Main Aspects regarding the Consumer Price Index*

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Abstract
This paper reveals the usefulness of CPI concepts. The cost of living view provides a price index whose dual is the volume of household consumption. The inflation view provides a price index whose dual is the volume of households’ final monetary purchases, which represent the demand pressure they put on the markets in which they participate.

Key words: weight, relative, transaction, market, aggregate

The four main price indices and their associated national accounts aggregates and matrices in the SUT are:
- producer price index (PPI): output of resident producers (P.1);
- consumer price index (CPI): final consumption of households (P.31) for CPI reference aggregate, plus gross fixed capital formation of households (P.51) for CPI reference aggregate;
- export price index (XPI): exports (P.6);
- import price index (MPI): imports (P.7).

The location and coverage of these major price indicators as they directly apply to goods and services value aggregates in the national accounts. It characterizes a price index as a function of price relatives and weights, noting that, other than the formula for the index itself, the requisite features of the relatives and weights would be determined by the value aggregate. These factors are:
- what items to include in the index;
- how to determine the item prices;
- what transactions that involve these items to include in the index;
- from what source to draw the weights used in the selected index formula.

Based on our survey of the goods and services accounts of the SNA 1993 culminating in the SUT, there are particulars for each of the four major indices.

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• **Scope of the expenditure aggregates of the consumer price index**

As noted, there are two principal expenditure sub-aggregates of the total final expenditure of the households (S.14) institutional sector employed in most national CPIs that we can now see are transparently linked to the SNA:

- CPI reference aggregate 1, comprising the consumption items:
  - P.311 Monetary consumption expenditure
  - P.313 Financial intermediation services implicitly measured (FISIM)
  - P.312 Imputed expenditure on owner-occupied housing services

- CPI reference aggregate 2, comprising the consumption and capital formation items:
  - P.311 Monetary consumption expenditure
  - P.313 Financial intermediation services implicitly measured (FISIM)
  - P.511a Gross fixed capital formation in residential structures

Proponents of CPI reference aggregate 1 generally take a consumption or cost of living view of the CPI, seeing household welfare as determined by the flow of goods and services, including the services of residential structures that are owned wholly or in part by the occupants, that households consume. On this view, households’ fixed capital formation, which is effectively limited to the purchase of residences for own use, is a business-related activity of unincorporated enterprises that households own and thus not in the scope of the CPI. The customary version of aggregate 1 excludes non-housing consumption from own production. Although compensation in kind in the form of benefits provided by the employer is an important part of this item, households often are only vaguely aware of its value, since the employer actually makes the payments to the providers of the benefits. An argument nevertheless could be made for including this item, as households sometimes are able to exercise control over how this part of their compensation income is spent.

Proponents of CPI reference aggregate 2 generally take a transactions or inflation view of the CPI, tailoring the index to measuring the rate of change in the prices of an expenditure aggregate broadly covering the monetary final expenditures that households make on goods and services, including their capital formation in residential structures via purchase of their own dwellings and the major improvements they make to them.

• **The consumer price index as a measure of inflation in market transactions**

Central banks take an interest in the major price indices, particularly if they are implementing a monetary policy that targets inflation. Indeed, reference aggregate 2 has been seen as a better measure of change in the prices of actual transactions in goods and services than CPIs based on reference aggregate 1, which gives substantial weight to the imputed rent of owner-occupied housing.

Both reference aggregates for the CPI are an important component of total final expenditure and GDP in virtually all countries, but the total value of transactions in goods and services also includes intermediate consumption, so as an inflation index for total goods and services transactions, the CPI’s coverage is rather limited under either definition 1 or 2 compared with, for example, the PPI, which covers, in principle, total output. Progress in extending the industry coverage of the PPI to cover all output-producing activities, services in particular, has, however, proceeded slowly owing to the technical difficulty of specifying service products and measuring the associated prices. The combination of the PPI, covering output, and the import price index provides a price index...
for total market supply, and is seen by at least one monetary authority as a useful inflation measure. Another central bank targets the total domestic supply price index, which is based on total supply less exports (that is, covering the aggregate comprising output plus imports minus exports).

The CPI’s purchasers’ price valuation principle also includes taxes less subsidies on products, which may not be desired in an inflation indicator for underlying price change. Nevertheless, the CPI is the most widely available macroeconomic price statistic, and may in many countries be the only available option for inflation measurement. Monetary authorities also may find the CPI the most socially acceptable inflation target precisely because of its focus on households.

- **Treatment of cross-border shopping in the consumer price index**

Exports P.6 are not an expenditure of any resident institutional unit and thus would not be the focus of a price index covering its expenditure. By implication, they would not appear in any CPI expenditure aggregate. Imports are, however, an expenditure of resident units and it is often relevant to consider the importance of imports in the expenditure aggregates of such units. In many countries, imports acquired by households directly through cross-border shopping are a significant fraction of household consumption expenditure.

Of particular note here is that imported goods P.71 and services P.72 for the household sector would contain only the direct expenditures of households on goods and services secured from nonresidents, that is, in cross-border shopping. This should include purchases of transportable goods and services by households from non-resident suppliers through all means, including in person, by mail order and through the Internet. These expenditures in transactions with non-residents are already covered in households’ individual consumption P.31 and capital formation P.5, so the purpose of identifying imports P.7 in the context of the CPI is to identify the importance of transactions with non-residents in the final expenditure aggregates of households and that part of those aggregates covered by the CPI expenditure aggregate.

Note that under both CPI reference aggregates 1 and 2 we would include expenditures on consumption goods and services provided by non-residents to resident households as the imported component of Individual consumption P.31. To assess the importance of imports when considering CPI reference expenditure aggregate 2, we also would include households’ Fixed capital formation P.51 expenditures on imported transportable goods such as building materials for residences, as well as residential construction services provided by non-residents.

- **Other price indicators in the national accounts**
  - **Price indices for total supply**

Consistent with our earlier discussion of the coverage of the PPI, we define total market-valued output as the sum of market output P.11 and output for own final use P.12. Total output P.1 is the sum of market valued output and other non-market output P.13. Total supply at basic prices is the sum of output and imports P.7. Mark-up adjustments at the product level for trade and transport margins on domestic production, insurance and freight on imports, and taxes D.21 less subsidies D.31 on products would be added to total supply at basic prices to produce total supply at purchasers’ prices.

In decomposing total supply into price and volume components, the total supply price index (SPI) at basic prices can be seen to be a weighted mean of the total output price
index YPI and the import price index MPI. The YPI comprises in turn the PPI and an implicit deflator index (IDI) for other non-market output. To obtain the price index for total supply at purchasers’ prices, the SPI would be multiplied by an index of the total mark-up for trade, insurance, and transport margins, and taxes net of subsidies on products. The margins only matter when developing supply price indices at purchasers’ prices for individual products and product sub-aggregates. For all products, they cancel out, leaving only taxes less subsidies on products contributing to the total mark-up on total supply at basic prices. Total supply price indices at product levels of detail are useful in compiling and reconciling discrepancies in supply and use tables expressed in volume terms. In addition, they are employed in producing industry price indices for intermediate consumption P.2, which are useful for compiling gross domestic product (GDP) volume measures from the production approach. Although principally used as a compilation aid and in deflation of value added at basic prices via the double deflation approach, supply price indices could also serve as analytical indicators in their own right because of their coverage of all goods and services transactions in the economy relating to production and external trade. As such, they may be useful as indicators for the analysis and evaluation of economic policy, where broad coverage of transactions is required, for example in formulating monetary policy.

- **Price indices for intermediate consumption**

In considering intermediate consumption price indices (IPIs) for the total economy and for industry, the weights correspond to a column-wise reading of the intermediate consumption part of the SUT’s use matrix. Because the various margins on basic prices inherent in prevailing purchasers’ prices may vary from user industry to user industry, the ideal sources for purchasers’ prices for intermediate consumption price indices would be enterprise surveys. Unfortunately, such surveys are generally burdensome and expensive. Instead, as noted in the discussion above on price indices for total supply, the price index of intermediate consumption by industry can be derived from detailed product components of the SPI, which will result in indices of acceptable accuracy if the variation in the total tax, subsidy, transport and distribution margin is not too great from industry to industry within product class. For the total economy, the price index of intermediate consumption is obtained as a weighted average of industries’ intermediate input price indices, where the weights are the share of each industry’s intermediate consumption in the total intermediate consumption in the economy.

- **Price indices for final uses**

The price indices for final use comprise deflators for individual consumption P.31, collective consumption P.32, gross fixed capital formation P.51, change in inventories P.52, acquisitions less disposals of valuables P.53 and exports P.6. Of the major price indices discussed above, the CPI is the principal source of detailed (product level) information for P.31, while the PPI is a significant source of detailed information for P.51 and the principal source for the finished goods component of P.52. When the CPI is defined on the basis of CPI reference expenditure aggregate #2, the CPI could also be the source of data on capital formation in residential structures. The SPI may be the principal source for the input inventories component of P.52 in the absence of a detailed survey of the purchase price of intermediate inputs, and the XPI is the deflator for P.6. The SPI can serve, as well, as a source of detailed product information for P.32, P.51 and P.53. We will designate the
deflator for total final uses as the final uses price index (FPI), which would be computed as
a weighted mean (formula to be determined) of the component indices just discussed.

- Price indices for gross domestic product

As noted above in the discussion of the SPI and the intermediate consumption
price index, the GDP price index can be compiled in two ways, corresponding to the two
goods and services methods of compiling GDP: the production approach and the
expenditure approach. Recall that the production approach derives from the definition of
value added, as the difference between output $P_{1}$ (at basic prices) and intermediate
consumption $P_{2}$ (at purchasers’ prices). The SNA 1993 recommends the use of double
deflation for value added, by which output at basic prices $Y$ is deflated by all the items $YPI$
to obtain output volume, and intermediate purchases are deflated by an intermediate
purchases price index to obtain intermediate input volume. Real value added is then
computed as the difference between output volume and intermediate input volume (see
SNA 1993, Chapter XVI). This operation is equivalent to deflating value added in current
prices with a double deflation-type price index having a positive weight on the $YPI$ and a
negative weight on the IPI. In the usual case just described, we have the value added
deflator as a Paasche index of the output price index $YPI^{s,t}$ and the intermediate input price
index $IPI^{s,t}$, where the weight on the $IPI^{s,t}$ is:

$$w_{I}^{t} = \frac{-P_{2}^{t}}{P_{1}^{t} - P_{2}^{t}}$$

and the weight on the $YPI^{s,t}$ is $1 - w_{I}^{t}$. The corresponding volume index has the Laspeyres
or “constant price” form, which is equivalent to the double deflation measure of the
volume of real value added divided by current price value added in period $s$. The total value
added at current basic prices divided by real value added, obtained via double deflation,
yields the implicit deflator for value added at basic prices. Finally, the GDP deflator at
purchasers’ prices is the value added price index (at basic prices for output and purchasers’
prices for intermediate input) multiplied by the index of the mark-up on value added of
output taxes less output subsidies on products.

Alternatively, the final expenditure deflator FPI may be combined with the MPI
using a double deflation-type approach. GDP volume is calculated from expenditure data
by deflating imports $P_{7}$ by the MPI, and subtracting the result from the volume of final
uses, calculated by deflating final uses by the FPI. The implicit GDP deflator would be the
ratio of GDP at current prices to GDP volume so calculated. The aggregate index of GDP
volume and the aggregate index of real value added should agree with one another, as
should, by implication, the implicit GDP deflator calculated from the two approaches.

- Price indices for labour services

Value added appears first in the production account, calculated as the balancing
item between output and intermediate consumption. This margin is used to pay for, among
other things, labour services. The SNA 1993 provides for the income components
comprising value added in the generation of income account. The largest of the income
components itemized in this account is compensation of employees $D.1$, comprising wages
and salaries $D.11$ and employers’ social contributions $D.12$. $D.1$ represents a value
aggregate for a flow of labour services and is thus susceptible to decomposition into price
and volume components. The price index for labour services ($LPI$) measures
developments in total compensation, by occupation, within industry. The price of labour services in total compensation terms is of particular interest when compared with the GDP deflator, which indicates the relative purchasing power of labour compensation in terms of production for final consumption. This comparison is useful in assessing cost-push pressures on output prices and as an input into compiling measures of the productivity of labour. A second useful comparison is between the wages and salaries sub-index of the LPI and the CPI. The ratio of the LPI to the CPI indicates the purchasing power of wages in terms of consumption goods and services, and tracks the material welfare, particularly of the employees subsector S.143 of the household institutional sector S.14. In the LPI, the price of labour services comprises all the components of compensation of employees, including employers’ social contributions (benefits), as well as wages and salaries. The wages and salaries sub-index of the LPI would be another example of a price index adjusted by a mark-up index. Analogously with the price index for total supply at purchasers’ prices or for GDP by production, the LPI would be adjusted in this case by a “markdown index”, deducting employers’ social contributions.

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