Handling of changes in quality

For calculating inflation, theory requires composition of the basket of goods and services to remain the same for a certain period so as to measure only pure price movements. However, in reality, products change over time – improving, following fashion trends and technological advances. For instance, it is difficult to monitor the price of a computer for longer than three months. Similarly, clothing generally has a life of just one season. Under these conditions, it is essential to establish rules for product substitution and for making quality adjustments.

Once a product is no longer part of sales outlet's range, there are six techniques which can be used to replace it:

1. Direct substitution: This method is used when the old and new products share the same features or are very similar. The new product thus replaces the previous one and any price difference is taken fully into account in the calculations. In the following example, the whole of the 30-cent increase between January and February 2016 is considered as inflation.

Article / Price	December 2015 (Base 100)	January 2016	February 2016
Price of A	2.- ⟶	2.50	
Price of B			2.80
Index of price	100	125	140

 2. The overlapping method: This method applies to products that may have changed but whose primary function is the same. For this method to work, both the old and new product must be on the market simultaneously for no less than one month. The noted price difference between the two is broken down into a qualitative difference and price difference, but only the price difference is included in the calculation. In the following example, the price difference between the two products in January is considered as a qualitative difference. The 30-cent increase between January and February 2016 is therefore split into two: 20 cents are considered as quality enhancement while 10 cents are seen as a price increase.

Article / Price	December 2015 (Base 100)	January 2016	February 2016
Price of A	2.- ⟶	2.50	
Price of B		2.70 ⟶	2.80
Index of price	100	125	129.63

Difference in quality

Difference in price

3. The option price method: In some areas, quality change can be directly estimated on the basis of product components. It is then deducted from price so that the qualitative difference has zero impact on the index. This method is particularly suited to the new car market, where technological innovations are often introduced first as options before being offered as standard features.

In the following example, item B, whose price is known, has options that confer upon it a higher value than item A. The value of these options can be estimated at 25 cents. With similar options, item A would have cost CHF 2.75 in January. The 30-cent increase between January and February 2016 is split into two: 25 cents are considered as quality enhancement while 5 cents are seen as a price increase.

Article / Price	December 2015 (Base 100)	January 2016	February 2016
Price of A	2.-	2.50	
Price of B		(2.75)	2.80
Index of price	100	125	127.27

Difference in quality
Difference in price

4. Explicit quality adjustment using class mean imputation (bridged overlap): This method involves imputing price development of items of the same variety which have not been replaced to replacement items whose quality is not comparable to the replaced items.

In the following example, item A and item B, though used for the same purpose, are of differing quality. Using the bridge overlap method, the price change between the two items from January to February is the same as for items of the same variety. In this instance, it is 5.66%. Item B would have cost CHF 2.65 in January. The price increase between the two items, A and B, is then split into a 15-cent quality enhancement and a 15-cent price change.

Article / Price	December 2015 (Base 100)	January 2016	February 2016
Index of variety	100	100	105.66
		The index increases by 5.66%	
PriceA	2.-	2.50	---
PriceB	---	(2.65)	2.80
Index of price	100	125	132.08

5. Explicit quality adjustment using hedonics: Such methods use a hedonic function to estimate quality change, which is then removed from the index. Hedonic methods have been in use to adjust for quality change in PCs and rents since 2011.

In the following example, item B does not have the same characteristics as item A. A hedonic function is used to estimate the prices of items A and B based on their features, thereby measuring the difference in quality. For example, it can estimate the price of item A in January 2016 as if it had possessed the characteristics that item B has in February 2016, which is tantamount of estimating the price of item B in January 2016. This is estimated at CHF 2.90, corresponding to a 16% quality-related increase relative to item A, which has a lower characteristic-based value. The estimated price of item B in January is higher than its actual price in February. The end result is a 3.45% decrease in the index between January and February 2016.

Article / Price	December 2015 (Base 100)	January 2016	February 2016
Price of A	2.- ⟶	2.50 ⎱ Estimated difference in quality 16%	---
Price of B		2.90 ⎵ Difference in price	2.80
Index of price	100	125	120.69

6. Non-replacement: Lastly, if none of the above methods are applicable, the price series of the product taken off the shelves (item A) is discontinued and a new price series begins (item B). No price comparison is carried out.

Article / Price	December 2015 (Base 100)	January 2016	February 2016
Price of A	2.-	2.50	---
Price of B	---	---	2.80
Index of price A	100	125	
Index of price B			125

As a closing point, it should be noted that product replacement and quality adjustments are one of the most problematic areas for price statistics. It is extremely difficult to measure a quality differential between two products in terms of utility. That is why particular care is given to plausibility testing and the quality screening of replacement items.

The bridged overlap method has been used by the FSO since 2011 to obtain quality-adjusted prices for clothing items. Because the decision to apply the bridged overlap method is based on a comparison of qualitative features, product characteristics must be noted at the time of basic price collection and each time there is a substitution. Price collectors no longer have to judge the comparability of products and instead can concentrate on selecting replacement items. Quality adjustments are then conducted directly at the FSO using strict criteria. By opting for centralised quality adjustments, the FSO ensures that replacement items are assessed using the same procedure in what are often complex fields.

To qualify as comparable, the item being replaced and the replacement item must have characteristics that vary in only a small proportion. For example, two items not of the same brand would be deemed non-comparable. When these characteristics are so different that quality cannot be considered comparable, the bridged overlap method is used. In practice, no price change is calculated directly between the old and new items. Simply, the price development affecting items of the same variety that have not been replaced is imputed to the item that has substituted another. Excluded from the imputed-price calculation, however, are missing items (for which pricing cannot be sampled immediately) and items whose prices have dropped temporarily through the effects of sales.