

UNDERSTANDING THE ARUBAN CPI

The Aruban Consumer Price Index (ACPI) measures the average change over time in prices of goods and services consumed by people for day-to-day living. It does this by following the prices of a fixed set of goods and services commonly purchased by Aruban households. This fixed set of goods and services (basket) is based on the Household Income and Expenditure Survey (HIES). The ACPI is the chief measure of average price change in the consumption sector of the Aruban economy. The Central Bureau of Statistics (CBS) produces the CPI and strives to do so in accordance with the best international practices. The ACPI is a complex construct that uses economic theory, sampling and other statistical techniques to produce a measure of the average change over time in prices of goods and services that all people in a country consume for day-to-day living.

COICOP AND THE ACPI FRAMEWORK

The universe of the Aruban CPI is all goods and services that Aruban households consume. Because this universe is so vast, the CBS stratifies it (breaks it into smaller parts called elementary aggregates). The stratification of ACPI universe has one dimension: an item dimension (all consumption goods and services), which covers the entire population and island. To stratify the item dimension into item strata, the CBS uses the Classification of Items According to Purpose (COICOP). COICOP is the international standard for classifying consumption goods and services and defining the scope of consumption (what is part of consumption and what is not). COICOP divides the consumption universe into 12 Divisions, 47 Groups, and 117 Item Classes. The CBS divides the set of all consumption goods and services into 12 Divisions, 43 Groups, 97 Item Classes, 169 Subclasses and in 408 Elementary aggregates. The Aruban CPI excludes COICOP item classes that are not relevant or important in Aruba and combines some COICOP item classes that have small weights. Both the expenditure weights and price collection cover the whole island, with no distinction made between urban and rural areas.

MAIN COMPONENTS OF THE CPI CALCULATION

A consumer price index is a weighted average of price changes (geometric average); the main inputs needed to compile a CPI are expenditure weights and price changes. The weights are based on households' total consumption, while the price changes are derived from prices of specific goods and services that are collected repeatedly over time.

FROM HIES TO THE CPI: GATHERING EXPENDITURE DATA

The expenditure data comes from the HIES, which was conducted during May 2016 and June 2016. The HIES canvassed households spread over the whole island. The HIES consisted of two surveys: the retrospective questionnaire and the daily expenditure questionnaire. The retrospective questionnaire asked the sampled households for data on household spending for consumption for the last year, while the daily expenditure survey covered expenditures made during a period of two weeks. The data needed for the CPI weights was derived from these two questionnaires.

STEPS IN THE ACPI PRICE COLLECTION

The CBS staff collects the prices for the CPI. To obtain prices, the CBS defined specific goods or services (products) to represent the 408 CPI items and chose which retail outlets to visit based on the size of the outlets. The CPI statistician selected the products (consumer goods or services) for each item stratum based on the results of the HIES. The CPI price collectors visit (or otherwise contact) the outlets periodically (monthly, bimonthly, quarterly, thrice, or semiannually) to collect the current prices of each selected product. Price collectors record the prices on either paper forms or tablets, which are submitted daily to the CBS office and entered into Excel spreadsheets. On average around 7,100 price quotations are collected each month for the ACPI.

MAINTAINING DATA INTEGRITY IN PRICE COLLECTION

It is important that the same product be priced each month from a given outlet; however, identical products do not need to be priced across different outlets. When a product in a particular outlet has not been priced for a period of six (6) months, the statistician instructs the price collector to identify a replacement product and report its price and its detailed specifications. Special procedures are applied for handling replacement products and products that cannot be collected in a given month.

NATURE OF PRODUCT COMPARABILITY IN THE ACPI

In compiling the CPI, prices are collected for a wide range of goods and services to reflect current household consumption patterns.

Maintaining comparability over time is a core principle of CPI compilation, including in cases where product replacement is required.

For certain product groups, however, strict one-to-one price comparisons over time are not always feasible due to the nature of the products and the way they are supplied to the market. At the same time, comparability remains a central consideration in CPI compilation. Even where identical items cannot be followed over time, efforts are consistently made to ensure that observed prices remain as comparable as possible.

PRODUCTS WITH FREQUENT CHANGES AND SHORT-LIFE CYCLES

Products such as clothing, footwear, computers, and other electronic goods are characterized by frequent model updates, changes in design, quality, brand, and technical specifications, as well as relatively short product life cycles. As a result, the exact same item priced in one period is often no longer available in subsequent periods. In these cases, product replacement is necessary to ensure continuity in price observation.

In line with CPI Manual recommendations on item replacement and comparability, CPI staff select replacement items that are as similar as possible to those previously observed, taking into account key characteristics such as quality, functionality, and intended use.

OTHER PRODUCT GROUPS AFFECTED

In addition to clothing and computers, limited item to item comparability also applies to several other product groups, including:

- Mobile phones and tablets, due to frequent model updates and changing specifications
- Household appliances, such as televisions, refrigerators, and washing machines, which are regularly replaced by new models
- Furniture, where changes in design, materials, and quality are common
- Footwear and accessories, which are subject to seasonality and rapid turnover
- Motor vehicles, due to model year changes, technological upgrades, and optional features
- Audio visual equipment, including cameras, headphones, and smart devices

These products typically have short life cycles or regularly changing characteristics. As recognized in international CPI methodology, this limits strict item-level comparability, while reinforcing the importance of careful replacement practices.

IMPLICATIONS OF PRODUCT REPLACEMENT

When product replacement occurs, the newly observed item may differ from the previous one in terms of characteristics or quality. In all cases, CPI staff carefully assess the comparability of replacement items by considering relevant attributes such as brand, specifications, quality, and functionality.

Consistent with CPI Manual guidance on quality adjustment and comparability, efforts are made to ensure that comparisons remain as consistent as possible over time. While practical constraints may limit the extent to which all quality differences can be fully adjusted, these differences are explicitly taken into account during the selection and validation process.

As a result, observed price movements for these product groups may, to some extent, reflect both pure price change and changes in product characteristics or quality. This reflects the inherent challenges identified in international standards, where rapid product change can limit full quality adjustment in practice, rather than an acceptance of uncontrolled differences.

Product replacement is therefore a necessary and actively managed process to preserve both the continuity and the representativeness of the CPI.

INTERPRETATION OF PRICE MOVEMENTS

Frequent product changes and the associated need for replacement are inherent features of certain product groups. The CPI is designed to measure changes in the overall price level faced by consumers, rather than to track identical products over extended periods.

In line with international methodological guidance, observed price movements are interpreted with careful consideration of underlying product changes, while maintaining a consistent approach to comparability across periods.

AGGREGATION AND SMOOTHING EFFECTS

For product groups with short life cycles or rapidly changing characteristics, item-level price movements should be interpreted within the broader context of aggregated indices.

At higher levels of aggregation, individual price fluctuations are smoothed, representativeness is maintained through expenditure weighting, and the influence of item-level differences is reduced across the index.

This aggregation process, as emphasized in the CPI Manual, complements item-level comparability practices and helps ensure that the CPI reflects underlying price trends rather than isolated product changes.

This approach is widely applied by statistical offices to maintain both the robustness and the relevance of the index in dynamic markets.

HOW THE ACPI INDEX IS COMPUTED

The CBS calculates the Aruban CPI in two steps: (1) Elementary indices for the 408 elementary aggregates based on the collected prices, and (2) Higher-level indices as weighted averages of these elementary indices. To calculate elementary indices, the ACPI applies a two-stage geometric average (GA) formula. The index in the current month (period t) equals the index in the previous month (period t-1) multiplied by the change in prices from the previous month to the current month. This change is measured as the ratio of average prices in the two months, more specifically, the ratio of the geometric mean of item prices in period t to the geometric mean of their prices in period t-1. Both averages must be based on the same set of items. For items priced less frequently than monthly, prices are carried forward, so the period t-1 price is the last collected price (for example, the period t-2 price if collected bimonthly).

$$x_{ELAgg}^t = x_{ELAgg}^{t-1} \times \left(\frac{\left(\prod_{j=1}^{n_{ELAgg}^t} p_{ELAgg;j}^t \right)^{\frac{1}{n_{ELAgg}^t}}}{\left(\prod_{j=1}^{n_{ELAgg}^{t-1}} p_{ELAgg;j}^{t-1} \right)^{\frac{1}{n_{ELAgg}^{t-1}}}} \right)$$

$$x_{ELAgg}^0 = 100$$

COMPUTATION OF HIGHER-LEVEL INDICES

To calculate higher-level indices, the ACPI applies a weighted arithmetic average of elementary indices. The weights are expenditures from the HIES and normalized to sum to 10,000.

$$X_{H,Young}^t = \sum_{ELAgg \in H} \left(x_{ELAgg}^t \times \frac{w_{ELAgg}^{WgtPeriod}}{10,000} \right)$$

$$w_{ELAgg}^{WgtPeriod} = \frac{Exp_{ELAgg}^{WgtPeriod}}{\sum_{ELAgg \in H} (Exp_{ELAgg}^{WgtPeriod})} \times 10,000$$

CBS MONTHLY CPI RELEASES

The CBS publishes monthly indices on its website, using June 2019 as the index reference period (June 2019=100).