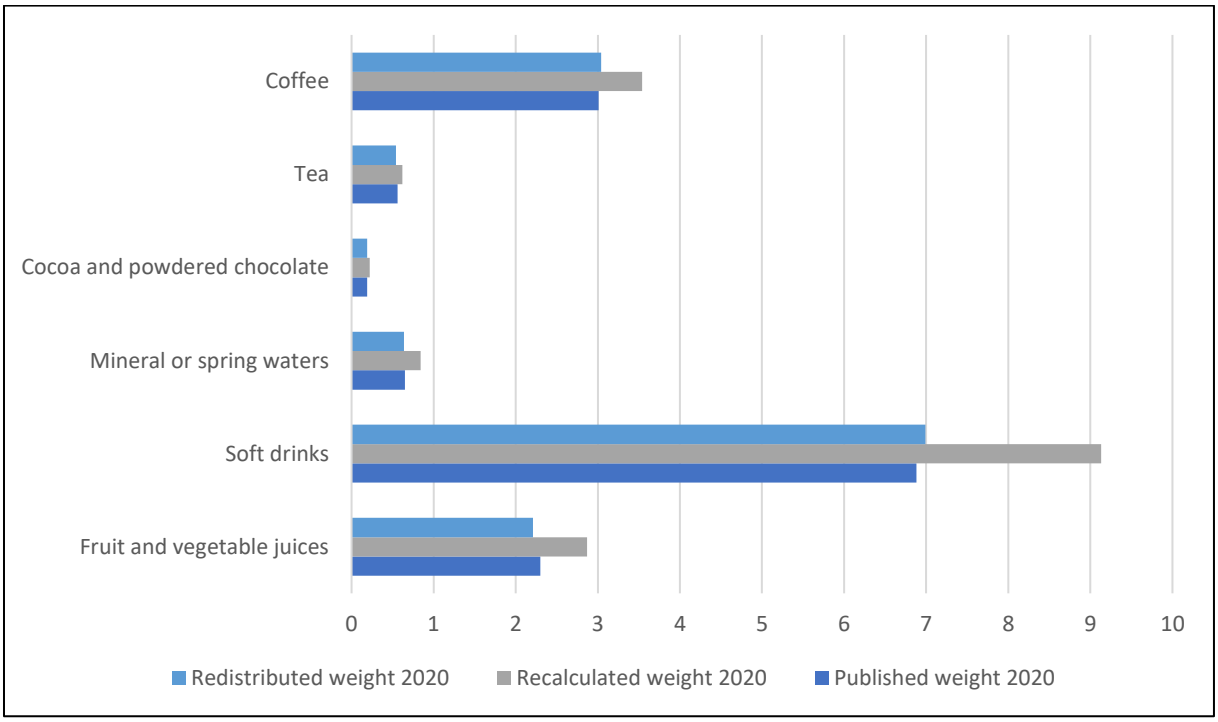


Source: Statistics Norway

Another group showing large increase in weights was COICOP 01.2 Non-alcoholic beverages. For non-alcoholic beverages we found that COICOP 01.2.2.2 Soft drinks received the greatest increase in weights in 2020 compared to the published weights.

Looking at the redistributed weights compared to the published weights 2020 however we find that the weight increase in COICOP 01.2 Non-alcoholic beverages is fairly evenly distributed across all 5-digit COICOP groups. Thus, the large weight increase for soft drinks is more related to its initial size of weight share than an exceptionally increase of consumption of soft drinks compared to the other non-alcoholic beverages.

Figure 5: 5-digit COICOP within group 01.2 Non-alcoholic beverages, weight shares, in per mille.



Source: Statistics Norway

4. Recalculating 2020 - Index calculation

4.1 Experimental CPI 2020

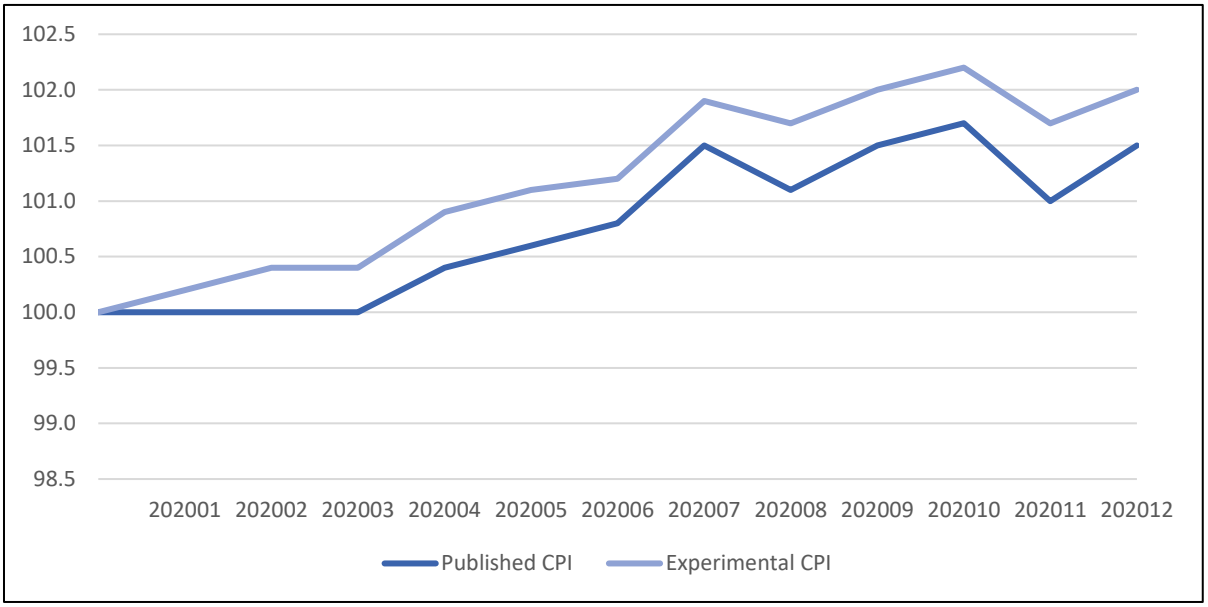
As shown above, and as was expected, we found large differences between published CPI weights in 2020 compared to actual consumption in 2020, measured by final NA 2020. In the following a recalculated *experimental* CPI index series for 2020 using the recalculated weight shares has been computed. It should be noted that the recalculated index series is an experimental index series and not an official index, thus should therefore not be viewed

as a “true” CPI index series for 2020. The experimental index series also inherit shortcomings on the compilation of weights, for example no adjustments to the relative distribution of weights at lower level aggregates (below the 4-digit COICOP level). In addition, the abrupt changes in consumption patterns varied largely during 2020, the weights reflecting consumption for a whole year will therefore not adequately reflect actual consumption for the individual months. This is also true for CPI compilation and weight calculations in general, but for 2020 the discrepancy and variance are larger than usual.

Comparing the published CPI index series and the recalculated experimental CPI index series we found that the published CPI lies below the recalculated experimental index series throughout the year. This indicates that the published CPI in 2020, using weight shares based on lagged consumption data, somewhat underestimated inflation in 2020. This is in line with other studies such as Reinsdorf (2020) and Lamboray et al. (2020).

We see however an upward level shift for the recalculated experimental series in the beginning of 2020, a period not related to the COVID-19 pandemic. It is reasonable to believe that the recalculated weights for the period January to mid-March 2020 might be less representative than the published weights in the same period as consumer expenditure was not yet affected by the restrictions during the pandemic, thus these results must be handled with care.

Figure 6: Published and recalculated experimental CPI index (DEC2019=100). January - December 2020.

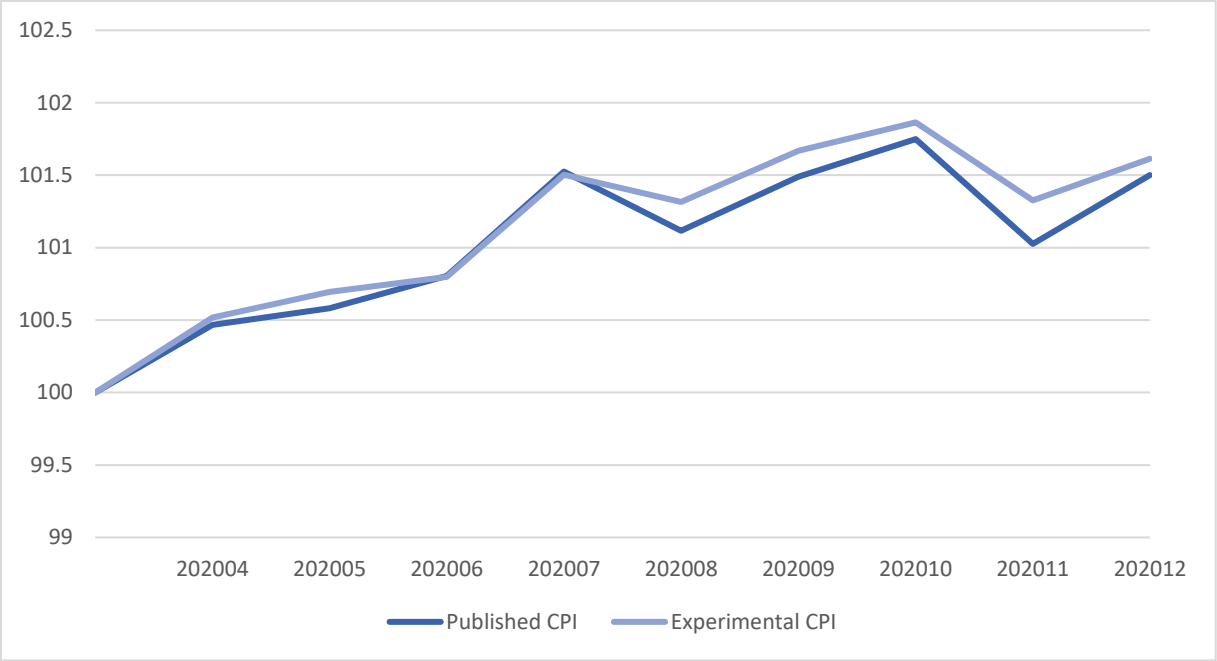


Source: Statistics Norway

The first wave of the COVID-19 pandemic hit Norway mid-March 2020, thus both consumption and expenditure were less affected by the pandemic in the first quarter of 2020. Therefore, the figure above might be overestimating the effects of using the published weights compared to the recalculated weights. March 2020 was the last semi-normal pre-pandemic month, thus starting the recalculated index series in March 2020 will give a better assessment of the difference between published and recalculated experimental CPI index series.

Comparing the published and recalculated experimental CPI index series starting March 2020 we found that the deviation between the two indices are less than when comparing the year as a whole. This indicates that the underestimation of the CPI we found using the whole year might be misleading to a certain degree; the size of the divergences was reduced when isolating the months mostly affected by the pandemic. It should be noted that a weakness in the analysis is that the recalculated weights are based on the whole year of 2020, including both pre-pandemic months and months affected by the pandemic. It is reasonable to believe that excluding the pre-pandemic months from the data could alter the results further, leading to larger deviations, however this has not been tested in the analysis.

Figure 7: Published and recalculated experimental CPI index (MAR2020=100). March – December 2020.



Source: Statistics Norway

As shown above, the published and recalculated experimental CPI index series show close to identical development from March to July 2020. From August we found a level-shift were the recalculated experimental index series show a smaller decrease than the published index. A similar larger drop in the published CPI is found in November, before the two indices diverge back to each other in December 2020.

4.2 Contributing factors

To examine the driving factors behind the differences in the two indices we calculated and compared the *contribution factors* for each month in 2020. The contribution factor is defined as the products contribution to the rate of change in the all-items CPI, either the monthly or the annual rate of change, and is related to both the price development of the product and the products weight share. In order to examine which COICOP divisions that contributed to pulling the recalculated experimental CPI index up (down) compared to the published CPI, we compared the contribution factor for each of the twelve COICOP

divisions for both index series. The contribution factors were calculated for the all-items CPI annual rate of change for each month in 2020[11].

Figure 8 below present the difference between the contributing factor for the recalculated experimental index series compared to the published index series, month-by-month, for the annual rate of change in the all-items CPI. Looking at figure 8 we found some larger deviations, in particular for COICOP division 01 Food and non-alcoholic beverages, and 07 Transport, with opposite signs. Both, as well known, severely affected by the pandemic. The price development of COICOP division 01 Food and non-alcoholic beverages together with 05 Furnishings, household equipment and routine maintenance showed the largest deviation pulling the recalculated experimental index up compared to the published CPI.

We see that the recalculated experimental index for food and non-alcoholic beverages lies above the published series throughout the period, not so surprisingly as the annual rate of change for food and non-alcoholic beverages remained positive throughout 2020. We find a larger impact in especially February and July, two months prone to price increases: Increased prices in combination with larger weight shares in the recalculated experimental series, the results are as expected. It should be noted that February was a month not affected by the pandemic, the increased weight share in the experimental series might therefore somewhat overstate actual consumption for food and non-alcoholic beverages in February.

In addition to food and non-alcoholic beverages we also found a larger positive contribution to the recalculated index series for COICOP division 05 Furnishings, household equipment and routine maintenance, 04 Housing, water, electricity, gas and other fuels, and 02 Alcoholic beverages and tobacco. COICOP division 05 received a larger weight share in the experimental CPI, and in combination with an positive annual rate of change we found that the contribution from division 05 on the experimental CPI were increasing during the most part of 2020.

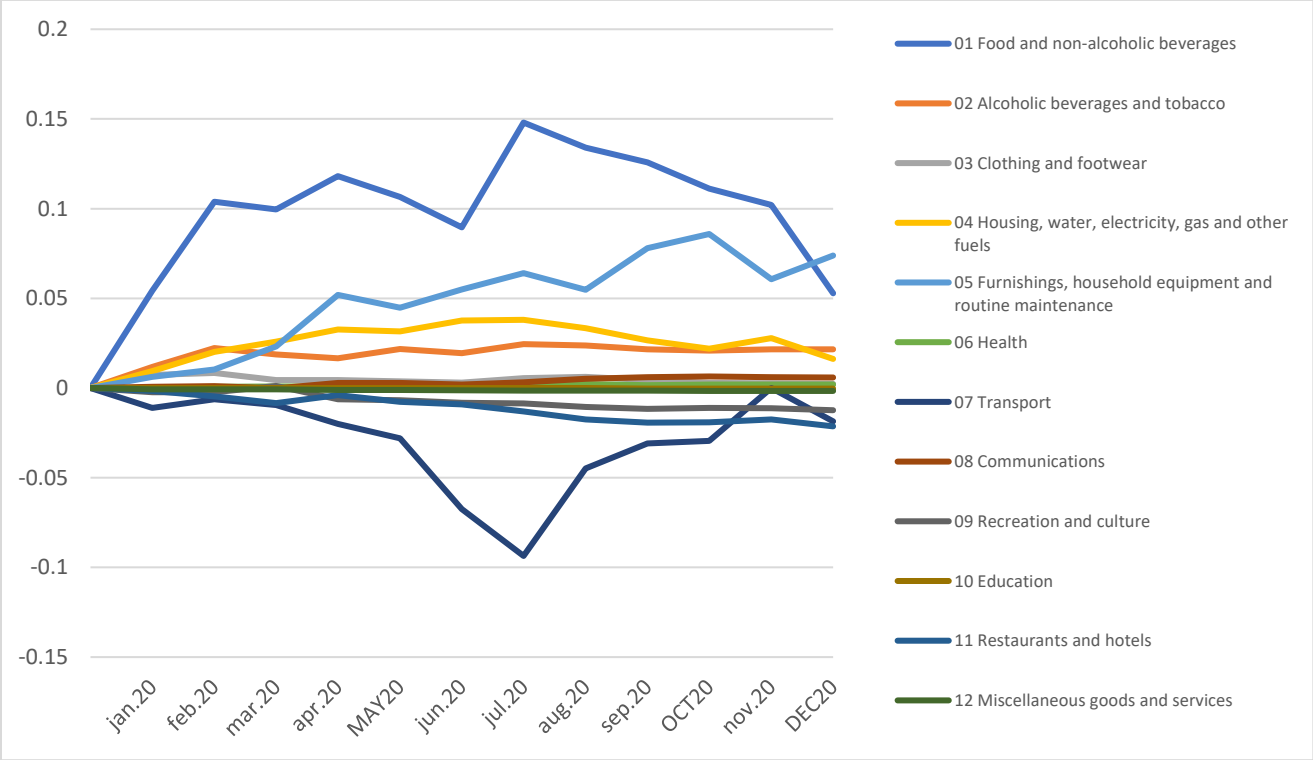
For COICOP division 04, the price decrease during 2020 for reasons explained above, in combination with considerably less weight share on electricity for the recalculated 2020 weights also contributed to pulling the experimental CPI up. For division 02 Alcoholic

[11] For elaboration of the calculation of contribution factor, see Nygaard (2017) and OECD (2022)

beverages and tobacco an increased weight share in combination with price increases in particularly the beginning of the year, i.e. pre-pandemic months, was the main factor for contribution to pulling the experimental CPI up compared to the published CPI.

In the opposite direction we found the largest contribution to pulling the experimental CPI down compared to the published CPI in division 07 Transport. Expenditure on transport showed a sharp decline during 2020 due to the government restrictions, pulling the weight share in the experimental series down. For the price movements during 2020 it should be noted that division 07 was largely influence by having imputed prices by a seasonal factor, the results must therefore be handled with some care.

Figure 8: Contributing factor, difference between recalculated experimental and published CPI



Source: Statistics Norway

5. Concluding remarks

The COVID-19 pandemic had large implications for the CPI compilation in 2020. A sudden shift in consumption when the pandemic hit made it challenging to compile the CPI in a

regular manner. The main challenges were large scale missing price observations, in addition to having obsolete weights compared to the COVID-19 consumption pattern. According to international recommendations, and the formula in general, the weight shares were kept fixed during 2020. The challenges related to the CPI compilation were resolved by imputing missing price observations, either by the all-items CPI of reliable indices, or by imputing by a seasonal factor, depending on the presence of seasonality for the product in question.

Having NA 2020 data on household final consumption expenditure enabled a study on the differences between the weight shares used for CPI calculation in 2020 and the recalculated weight shares based on actual consumption, according to NA 2020. As expected, the recalculated weights showed an increase in consumption for activities related to staying at the residence, and likewise a decrease in travel and leisure related activities.

An experimental analysis on how the weight differences affected the CPI compilation showed that the published CPI somewhat underestimated the inflation during 2020, when compared to using weight shares according to NA 2020. These results should however be treated with some care. 2020 was a year that contained months both heavily affected by the pandemic and subsequent government restrictions, but also months not affected by the pandemic. Neither a basket containing pre-pandemic weights nor a basket containing the effects of the pandemic will fully be adequate for all months of the year 2020. Nevertheless, the experimental study could give some insight on the size and sign of the impact of the sudden shift in consumption that were experienced during the pandemic.

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