INVENTORIES OF SOURCES AND METHODS FOR PRICE AND VOLUME MEASURES IN NATIONAL ACCOUNTS

Chapter 2 General information on main sources used

2.1 Introduction

This chapter provides a general description of the primary price indices used in the national accounts to convert current prices to corresponding constant prices.

2.2 Consumer Price Index - CPI

2.2.1 Design and implementation

The consumer price index is arrived at through monthly calculations of price changes in private domestic consumption. Price data are collected either by SCB interviewers who visit shops, or centrally by the SCB. Price material is collected on the 15th of the month or during the week in which the 15th falls. Prices of daily consumer goods (excluding the fresh products bread, fish, fruit and vegetables) are obtained from approximately 40 randomly selected points of sale. Different selections of representative goods are used in the shops, depending on which chain they belong to (ICA, KF or others). Samples in each case comprise approximately 400 precisely specified products which are selected randomly with sampling probabilities proportional to the sales values. In the case of fresh bread, fresh fish, fresh vegetables and fresh fruit, prices are obtained for a sample of approximately 50 deliberately selected representative goods. The prices are collected by interviewers who visit approximately 40 randomly selected shops.
Prices of other retail goods and some consumer services (restaurant services, hairdresser services etc.) are collected from a random sample of altogether approximately 750 points of sale. The representative products whose prices are measured in this way number approximately 200. Prices are collected by way of shop visits, except in the case of services and certain goods for which the normal routine is to make inquiries by telephone.
Price data for petrol are collected each month from approximately 120 randomly selected petrol stations. These are contacted by telephone during the particular measurement week.
The prices of approximately 80 representative goods are collected centrally, including in those cases where a good or a service is assumed to have uniform prices throughout the country. In this central collection exercise, prices are collected on the 15th of the month.

Each year sees an updating of the representative goods which are measured, and of their weighting figure. By way of this procedure, changes in the breakdown of consumption are successively taken into account.

2.2.2 Price basis

The basis is the price which the consumer actually pays for the good or service, excluding certain conditions, e.g. in the form of discounts or discount coupons.

2.2.3 Statistical measurements

The CPI is designed as a chain index with annual links. Each annual link has December of the previous year as its basis. The weighting figure represents the consumption breakdown in value terms for the current year in the long-term link but for the previous year in the short-term links. The long-term link is calculated for the month of December only, whereas short-term links are calculated for all the months of the year. The long-term links form the chain between the current short-term link and the base year (1980=100).

Accounting is in accordance with the COICOP (Classification of Individual Consumption by Purpose), which is an international classification of private household consumption.

2.2.4 Reference periods

The CPI base year is 1980. The annual average is formed by the non-weighted arithmetical average value of the monthly figures. The monthly figure refers to the 15th of each month or the week - measurement period - in which the 15th falls. The principal exception to this occurs in respect of rental apartments, the average figure for which relates to the entire month and is surveyed in January, April, July and October only. Interest costs likewise relate mainly to the monthly average.

2.2.5 Overall reliability

The main sources of errors in the CPI and HICP are coverage errors, sampling errors, errors relating to changes in the quality of the products whose prices are being measured, and weighing errors. The choice of calculation method for a partial survey also has an impact on the outcome. This applies in particular to the owner-occupied homes item.

2.2.6 Sampling

Sampling errors stem from the selection of points of sale, which is mainly made by means of probability sampling, and from the selection of goods. With the exception of the daily consumer goods area, goods are not selected by means of probability sampling. Calculations have shown that the sampling error for the total CPI is in the order of 0.4 index points for an annual link expressed as a 95% confidence interval.

2.2.7 Frame coverage

The most serious area of undercoverage is social welfare, which at present is not included in the CPI. This item accounts overall for approximately 2.2 % of private consumption[1]. Some groups of goods are not measured directly but are represented by other groups. The most important example is that of tenant-owner apartments (approximately 3.8 % of private consumption), which are represented by rental apartments.

2.2.8 Measurement

Price quotations are collected for a stratified sample of goods and services, so-called representative products. The prices are collected in part locally in shops by interviewers, and in part centrally by the SCB, e.g. by means of postal surveys or on the basis of price lists. Price development is calculated at the lowest level for approximately 340 product strata of goods and services. For approximately 250 goods strata, prices are collected by interviewers either by telephone or in visits to around 900 shops. Prices are collected centrally for approximately 80 product strata, including in cases where a good can be assumed to be sold at uniform prices throughout the entire country. Goods and services for which special methods have to be used are measured centrally. Changes in housing costs are measured by means of, amongst other things, rent surveys which are carried out once a quarter. In addition, price data are gathered centrally on heating and domestic electricity. The calculation of the CPI weighting figure is based on the national accounts' preliminary data relating to the 1st to 3rd quarters in conjunction with a forecast for the 4th quarter. According to an alternative calculation of the long-term index for the years 1986, 1987 and 1988, which the SCB carried out for the State Auditors (*Riksdagens revisorer*), the CPI would have been between 0.1 and 0.2 percentage points higher if the final national accounts had been used instead of the preliminary figures.

2.2.9 Non-response

In shop visits and telephone interviews, the non-response rate is virtually zero, compared with a good 5% in the quarterly rent surveys.

2.2.10 Comparability over time

The CPI is a chain index with annual links. As a rule, the method is changed at the end of the year, i.e. ahead of a new annual link. Normally, therefore, no break occurs in the time series. Major changes: for daily consumer good (excluding fresh products) price lists were used instead of shop-visit measurements from 1983 to 1992 inclusive. A new measurement method was introduced for wearing apparel starting from 1991, and a new method for evaluating quality differences was used as from 1994. From April 1990 onwards, a new method was brought in for weighting together the individual

[1] The social welfare index is included in the HCPI (Harmonised Index for Consumer Prices) and the data are used in the national accounts.

price quotations on which the index is based. Over the period January 1990 to March 1990, a method was used which differed from that used both in the previous and in the subsequent period. Starting from 1984, the calculations of the costs of owner-occupied homes were modified as regards interest and depreciation. Seasonal adjustments for fresh vegetables and fresh fruit were discontinued starting from 1992. Once established, the index number does not undergo revision.
Since April 1997, and including that month, a new method has been in use for calculating the costs of owner-occupied homes as regards interest. The change in method means that shifts within the year between the weight of loans with different fixed-interest periods do not affect the index. The change also means that account is taken of the cost of the compensation for interest rate differentials that is due on early repayment of housing loans.

2.2.11 Comparability between groups

The CPI measures average price development using the same method for all the sub-groups included in the CPI. Price development is thus fully comparable between groups.

2.2.12 Quality change

Several methods are used in the CPI to allow for quality change in different product categories. We first describe two main approaches which are used for local price collection for products other than clothing. These are divided into two categories - quality adjustment products and non-quality adjustment products.

Quality adjustment products in local price collection

Here, the price collectors perform the adjustments. The method is best described by quoting the instructions to the price collectors.

Excerpts from instructions to price collectors on quality adjustment

When should a quality adjustment be made?
A quality adjustment when replacing a product-offer shall be made for so called quality adjustment products, as given by (..list..).
A quality adjustment shall not be done when you replace a product in the reference period[2]. Also, if a price quote does not exist for the product earlier in the year or in the reference period, no quality adjustment can be made, since you do not then have information of any old variety.

Principles for quality adjustment
A quality difference is understood to be a difference in material or design. Differences due to fashion changes are not counted as quality differences. Factors in the products that you should consider are e.g. function, comfort, durability, security, guarantees and ease of handling.

Differences in quality are to be valued from the viewpoint of the consumer. Differences in e.g. production or distribution costs should not be considered. You should instead try to assess how the average consumer experiences differences in material and design. This is difficult and in practice it means that you will have to use your own assessment of the differences.
Please note that the quality of a variety can also change by changing the service provided to the consumer. Examples are rules concerning guarantees and home delivery.

Differences in material and design are often difficult to detect. Also, the old variety is rarely available for inspection. Ask for help from a shop assistant in detecting the differences. But remember that it is your own valuation and not that of the assistant that you are to report. The valuation of the assistant should only guide your own valuation. This is because it is difficult for the assistant, due to her role as a seller, to make a true personal valuation.

Two varieties differ in a number of characteristics. One way of making the valuation could therefore be characteristic by characteristic, in money terms, summing the valuation over the characteristics.

You should ignore the price differences between the varieties. If the price difference is large, it does not necessarily mean that the quality difference is large. There can also be a quality difference although the price is the same. Companies often compensate themselves for changes in cost in connection with the introduction of a new model. Therefore, a higher price does not necessarily mean that the new model is of higher quality than the old one.

Quality adjustments according to these principles are difficult to make. If you feel uncertain about your valuation, you should note your views and observations in the bottom part of the form. Remember too that you will gather a considerable knowledge of the products through your CPI work and that by and by you will be in a better position to make the adjustments from a consumer point of view.

When you specify a quality adjustment you state how much better or worse the new variety is, in money terms. When no quality difference exists between the new and the old variety, you simply state the adjustment as 0 (zero)."

[2] December.

The price collector's adjustment is added to the reference price, resulting in an adjusted reference price. This is according to the following recursive formula:

$$p_{0(m),i} = p_{0(m-1),i}\left[1 + \frac{K_{m,i}}{p^{reg}_{m-1,i}}\right] \qquad (16)$$

$K_{m,i}$ denotes the quality adjustment (positive or negative) for a replacement from month m-1 to m, as stated in SEK by the price collector. $p_{0(m),i}$ denotes the adjusted reference price in month m (note that the reference price may be adjusted several times in a year and that $p_{0(0),i}=p_{0i}$ is the actual, observed reference price). $p^{reg}_{m-1,i}$ denotes the *regular price* in month m-1. (This term is not rigorously defined but can, if it differs from the actual price, usually be interpreted as a "normal" price as opposed to a promotional price, or as a price existing prior to a sales price. If it is stated on the price label alongside the current price, the price collectors are instructed to note it as part of their price collection work.)

Non-quality adjustment products in local price collection

For products where quality adjustments are not made, but package size has been altered, only new package sizes where the quantity change is less than 50 per cent are accepted as replacements. A proportional adjustment is then made so that the price effectively becomes a price per quantity unit.

In other cases, where a product-offer can no longer be found, it is deleted and price change is computed over the rest of the product-offers in the product group.

Other product groups

Quality adjustment methods for other product groups are described in the Handbook on methods for CPI[3]. Here we shall only give a short summary.

Clothing. A hedonic method is used for garments.
By the procedures used for quality adjustment of clothing in the CPI, similar semi-logarithmic hedonic regression models are applied for each of 24 product groups of clothing. The explanatory variables in these regressions essentially reflect outlet type, brand and country of origin, and physical characteristics that are largely unrelated to fashion. The hedonic coefficients for clothing are updated annually.

New cars. An expert panel takes the decisions on the positive or negative value of changes in specification for new car models.

[3] The Swedish Consumer Price Index. A Handbook on methods. ISBN 91-618-1097-5, Örebro 2001. This publication is also available on www.scb.se.

Used cars. A regression model, developed by a private company, is used for holding mileage constant when comparing prices.

PCs. Monthly chained indexes consisting of models that are found in both months are multiplied. The method could be labelled as a matched model index, using a monthly overlap method. Or a *monthly chained overlap method*, for short.

2.2.13 Overlap method when chaining in December.

In many product groups samples are renewed in December at the start-up of a new index link. This means that in December prices are collected for both the old and the new sample. An *overlap* method is then applied for effectively evaluating the quality differences between the two samples.

In many products groups this annual overlap is in practice the most influential method for dealing with product and outlet dynamics. For unbiasedness, it rests on the assumption that the quality differences between the old and the new samples are on average equal to the price differences between the two samples.

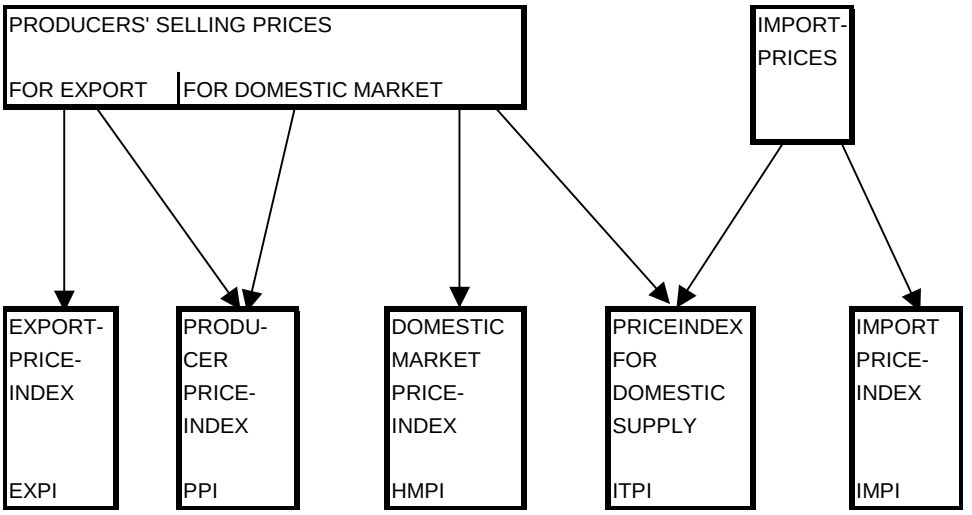
2.3 Producer and import price index – PPI, EXPI and IMPI

Approximately 4 000 prices are collected monthly from around 1 300 companies.
The data collected are broken down into domestic producer prices, export and import prices, and monthly price indices are calculated for each of these main groups. With some exceptions, the survey's product coverage spans agriculture and forestry, fisheries, mining and quarrying, and manufacturing, as well as electricity, gas, heat and water supply (CPA categories A-E).

The domestic producer price index gauges the development of prices for products that are manufactured and sold in Sweden. The export price index measures the producer price changes for goods sold for export, while the import price index is the price index for imported goods. The producer price index, PPI, combines the domestic and export sales producer price indices. The price indices that are calculated monthly are linked annually to the December index of the previous year.

Data are collected roughly between the 1st and the 20th of the month after the statistical month concerned and are published around the 25th.
Approximately one-half of the data are collected via telephone (TDE) and most of the rest by means of shuttle forms.
The price data relate to domestic producers' selling prices and importers' purchase prices. Respondents are also required to state whether there have been any changes to the specifications of the respective goods. If this is the case, after consulting the respondent the December *base* price is adjusted, where appropriate, so that quality changes are factored out of the price comparison.

Figure 2.1 Interrelationships between the various price indices



2.3.1 Objective and background

The price index at the producer and import stage is intended to reflect the average price development, both overall and for various product groups. Prices are measured, respectively, at the first distribution stage, where the goods are supplied by the Swedish producer, and at the first purchasing stage, where the goods enter Sweden. Price index series with a rough product group breakdown have been calculated since 1860. From 1920 onwards a wholesale price index has been reported monthly, with more of a fixed structure and a more detailed product group breakdown than was previously the case. This set of statistics took on its modern form in 1963, when a more systematic, international classification of branches of economic activity was introduced.

2.3.2 Observed variables

The variables for which the survey collects price data are goods transactions relating to Swedish producers' sales of own-manufactured products and goods imported into Sweden.

2.3.3 Statistical targets

The producer and import price indices are designed to measure on a monthly basis, also within different product groups, the average price development, in SEK, of Swedish-produced goods, both in overall terms and broken down into domestic market and exports, and imported goods. This set of statistics measures price development at the first marketing stage, i.e. domestic producers' selling prices and importers' purchase prices, respectively. For Swedish-manufactured goods, the price should be *ex-works* for the domestic market and *free on board* (f.o.b) for export sales. On the import side, prices should be *c.i.f. (cost, insurance, freight)*. VAT and other taxes on goods are not taken into account. However, there are two exceptions: the price index for domestic supply (see below), which is designed to measure price development including customs duties and other import taxes (at present, however, changes in customs duties and other import taxes are not taken into account), as well as specific index series for petroleum products which include energy and environmental taxes.

Any change of the prices charged/paid that stems from a change in quality or other price-determining characteristics should be adjusted for. In principle, only pure price changes that are reflected in the pricing of comparable transactions should have an impact on the price index.

The price concerned is that which the purchaser actually pays after deduction of any discounts.

Under Council Regulation (EC) No 1165/98 concerning short-term statistics, the index has to measure the development of prices, including taxes on goods (apart from VAT) for orders received during the month, primarily on a certain day in the month. The Swedish index, however, continues mainly to

reflect the development of the average price for the month's invoices, excluding taxes on goods.

2.3.4 Object and population

The price index at the producer and import stage is concerned with transactions. The population comprises, respectively, all transactions relating to sales at the producer stage, and purchases at the import stage, of products belonging to the following product groups under Prod-SN197 (CPA).

Division	Designation
A	agricultural and forestry products
B	fish
C	products from mining and quarrying
D	industrial products
E	

Prod-SNI[4] 97 is a classification of products based on activities from the Swedish Standard Industrial Classification, SNI 1992, and uses the same product designations as SNI 92 uses for corresponding activities.

A further object, used for sampling and data collection, is enterprises.

2.3.5 Variables

The main variable is the price, as described above. The price, however, can be reported in any currency. Prices reported in foreign currency are then converted into SEK. The invoice currency and the reporting currency are, therefore, complementary variables.

Where prices are reported in foreign currencies, the Customs and Excise Department's exchange rates are used for converting into SEK. These are based on the exchange rate on the third Wednesday of the month preceding the PPI measurement month, with some adjustment being made for exchange rates that deviate by more than 5% within the measurement month. This method is used instead of, for example, the Swedish Central Bank's average exchange rates in order to promote the usability of the index as a deflator for estimating export and import values at constant prices in foreign trade statistics. Overall, approximately 15% of all export price data and approximately 25% of all import price data are provided in foreign currency, whereas other prices are in SEK.

2.3.6 Statistical measurements

The price index at the producer and import stage can be described as a Laspeyres-type chain index with annual links. A Laspeyres index is defined as

[4] Standard för svensk näringsgrensindelning, equivalent to NACE Rev.1 on 4-digit level

$$I_0^t = \frac{\sum_k P_{t;k} Q_{0;k}}{\sum_k P_{0;k} Q_{0;k}} = \sum_k \frac{P_{0;k} Q_{0;k}}{\sum_k P_{0;k} Q_{0;k}} \times \frac{P_{t;k}}{P_{0;k}},$$

where P_0 and P_t are the price per unit in the base period (0) and the comparison period (t), respectively, and Q_0 is the quantity in the base period. Summation is across products (indicated by k). In the centre element above, the index is expressed as the ratio between the summated value of the base-period quantities at the comparison-period and base-period price level, respectively. The index can also be expressed, as in the final element, as an average of the goods' price relatives weighted with the base-period values.

The index links in the price index at the producer and import stage are calculated with the current month m in year y as the comparison period, and with December y-1 as price reference period. The weighting period is the year y-2. A link is thus defined as:

$$I_{y-1,dec}^{y,m} = \sum_s \frac{V_s^*}{\sum_s V_s^*} \times \frac{p_{y,m;s}}{p_{y-1,dec;s}},$$

where the value weight V_s^* is the value of the transactions in year y-2 that are represented by the specification s, adjusted by the estimated price development from December y-2 to December y-1,

$$V_s^* = V_{y-2;s} \times \frac{p_{y-1,dec;s}}{p_{y-2,dec;s}},$$

and where p_s is the price at the respective period for the selected specification. See section 2.1 "Sampling procedure" for a description of how the value amounts $V_{y\text{-}2;s}$ are calculated. In exceptional cases, these amounts may provide a more up-to-date basis for the value weights than y-2.

2.3.7 Reference periods

The chained index number is primarily calculated for months and indicates the particular month's price level compared with the average price level in 1990 (1990=100). For the purpose of supplying data to Eurostat, the index is also calculated with the base year 2000=100). As set out above, the index number mainly reflects the development of an average price for the month. The annual average index is the unweighted arithmetical mean of the monthly indices.

2.3.8 Quality evaluation

Changes of the prices charged/paid that are the result of changed specifications regarding quality or other price-determining factors should not influence the price index. Only pure price changes that are reflected in the pricing of comparable transactions should have an impact on the price comparison.
In the price index at the producer and import stages, distinctions are made between the following types of specification changes.

A – new product specifications: an explicit evaluation is made in which the new product is given a higher value than the immediate predecessor;
C – new product specifications: an explicit evaluation is made in which the new product is given a lower value than the immediate predecessor;
E – new product specifications: an explicit evaluation is made in which the new product is given the same value as the immediate predecessor;
G – new product specifications which result merely in a change in volume or variety, e.g. a minor change in the size of the packaging;
I – new product specifications: overlap method applied by obtaining the real basic price for the new product (for December of the previous year);
K – new product specifications: overlap method applied by obtaining the new product's price for the previous month;
M – product no longer sold for rest of year, index imputed from other aggregate;
O – new product specifications: valuation impossible, index assumed to be unchanged from previous month;
R – new product specifications: valuation impossible, index assumed to be unchanged from two months earlier or more;
T – changed definition of price, or price calculated on a different basis from previously;
Z –other.

2.3.9 Calculation of an adjusted reference price

(price as at December of previous year)
In cases **A** and **C**, a new basic price is calculated from the quality evaluation made in the particular instance. The question arises here as to what impact the change in specifications has had on the price. The effect on price can be gauged either in terms of the changed specifications' impact on the cost of supplying the product or in terms of how the customer is expected to appraise the change.

A new reference price (for month *m*) is calculated as

$$\hat{P}_0^N = P_0^G * \frac{\hat{P}_{m-1}^N}{P_{m-1}^G} = P_0^G * \frac{P_{m-1}^G + F^N}{P_{m-1}^G}, \quad (1)$$

where *P* represents prices, *F* the value of the change, *G* and *N* the old and new product, respectively, and *0*, *m-1* and *m* a particular month. *0* is thus the reference month. $\hat{P}_{m-1}^N$ can be understood as an estimated or imputed price for the new product in the previous month.

Let us assume, by way of example, that the price for a product in the original specifications was SEK 38 in the reference month (December), that the price rose to SEK 40 in March and that the price for the product according to the new specifications is SEK 45 in April. Meeting the new specifications involves a greater use of resources, so that the cost of supplying the product rises. The price of SEK 45 is thus not comparable with the reference-month price of SEK 38. Let us further assume that the change in specifications has led to a price increase of SEK 3 per unit. A new reference price that is comparable with the price for the new specifications can thus be calculated as

$38 \times \frac{40+3}{40} = 40{,}85$, *and the April index (Dec =100) for this quotation can thus be calculated as* $100 \times \frac{45}{40{,}85}$.

In case **G** a proportional conversion of the reference price is carried out.

Case **I** is straightforward, as the new reference price is genuine and it can simply be substituted for the old one. It may be debatable, however, whether the previously recorded price development up to and including the previous month should be superseded in this way.

The overlap case **K** requires more careful treatment. Here, the index has to be calculated as

$$I_{0,m} = \frac{P_{m-1}^G}{P_0^G} * \frac{P_m^N}{P_{m-1}^N}, \quad (2)$$

with the new, imputed reference price being correspondingly calculated as

$$\hat{P}_0^N = P_0^G * \frac{P_{m-1}^N}{P_{m-1}^G}, \quad (3)$$

where *P* represents prices, *G* and *N* are the old and new products, respectively, and *0*, *m-1* and *m* each represent a particular month. *0* is thus the reference month.

Let us say that, in the above example, the product meeting the new specifications was being sold as early as March at a price of SEK 44. A new basic price that is

comparable with the price for the new specifications can then be calculated as

$$38 \times \frac{44}{40} = 41{,}8$$

The observed price change in case **M**, before the product disappeared, should not be eliminated. Rather, the index should in principle be calculated as

$$I_{0,m} = \frac{P_{m-1}^{G}}{P_{0}^{G}} * I_{m-1,m}^{AGG}, \tag{4}$$

i.e. imputation should be applied only for the time after the product's disappearance. Where only the results up to and including the month before the current month can be used for imputation, the last factor in the expression becomes the first imputation month equal to one ($I_{m-1,m-1}^{AGG}$).

The most practical procedure is now to introduce a new "reference price" (reference index), which is the ratio between the aggregate's and the product's index number for month *m*-1 as set out below:

$$\hat{I}_{0}^{N} = \frac{I_{0,m-1}^{AGG}}{I_{0,m-1}} \times 100, \text{ where } I_{0,m-1} = \frac{P_{m-1}^{G}}{P_{0}^{G}} \tag{5}$$

Thereafter, one simply inserts the index number for each new month (December = 100) for the series which represents the outgoing product. This works because

$$I_{0,m} = \frac{P_{m-1}^{G}}{P_{0}^{G}} \times I_{m-1,t}^{AGG} = I_{0,m-1} \times \frac{I_{0,m}^{AGG}}{I_{0,m-1}^{AGG}} = \frac{I_{0,m}^{AGG}}{\hat{I}_{0}^{N}}, \tag{6}$$

Cases **O** and **R** are similar to case **I** as far as the calculation of the new basic price is concerned. We can summarise the index calculation as follows;

$$I_{0,m} = \frac{P_{s}^{G}}{P_{0}^{G}} \times \frac{P_{m}^{N}}{P_{f}^{N}}, \tag{7}$$

where *s* designates the last month with the old specification, and *f* represents the first month with the new one. The new, imputed reference price is correspondingly calculated as

$$\hat{P}_{0}^{N} = P_{0}^{G} \times \frac{P_{f}^{N}}{P_{s}^{G}}, \tag{8}$$

We note that, in month *f*=*m*, which is the new product's first observation month, the index according to (7) is unchanged vis-à-vis month *m*-1.

2.3.10 Quality evaluation of personal computers (PCs)

In order to adjust for specification changes to personal computers (import price index), a so-called hedonic regression model is used (see J.Dalén 1989). The model provides estimates of parameters for the three variables RAM, clock frequency and hard-disk capacity, which are used to calculate the new basic price.

$$\hat{I} = \frac{\sum_{i=1}^{n} w_i p_{t,i}}{\sum_{i=1}^{n} w_i p_{t,i}^{Bas}} \times 100$$

$$p_{t,i}^{Bas} = \frac{p_{t-1,i}^{Bas}}{\hat{Z}_{t,i}}$$

$$\hat{Z}_{t,i} = \frac{100}{e^{\hat{Y}_{t,i}}}$$

$$\hat{Y}_{t,i} = \hat{\beta}_{HD} \times \log\left(\frac{X_{t,i}^{HD}+1}{X_{t-1,i}^{HD}+1}\right) + \hat{\beta}_{F} \times \log\left(\frac{X_{t,i}^{F}}{X_{t-1,i}^{F}}\right) + \hat{\beta}_{MD} \times \log\left(\frac{X_{t,i}^{M}}{X_{t-1,i}^{M}}\right)$$

X^{HD} = Hard disk capacity

X^{F} = Clock frequency

X^{M} = RAM

t = timeperiod

i = item

The parameters $\hat{\beta}$ are estimated using the *lowest square method* in the usual way.

2.3.11 Moving averages

For some products with marked monthly price fluctuations, where the variations are assumed to stem from changes in the composition of transactions from one month to the next, the average value for the last three price observations is calculated and then used to calculate the index.

$$\overline{p_t} = \frac{\sum_{t-2}^{t} p_i}{3}$$

2.3.12 Imputations

The PPI system uses imputations for four different types of non-response:
- *Compensation for non-response*: The price does not come in by the deadline and is estimated using the last price to come in, which is normally the previous month's price. This is flagged, and the number of imputations, normally 1-3% of the sample, is documented each month.

- *No transactions*: The price is estimated using the last-observed price, no flagging.
- *Products no longer sold*: In cases where the company has ceased trading or no longer imports/manufactures products under the particular tariff heading, the price development is imputed using the price development of closely related products, with a one-month time-lag. This is flagged and is documented at year's end. Normally, 2-4% of the sample is imputed using this method at the end of the year.
- *Larger product groups not in the sample*: Where measurements are completely missing for product groups under Prod-SNI 97, 5-digit level, with values over SEK 250 million, or for a CN heading with values over SEK 350 million, these are generally included in the sample with their weights, not grossed up to the price reference month level. The price development for these is assumed to be in line with that of another, closely related product group within which price measurements are carried out, or alternatively with that of the same product group on another market (homes sales, export, import). The absence of measurements may stem, for example, from the fact that the group of goods concerned is characterised by unique or "tailor-made" products. This means that it is impossible to measure prices for transactions which are comparable over time Another possible reason why the measurements may be missing is that the basis for the weighting figure or the sampling frame is clearly out of date in relation to the new statistical year.

2.4 Service Price Index - SPI

2.4.1 Premises Rentals Index

Data on premises rentals have been collected since 1996. Data collection takes place at the beginning of each year (t). Rental incomes for December in year (t-1), total rental incomes for year (t-1) and rental incomes for January in year (t) are included. Data are also collected on total useful area in m^2 and on useful area not rented out. The premises surveyed span a wide range of uses: offices, shops, industrial premises, garages, hotels, restaurants, craft work shops, studios, etc.
The survey covers a sample of 2 000 premises drawn from the real-estate tax-assessment register. The types of premises surveyed are those referred to in the real-estate tax-assessment register as rental block units and industrial units. Among the rental block units, those of a predominantly residential nature were taken out, while among the industrial units those owned by real-estate rental companies and those owned by companies other than industrial companies are included in the survey. In the case of other industrial units, the premises are normally owned by the producing company, so that there is no rental income.
A new premises category - Other type of premises - was introduced in the 1997 survey, recording the renting out of premises to restaurants, hotels, studios, etc.
The premises rental index is computed as a so-called Fisher index. This is calculated as:

$$\sqrt{Paascheindex * Laspeyreindex}$$

In the national accounts, however, the Paasche price index is used.

2.4.2 Hotel index

The service price index for hotels is a producer price index relating to the output of hotel services. Service prices for hotel services have been collected since 1995.

From January 2002 onwards, the survey has covered three types of services:
Average invoiced room price, excl. VAT, weekdays
Average invoiced room price, excl. VAT, weekends
One-day stay (weekdays) for a conference guest, single room, half-board, excl. VAT

2.4.3 Computer services

The following partial index has been produced since the 4th quarter of 2001:
Computer system and software consultancy (7220)
Consultancy services relating to computer systems and software produced on own account (7220EG)

Maintenance and repair of computers and other computer-linked machinery (72500)
From 2002q4 also the following index is calculated:
Other computer services (72A)

The collection of price data on computer consultancy and the maintenance and repair of computers and other computer-linked machinery, as well as on other data-processing services began in 2002. The work is carried out in consultation with the branch organisation IT-Företagen and with companies in the industry.

2.4.4 Car hire

The service is defined as providing the use of a car without ownership, a prerequisite being that the vehicle is in a good condition. Quality in this regard is quite homogenous, as hire cars are at most three years old. For the customers, quality in this case is about assured access to a hire car, as sometimes a hire car is required at short or very short notice. The sampling frame was taken from the Swedish car hire industry association, *Biluthyrningsbranschens Riksförbund* BURF. Coverage of the short-term-hire branch is around 65%.
The following data are collected for the "corporate", "public authorities" and "households" customer categories: number of transactions, number of hire days, and income. The car groups concerned are B and C. The point of observing a car group rather than a particular model is to minimise the problem of possibly having to make an adjustment for quality when a model is changed. Car groups are regarded as being a long-term proposition in keeping with the definition of the service concerned and with customers' quality perception.

2.4.5 Air transport services

Service prices for domestic passenger flights have been collected since December 1995. Airlines supply monthly price data on tickets for business and private flights. For business trips, account is also taken of season tickets, books of tickets, corporate tickets and the like. The index for business travellers is calculated exclusive of VAT. An index for freight transports is currently under development.

2.4.6 Telecommunications services

The service price index for telecommunications services has been calculated since 2000. This index is used in the national accounts to calculate at constant prices the output value of telecommunications activities. As one of the service providers holds a dominant market position (with a share of over 50 %), confidentiality rules apply and the service price index for telecommunications services cannot be published.
The service price index breaks down into two user areas: telecommunications services for private individuals and telecommunications services for legal

persons. In both areas, prices are collected for fixed-telephony, mobile-telephony and Internet-access services. Price measurements are carried out for numerous services, different variants of subscription fees and traffic charges within each market segment, and from numerous service providers selected from among the major players in each market segment.
The service price index for telecommunications services is subject to ongoing modifications designed to reflect changes which occur in the market as new services and providers come into play and market shares shift accordingly.

2.4.7 Architectural services

The service price index for architectural services was launched in the third quarter of 2002. The work is carried out in consultation with the industrial organisation Svensk Teknik och Design (STD) and with companies in this sector.

2.4.8 Technical consultancy services

The service price index for technical consultancy services is currently being developed. The work is being carried out in consultation with the branch organisation Svensk Teknik och Design (STD) and with companies in the sector. The collection of prices started in the fourth quarter of 2002.

2.4.9 Economic consultancy services

The service price index for economic consultancy services is currently being developed. The index is designed to measure price changes at auditing and accounting firms. The work is being carried out in consultation with enterprises in this sector and discussions have been held with the accounting branch organisation FAR, the accountants' association Revisorsamfundet SRS and the accounting consultants' association Sveriges Redovisningskonsulters Förbund - SRF. The collection of prices started in the first quarter of 2003.

2.4.10 Legal consultancy services

The index is designed to measure the development of prices for business services in the field of company law. The work is being carried out in consultation with large companies in the sector. The lawyers' association Sveriges Advokatsamfund has been informed about this work. The collection of prices started in the first quarter of 2003.

2.4.11 Other development projects

Development work is currently underway on price indices for the transport of goods by road, sea and air, and for banking, advertising services, postal services and other transport mediation. The work is being carried out in consultation with the respective branch organisations and with large

companies within the particular sectors. Price data will be collected on a quarterly basis.

2.5 Unit value index

The unit value index is calculated on the basis of data on values and quantities at detailed goods level within goods production statistics. The value is divided by the quantity and a price can be calculated, expressed for example in SEK per kg. By comparing the prices for the same product for two consecutive years, the price development can be calculated. The unit value index is used primarily for goods which do not undergo a particularly high degree of processing in various operations. Otherwise, it is difficult to tell whether the measured price difference merely stems from price changes and not from some change in composition or processing operation. In those cases where the unit value index is used, plausibility checks are carried out against the PPI of the measured price changes. The largest and the smallest values are followed up separately. If the unit value deviates from the interval created around the nearest PPI value, the unit value is rejected and the PPI used instead.

2.6 Specific price indices within agriculture

The **means-of-production price index (*Produktionsmedelprisindex* - PM index)** is designed to measure the development of prices for means of production used in agriculture. This index series is comparable with the Input Price Index calculated by the EU.

The output price index (*Avräkningsprisindex* - A index) measures the development of producer prices for agricultural products. Compensatory payments which boost producers' income, such as cultivation incentives or livestock aid, are not included. This index series is comparable with the Output Price Index calculated by the EU.

The base year is 1995. The index number is submitted to Eurostat every month. The price must relate to the same product over time and not include quality changes. If the quality changes, various methods are applied in order to adjust the price obtained in connection with the index calculation, depending on what information is available.

Price data are collected monthly by the Board of Agriculture from a large number of data providers. The index number is calculated per month and year. Both the total index and the product index are calculated as a chained Laspeyres price index. The sample of respondents and the product sample are selected subjectively according to the criterion that a large part of the respective market is to be covered by relatively few price data. On account of the methods used, it is not possible to state the margins of statistical uncertainty. The principal sources of error are sampling, coverage and measurement errors.

2.7 Wages index for private activity

The wages index reflects the development of prices for labour, which is a central input factor in production. It is therefore not an output price index but an input price index. The wages index, which is used for deflating purposes in the output calculation, is calculated for the branches listed below. In the deflating process, it is thus assumed that the prices for the products produced by a company vary with employees' wages. Deflating with the wages index is classified as a C method.

SNI 65.1-2 Financial intermediation except insurance and FISIM
SNI 66 Insurance and pension funding except non-life insurance
SNI 67 Activities auxiliary to financial intermediation
SNI 71 Renting of machinery/equipment
SNI 73 Research and development
SNI 741 Legal and economic services
SNI 742+3 Architects, technical consultants
SNI 744 Advertising
SNI 745-8 Recruiting, security, cleaning activities
SNI 80 Education
SNI 851 Human health activities
SNI 852 Veterinary services
SNI 853 Social work activities
SNI 90 excl 90001 Refuse disposal, sanitation and similar activities
SNI 91 Activities of membership organisations n.e.c.
SNI 92 Recreational, cultural and sporting activities
SNI 93 Other service activities

The underlying material used for the calculations consists of short-term wage and salary statistics. The survey provides information about the level of wages and salaries mainly in the private sector, and changes over time. The results are presented as average hourly wages for manual workers and average monthly salaries for non-manual workers.
Changes are calculated based on the difference between wages and salaries the previous year and wages and salaries for the present year. The changes of wages and salaries respectively are weighted with the number of manual workers and non-manual workers for each branch.
The frame of the survey is all workers between 18-64 years of age within companies, organizations and foundations in the private sector plus limited companies in the public sector. The sample is drawn as a stratified population based on a simple random sample (SRS) from the Business Register. The objects are stratified by branch and size, measured as number of employees. Possible sources of errors are for coverage, sampling, measurement and non-response. Non-response are corrected by imputation. Information on wages and salaries and employees is collected per local unit or enterprise.

2.8 Building price index

The building price index, which is an **output index**, measures price developments for a given category of buildings under construction. It is the price for the finished product which is accounted for and consequently it includes profit and productivity. It is used amongst others:

- To follow and analyse the cost development and for valuation of different reforms within the building sector;

- To calculate housing investments in the national accounts;

- In the consumer price index in order to calculate the depreciation costs for owner-occupied one- or two-dwelling buildings;

- In the calculation of national wealth in the national accounts;

- In order to calculate capital wear and tear in the national accounts;

- In productivity analysis.

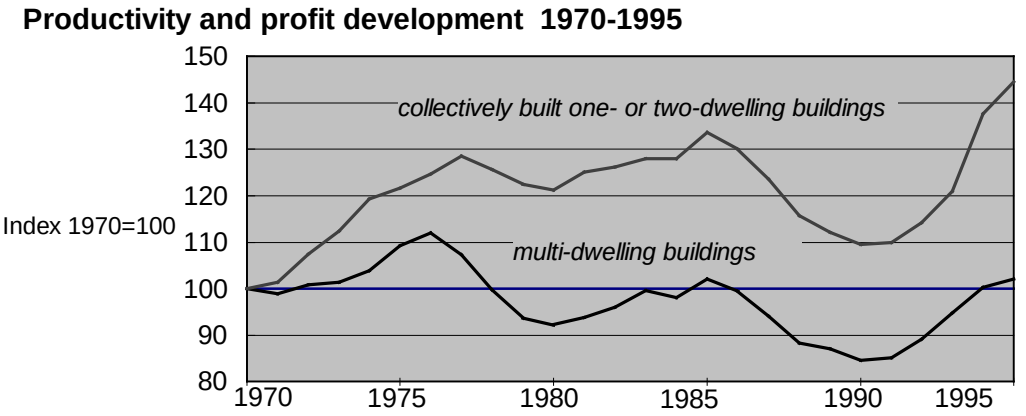
In the calculation of housing investments in the national accounts, the building price index for multi-dwelling buildings and collectively built one- or two-dwelling buildings is used as a deflator. Without the building price index, the national accounts would have to depend on the factor price index and make assumptions about the development of profit and productivity. Since the difference between the development of the building price index and the factor price index varies from year to year, such assumptions become uncertain.

Factor price index, which is an **input index**, measures the cost-development for construction activities, provided that the building technique is unchanged. The factor price index measures the prices on production factors such as; the work-force, material, machine utility amongst others, that are used during the construction of a building.

Comparisons between the building price index and the factor price index are important for the price analytical work within the housing construction area. By deflating the factor price index with the building price index, an index is obtained, that shows the collective effect of the development of productivity and profit within the concerned building and construction sector.

The diagram below shows the collective development of productivity and profit for multi-dwelling buildings and collectively built one- or two-dwelling buildings for the period 1970 - 1995. An increase in productivity will increase the index, the same applies with a profit decrease. A productivity decrease or profit increase, influences the index towards a lower level. An increase in both profit and productivity seems to equalise the index, because

these two factors influence the index in different directions. It is both these collective effects that the index measures.



According to the government instructions to Statistics Sweden, there is an established Construction Index Board with representatives for important users. This board meets every 6 months. When the government aid for housing construction was changed in 1993, the Construction Index Board made an investigation of the need of construction indices. It was observed that the need of building price index for economical analysis would be great in the very near future. The need was judged as having strengthened because of questions ahead on world changes, such as the revision of the government aid for housing financing, the European Economic Space (EES) agreement and the new Competition Act.

The Calculation Model

The calculation of the building price index is done from the year 1968. The principles for the calculations were put into operation by an investigation in the beginning of the 1970s. The investigation is very extensive, and is accounted for in the States Official Investigations (SOU) Construction Index for Housing SOU 1971:79.

The building price index measures price changes of residential buildings eliminated from quality changes and regional differences. The difficulty in constructing such an index, is that the quality of a building changes over time. For this reason, quality elements had to be eliminated from the calculations, so that the index would measure buildings of identical quality. We do these quality eliminations with the calculation model for the building price index, which is used by Statistics Sweden.

The calculation of the building price index is based upon the so-called `Hedonic´ technique. This technique arises from the thought that different

characteristics of a housing project represents the value of the project and that there are prices on the
characteristics.

For the calculation of the building price index, information is demanded of both, the total price and the quality characteristics of the housing project. Furthermore, a valuation is needed of the quality characteristics.

The building price is regarded as a function of various quality features relevant to the index calculations. The effect of the different quality features on the price of a building one year, compared with another year is determined by regression analysis. The regression analysis which is based on the material of the preceding year, is carried out with the building price per m^2 total primary utility floor space, as the dependent variable.

The building price is composed of the costs for construction work, connecting fees for energy, district heating and natural gas, development costs and costs for drainage and water supply on the block of land. The price includes investor's costs, like the costs for administration, projecting costs, interest costs and value-added-tax. Deduction is made for eventual benefits.

The total primary utility floor space is composed of the useful floor space of dwellings, the useful floor space of non-residential premises and the communication space, such as the corridors, stair wells and the like.

The technique behind the calculations of the building price index can simply be described if one supposes that the variations in the building prices at a given point of time can be explained in terms of a single quality variable. Let us assume therefore, that the building price per dwelling (Y) depends on the size of the total primary utility floor space (X). This is assumed to be a linear function corresponding to the following equation:

$$Y = a + bX$$

where `a´ represents a fixed amount (price), which applies to the building price irrespective of the value of variable X. The coefficient b shows how much the price changes if variable X increases by one unit and can therefore be interpreted as the price per unit for variable X. The regression line estimated in this way can be regarded as representing the average relationship between building prices and quality feature X over a certain period.

Assume that at time 0 (base time) it was possible to determine the relationship between the variables price per dwelling and total primary utility floor space, thus obtaining the following equation (regression line):

Y = 150 000 (fixed amount) + 7 500 * X

The amounts 150 000 and 7 500 (values of a and b) have been derived by calculating the above regression line. Assume that at time 0 there was an average primary utility floor space of 80 m^2 per dwelling and an average building price of 750 000 SEK, which can be calculated from the above equation by giving variable X the value of 80.

At time t, the price has increased to 950 000 SEK and the primary utility floor space to 90 m^2. The quality increase (K) can be calculated with the aid of the regression equation obtained at time 0 by applying the values 80 and 90 for the primary utility floor space in the following equation:

$$K = \frac{150\,000 + 7\,500 * 90}{150\,000 + 7\,500 * 80} * 100 = \frac{825\,000}{750\,000} * 100 = 110$$

The value has increased from 750 000 to 950 000. This corresponds to an increase (V) of 27 percent (%).

$$V = \frac{950\,000}{750\,000} * 100 = 127$$

The price increase (P) can now be calculated by dividing the value increase (V) by the quality increase (K):

$$P = \frac{127}{110} * 100 = 115$$

The price increase can also be calculated directly by inserting the value of the quality variable at time t into the regression equation for time 0 and calculating the following quotients:

$$P = \frac{a_t + b_t x_t}{a_0 + b_0 x_t} * 100 = \frac{Y_t}{a_0 + b_0 x_t} * 100 = \frac{950\,000}{150\,000 + 7\,500 * 90} * 100 =$$

$$= \frac{950\,000}{825\,000} * 100 = 115$$

In this case, only the parameters (values of a and b) have been calculated for the observation material at time 0. This gives a Paasche-type price index, since the comparison is carried out on the basis of an average building at the time of comparison (t).

The building price index is always calculated as a Paasche-type index, because when the quarterly indices are being calculated estimates of the values a and b are not available as the volume of data on which the calculations are based is too small. For example, when calculating the index link 1994 -1995, the values a and b were estimated on the basis of the 1994

data, whereas only the value X had to be calculated on the basis of the 1995 material - either the quarterly or annual values.

The building price index is also calculated as a chain index, which means that the relationship between prices and quality is re-examined each year. The 1993 - 1994 index link is therefore calculated on the basis of estimates of the values of a and b for 1993 buildings and the 1994 -1995 link is calculated similarly on the basis of 1994 buildings.

The variables included in the regression analysis can be divided into quality variables and shift variables. The former group includes variables describing areas, standard of equipment and joist**,** roof and external wall structures. The latter group includes variables which describe e.g. the geographical location, type of building, type of investor etc.

Residential buildings and their characteristics are valuated with regard to the value they have for those who shall use and manage the building, which we here have called an investor oriented valuation. The so-called multiple regression can cover several quality variables simultaneously.

The current calculation method presupposes that there is a linear relationship between the average building price for a number of buildings and a number of quality variables or other determining variables. The regression coefficient in such an equation represents the anticipated change in the building price as a result of a change of one unit in one quality variable where all other variables remain constant. Thus it can also be interpreted as a unit price for the quality variable in question.

The quality variables are measured in quantitative terms, e.g. m^2, continuous metres etc. In the regression analysis, the quality variables, like the building price have been divided by m^2 primary utility floor space. The remaining variables are so-called classification variables, also known as dummy variables. They assume either the value 0 or 1 according to whether they are part of the class or not.

The regression coefficients for classification variables do not give any price per unit - as the quantitative variables do - but rather represent price differences in relation to the zero variable in the group.

Shifts in building activity from one year to another, e.g. from a regional area with lower prices to one with higher prices, will not be reflected in the index. If this were done, a shift in housing construction from low cost to high cost areas would be reflected in the index as a price rise, without there having been a corresponding increase in prices either in the low price or in the high price range. The same applies to shifts between redevelopment and development areas.

If the consumers are not supposed to regard the shifts as qualitative changes the effects of the shifts should be reflected in the building price index. Seen from the investor's point of view, it is obviously not a question of quality differences between different buildings.

The variables included in the calculation of the building price index are divided into three main groups:

I) equipment standard

II) surrounding areas, savings in running and maintenance costs

III) other variables, this includes shift variables.

The **first component** represents a composite variable. When constructing this variable, estimates of a number of subcomponents have been combined to form a larger concept. The variable includes amongst others the number of rooms, cooking and sanitary facilities in the dwelling, lift, stair well, laundry equipment etc.

The **second component** includes different areas such as wall area, window area, roof
area and heating system.

The **third component** consists of shift variables like region and redevelopment/ development area.

Four different indices are calculated. These are building price index, tender prices, building price index for buildings under construction, function price index and quality price index.

The building price index, tender prices can be regarded as the base index.

The building price index for buildings under construction is calculated by weighting the building price indices, tender prices, for five quarters with corresponding number of dwellings begun, which can be found in the new construction statistics.

The function price index shows the changes in price and quality, for an average dwelling.

Quality price index is calculated by dividing the function price index by the building price index and shows the development of the value of the gathered quality changes per average dwelling between the comparison periods.

The components in quality price index are

I) equipment standard

II) surrounding areas, savings in running and maintenance costs

III) other variables, this includes shift variables

IV) area component

2.8.1 Collection and compilation of data for statistical use

The calculations of building price index are based on the same basic material as the statistics of new construction costs. Before, in principle until 1993, statistics was based on decisions and applications in connection with government aid.

The County Housing Boards (which from the 1st January 1994 joined as a unit in the County Administrative Boards) have supplied Statistics Sweden with copies of these application documents. These documents have contained variables that are needed for the calculation of the building price index.

With the revision of the system of government aid for financing housing on 1 January 1993, most of the administrative documents used by Statistics Sweden for calculating the building price index are gradually becoming unavailable. Due to this, Statistics Sweden from 1994 currently collects information for new construction cost statistics and calculations of building price index through questionnaires to investors.

Before the transition to collecting through questionnaires, extensive studies of statistical variables were made and the need of building price index was examined. In connection with the construction of questionnaires, contact was taken with amongst others; the National Board of Housing, Building and Planning, investors, contractors, consultants and County Administrative Boards. Consultation with the Respondent Delegation of Enterprises occurred during the drawing up of the enquiry.

The compilation covers new construction projects which have been awarded government aid. The population comprises projects with multi-dwelling buildings, as well as collectively built one- or two-dwelling buildings to be placed on the market or made available with tenant-ownership or renting rights. Individually built one- or two-dwelling buildings, with government aid, are not included in the statistics. The same applies for buildings of seasonal and secondary use. It would cause great difficulties for both respondents and for quality reasons, to include individually built buildings and buildings for seasonal and secondary use in the calculations.

In the cost statistics, that forms the base for the calculation of building price index, only the projects with ¨normal¨ residential buildings are included. Entities not covered by cost statistics include, for example, residences for communities and premises with a large proportion of areas for non-residential use.

For those projects where government aid has been awarded according to the new system for housing financing, data are collected in connection with the beginning of the actual building work (laying of basement floor, basement walls, foundation plate etc).

Just now when the construction of dwellings is low, statistics is based on a total survey. If the construction of dwellings increases Statistics Sweden will proceed to sample surveys which cover about five hundred (500) projects with multi-dwelling buildings and five hundred projects with collectively built one- or two-dwelling buildings per year.

For the current data collection, obligation to respond by the Law of the Official Statistics is applied on the basis of the large economical importance that this statistics has.

The statistical compilation is done in a database solution in client server environment. The data entry includes ticking-off of the incoming enquiries etc and is done directly into the database. This facilitates the status calculations (so far responses received, non-response, etc).

The data entry form that is programmed in Visual Basic has a presentation that follows the questionnaire. This decreases the risk for registration errors. The same person carries out all the moments (data entry, editing, completion and corrections). The manual edition concentrates on incomplete and obvious mistakes, afterwards computer assisted edition takes over, where the consistency of data is controlled. After the controls, the investors are contacted for the eventual completion of questionnaires. In connection with the completion of the data, more knowledge is received about the reality behind the figures. All the collection, edition and completion work is carried out within Statistics Sweden.

2.8.2 List of variables included in the building price index calculations

Index variables for multi-dwelling buildings

Quality variables

Variables of group I
(equipment standard)
Equipment standard represents a composite variable UTRTOTM[1] comprising the number of rooms, cooking and sanitary facilities in the dwellings, lifts, stairs, laundry facilities etc., cf. below.

Variables of group II
(surrounding areas, savings in running and maintenance costs)

- Utility floor space under joist floor
- Secondary utility floor space
- External walls + windows (incl. screen walls)
- Roof
- Heating system and heat distribution

Variables of group III
(other variables)

- Communication space
- Value for class A-E premises

All these data are multiplied by their respective valuation figure (standard amount) which represents an estimated cost for the variable in question.

Shift variables

All the following variables are dummy variables and belong to group III

- Region 1 (Greater Stockholm)
- Region 2 (Greater Gothenburg)
- Region 3 (Greater Malmö)
- Region 4 (County Y+Z+AC+BD)
- Region 6 (County F+G+H+I+K+L+M excluding Greater Malmö)
- Redevelopment area

---

[1] The variable UTRTOTM is composed of several sub-variables (see Annex).

Index variables for one- or two-dwelling buildings

Quality variables

Variables of group I
(equipment standard)

- Equipment standard represents a composite variable UTRTOTM[1] comprising the number of rooms, cooking and sanitary facilities in the dwellings, stairs, laundry facilities etc., cf. below.

Variables of group II
(surrounding areas, savings in running and maintenance costs)

- Utility floor space under joist floor
- Secondary utility floor space
- External walls + windows (incl. screen walls)
- Roof
- Heating system and heat distribution

All these data are multiplied by their respective valuation figure (standard amount) which represents the estimated cost for the variable in question.

Shift variables

All the following variables are dummy variables and belong to group III:

- Region 1 (Greater Stockholm)
- Region 2 (Greater Gothenburg)
- Region 3 (Greater Malmö)
- Region 4 (County Y+ Z+AC+BD)
- Region 5 (County AB excl. Greater Stockholm +C+D+E and N+O+P excl. Greater Gothenburg + R+S+T+U+W+X)
- Redevelopment area

The UTRTOTM variable

Sub-variables

- Number of rooms, cooking and sanitary facilities in the dwelling
- Separating walls between dwellings in row and semi-detached buildings
- Balcony
- Extra dwelling door towards the open space at back entrance or equivalent
- Extra entrance door with maintenance-free outside (refer to multi-dwelling buildings)
- Resident's laundry
- Laundry capacity in resident's laundry
- Laundry arrangements in kitchen or bathroom
- Laundry facilities in a separate room
- Washing machine in dwelling
- Supplement for lodgings comprising:
1) cooking recess cupboard
2) kitchen
3) additional toilet without shower
4) additional toilet with shower
- Stair well
- Storey high flight of stairs
- Storey high external steps
- External basement steps
- Stairs in dwelling
- Walls of tile/clinker or similar materials in bath- /shower-room
- Lift
- Stop level
- Attic in one- or two-dwelling building which can be made habitable
- Access balcony

List of explanatory variables which are not included in the index calculations but are included in the regression model

The variables marked with (D) refer to dummy variables.

- Basement or semi-basement, creep foundation, whole base slab, heated building
- Whole base slab, building not heated, more simple foundation
- Load-bearing parts (D)
- Facing (D)
- Foundation (D)
- Ventilation (D)
- Heat recovery (D)
- Material in vertical load-bearing parts (D)
- Roofing (D)
- Form of tenure (D)
- Type of investor (D)
- Type of building (D)
- Service dwellings (D)
- Average useful floor space of dwellings
- Number of storeys (D)
- Cost adjustment (D)
- Type of contract (D)
- Questionnaire to the investors (D)
- Existence of investment allowance (D)
- Number of dwellings (log)
- Heating system (D)
- Construction method (D)
- Invitation of tenders (D)

2.9 Factor price index

In order to measure price and cost changes in the construction sector, the SCB produces not only the building price index but also the factor price index FPI and the *entreprenadindex*, E84, which are so-called input indices. The factor price index for construction activity measures changes in entrepreneurs' costs and the contract principal's costs in relation to a project.

The factor index is made up of numerous price indices for goods and services. Price indices are first calculated for various production factors: materials, labour, transport, fuels, electricity, machines, the entrepreneur's other costs and the contract principal's costs. Included in the principal's costs are interest, land registry fees, planning fees etc. Once all calculations for cost factors have been completed, the price indices are weighted together into a total index for the respective factor model. The various changes are weighted together into a partial and total index according to the proportion of total cost which the individual production factors account for. The index is computed as a fixed-base index according to the Laspeyres method and is not affected by changes in production techniques. Where a particular product is no longer available, the base price for the new product is computed with reference to the price development of the outgoing product.

The difference between the construction price index and the factor price index is that the factor price index does not take profit/loss and productivity into account, whereas the construction price index does. The factor price index does not take the market situation into account.

The national accounts use the FPI, exclusive and inclusive of wage drift, for fixed-price calculations of building investments.

2.10 Integrated constant-price calculation of domestic supply

An integrated constant-price calculation is carried out within the system of supply and use tables (SUTs). In this way, supply and use are deflated in a consistent manner so that no residual items arise as a result of fixed-price calculations. In this connection, account is also taken of margins and product-linked taxes and subsidies. One can also distinguish between various types of market, e.g. domestic industry, final domestic use and the export market, and operate with different trading and transport margins for different product groups. The calculation procedure is as follows:

2.10.1 Output

Data on industry's output of goods and services are generally found, or calculated, in current prices for the approximately 400 product groups which make up the most detailed level of the SUTs. Output here refers to gross output and not to value added. The output value at current prices is deflated using the relevant price indices. For some product groups, volume extrapolation is carried out using volume indicators, and current prices are

obtained by reflating. This applies, for example, for electricity and district heating.

For detailed HS headings, industrial output is deflated to t-1 prices using data from the PPI. In the national accounts, these data are aggregated to product group level and chained price indices are computed with the aid of calculations from the previous year. The output value for each product group at year t-1's price is then obtained by deflating with the chained price index the particular product group. Other output is deflated by product group, using for example the CPI or wages index.

Construction output is calculated in the national accounts from the use side at current and constant prices. This means that output is deflated as the sum of building investment and repairs.

Services are deflated per product group, using various indices. Products used mainly for private consumption purposes are deflated using a partial index from the CPI. For those areas where a producer price index for services exists, this is used. For many transport services, the factor price index is used, while for some others volume data are drawn on. Other services are deflated applying the wages index. The wages indices used are based on structural wages. Wage indices are not adjusted for any assumed changes in productivity.

For **foreign trade** in goods, the IMPI and EXPI are used to deflate foreign trade by CN heading to (t-1) prices. CN headings are linked to SNI product groups. For services, the PPI, CPI, SPI and wages indices are used amongst others.

General government sales of market products are included in supply in the SUTs. These sales are deflated using, *inter alia*, the CPI and wages index.

2.10.2 National accounts' domestic supply index

After the calculation at current and constant prices of overall supply in the form of output, imports (including customs duties and agricultural levies) and sales by public authorities, as well as export use, a domestic supply index (DSI) is derived for each product group. The index is computed as shown in the example below.

Current prices: industrial output + general government sales + imports – exports

Constant prices: industrial output + general government sales + imports – exports

Example, product group 33101, medical equipment and instruments:

	SEK Cur.pr.	SEK Cnst. pr.
Industrial output	8596	8879
General government sales	216	215
Imports	6431	6220
Customs duties and agricultural levies	2	2
Exports	9420	9723

$$\frac{8596+216+6431+2-9420}{8879+215+6220+2-9723} * 100 = 104,1$$

The index is adjusted for any changes in rates of taxes on products.

The domestic supply index is used to deflate on a product-by-product basis **intermediate consumption** in industry and general government, as well as gross investment. The DSI is used where no other specific index information is available.
As a result, intermediate consumption and gross investment in every branch is deflated using an index that is calculated for the products which are used in the particular branch concerned.

In the case of some consumption, the branch and product group are known. In such cases a constant price can be calculated using a suitable DSPI (for some types of energy, volume extrapolation using quantities may also be carried out). Other consumption, where the product group is not known, is extrapolated from the previous year's consumption values at constant prices for the respective product groups and branches by applying the branch output volume trend (this means that we start by assuming an unchanged input coefficient). Current prices are then calculated by reflating with the product group's domestic supply index.

Household consumption. This is deflated using various partial indices from the CPI. The DSI is also used for some product groups (e.g. wearing apparel), as well as volume extrapolation and reflating for owner-occupied houses, for example.

General government consumption. Consumption which is known in terms of purpose and product group is deflated using a suitable price index, e.g. DSPI (domestic supply price index from the PPI system) or factor price indices (for building repairs). Unknown consumption is broken down by product group using standard models and deflated using the domestic supply index for the respective product group.

General government consumption, compensation of employees and consumption of fixed capital
These calculations are carried out separately from input-output calculations. Wages are extrapolated from the trend in the number of hours worked. Consumption of fixed capital is calculated at constant prices in a separate system using the same indices as for investment.

Gross investment. Investments whose product group is known (e.g. transport equipment and buildings) are deflated using a suitable DSPI or, for example, the construction price index. Unknown consumption is broken down by product group and deflated using the domestic supply index.

Inventories. The PPI is used.

2.10.3 Taxes and subsidies on products

When calculating taxes and subsidies at constant prices, the rate of tax that applied for the constant-price year has to be used. In the Swedish national accounts, the tax rates that applied in the previous year are therefore used. The effect of this is that, in the year in which a new tax is introduced, e.g. if VAT is extended to encompass new products, there will be a tax amount in current prices whereas the amount in constant prices is zero.