Price and volume measures in national accounts - Use

by

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A/B/C METHODS BY TRANSACTION CATEGORY (1) – Final consumption expenditure by households

The obvious approach to deflating the components of household final consumption is to draw upon detailed Consumer Price Indices (CPIs) since these are intended to show the change in consumer prices.

Those methods based on deflation of household expenditure using appropriate CPIs are **A** methods.

An index is appropriate if it:

- is an index of the price consumers pay for exactly that (group of) product(s);
- is valued at purchasers' prices including VAT;
- Take in account the differences between CPI methods and the definitions required in the national accounts

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A/B/C METHODS BY TRANSACTION CATEGORY (3) – Final consumption expenditure by households

However, there are some differences between CPI methods and the definitions required in the national accounts, to take in account:

Main differences of coverage

Goods and services purchased abroad by resident households. The CPI covers all purchases made by resident and non-resident households on the economic territory of a country . Household consumption in the national accounts covers the expenditure of resident households, including those purchases made abroad, but excludes the expenditure of tourists on the economic territory of the country which is covered by the CPIs.

Within the supply/use framework, final consumption by product is normally compiled for total purchases made on domestic territory, with the net difference of purchases abroad and by nonresidents domestically made as a global adjustment.

If purchases abroad by residents form a significant proportion of total household consumption, and prices are evolving differently from domestic prices, then this should be reflected in the calculations of the volume series for the net adjustment - one method to undertake this could be to use the HICP data from another Member State

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A/B/C METHODS BY TRANSACTION CATEGORY (4) – Final consumption expenditure by households

However, there are some differences between CPI methods and the definitions required in the national accounts, to take in account:

Main differences of coverage

Consumption of own-produced goods and services. These items are not included in the CPI. The general rule here is that products produced for own-consumption should be valued at the prevailing basic price for equivalent products, or at costs of production if market prices are not available. Where output for own final use is a significant part of total consumption of a certain product, it will be necessary to separately deflate it by a Suitable basic price index; otherwise use of the CPI is appropriate.

Here we have a list of the most common types of goods that should be included:

- the production of agricultural products and their subsequent storage; the gathering of berries or other uncultivated crops; forestry; wood-cutting and the collection of firewood; hunting and fishing;
- the production of other primary products such as mining salt, cutting peat, the supply of water, etc.;
- the processing of agricultural products; the production of grain by threshing; the production of flour by milling; the curing of skins and the production of leather; the production and preservation of meat and fish products; the preservation of fruit by drying, bottling, etc.; the production of dairy products such as butter or cheese; the production of beer, wine or spirits; the production of baskets and mats; etc.;
- other kinds of processing such as weaving cloth, dress making and tailoring, the production of footwear, the production of pottery, utensils or durables, making furniture or furnishings, etc

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A/B/C METHODS BY TRANSACTION CATEGORY (2) – Final consumption expenditure by households

Where a detailed CPI is not available, B methods include the use of other indicators completely or partially covering the products in question - for example, PPIs, import/export prices, or volume indicators where these are available. The main reason why use of adjusted PPIs is not an A method is that they will generally cover products consumed by businesses as well as those consumed by households.

Any method using an index that does not correspond at all to the product in question is a **C** method.

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A/B/C METHODS BY TRANSACTION CATEGORY (5) – Final consumption expenditure by government and NPISHs

By convention, the final consumption expenditure of general government and NPISHs consists of:

- the value of non-market goods and services produced by government or NPISHs other than ownaccount capital formation and sales;

- purchases by general government and NPISHs of goods and services produced by market producers that are supplied, without any transformation, to households as social transfers in kind.

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A/B/C METHODS BY TRANSACTION CATEGORY (6) – Final consumption expenditure by government and NPISHs

Final consumption expenditure consists of both individual and collective consumption.

Value is measured by convention as the sum of costs:

compensationto employees, intermediate consumption (including the cost of products purchased for social transfer in kind), consumption of fixed capital and other taxes (less subsidies) on production

A/B/C METHODS BY TRANSACTION CATEGORY (7) – Final consumption expenditure by government and NPISHs

Whilst the value of government and NPISHs final consumption is measured using an "input" approach, this does not mean that the only method for deriving constant price data is to deflate the value of inputs by suitable deflators. In fact, there are suitable methods based on direct output indicators for individual consumption, such as "pupil hours" for education, "patient treatments by type" for health, and "members by type" for NPISHs.

However output destined for collective consumption (especially those relating to 'public administration') presents more difficulties, and suitable deflation of the inputs may be the only viable option in many cases.

A/B/C METHODS BY TRANSACTION CATEGORY (8) – Final consumption expenditure by government and NPISHs

A, B and C methods

For social transfers in kind consisting of goods or services purchased by government from the market, deflation by suitably detailed CPIs would be A methods if:

- allowance is made for any discounts which the Government may have negotiated directly with suppliers, and
- adjustments are introduced for any contributions which are payable by those receiving the transfers.

A/B/C METHODS BY TRANSACTION CATEGORY (9) – Gross fixed capital formation

Gross fixed capital formation (GFCF) covers both tangible and intangible fixed assets.

GFCF can be measured from either the supply or demand side.

However, the use of the supply side approach as the main measurement method is more frequent for GFCF because it presents a less resource intensive option compared to measuring GFCF independently from the demand side.

Measurement from the supply side uses data on domestic output less exports plus imports of capital goods at the product level. Product classifications are generally quite detailed, but still do not always allow the differentiation of products between those of a capital nature and those that should be considered intermediate or final consumption. This limitation needs to be kept in mind when considering methods for estimating prices and volumes from the supply side.

A/B/C METHODS BY TRANSACTION CATEGORY (10) – Gross fixed capital formation

Measurement from the demand side uses data from purchasers of capital goods on the purchases they have made. The product classification of GFCF from the demand (consumption) side generally has limited product detail. For example, ESA95 provides a regrouping and coding for investment that, at its most detailed, is limited to only six products (Pi6). Compiling volume estimates of GFCF at such a limited level of detail is unlikely to produce high quality results, given the many different products and their unique nature. It therefore seems appropriate when considering the criteria for the classification of methods to provide further guidance on the minimum level of detail to be used.

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A/B/C METHODS BY TRANSACTION CATEGORY (11) – Gross fixed capital formation

Valuation is an important issue when considering the suitability of price indices for the deflation of GFCF. For price indices to be entirely appropriate they should measure changes in the purchasers' price of the particular products, including any non-deductible VAT included in the price. Price indices of this kind are often referred to as investment price indices. The direct use of PPIs, even if the product match is exact, can therefore be seen as not entirely suitable because PPIs are measured at basic prices. The use of PPIs for the deflation of GFCF would assume that the change in basic price and purchasers' price is the same, i.e. taxes, transport, installation and the other costs of ownership remain constant in constant price terms.

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A/B/C METHODS BY TRANSACTION CATEGORY (12) – Gross fixed capital formation

Another important consideration is that some goods recorded as GFCF will have been imported. This creates the need to ensure a consistent approach to the deflation of products within imports and GFCF, taking account of any difference in price, for example due to taxes and subsidies on imports.

A/B/C METHODS BY TRANSACTION CATEGORY (13) – Gross fixed capital formation

A, B and C methods

The use of genuine investment price indices (IPIs) for the deflation of GFCF will be an A method, providing they satisfy the following criteria:

- it is an index with a coverage of exactly that (group of) product(s);
- it takes proper account of changes in quality of the product(s);
- It is valued in purchasers' prices including non-deductible VAT;

The use of PPIs adjusted to purchasers' prices would also be an A method provided they satisfy the criteria described above for investment price indices.

A/B/C METHODS BY TRANSACTION CATEGORY (14) – Gross fixed capital formation

The following list of products should be considered to be the minimum acceptable for a B method:

Tangible assets

- *Construction products*
  - Dwellings
  - Other buildings and structures
    - Non-residential buildings / - Other structures
  - Major improvements to dwellings and other buildings and structures
- *Machinery and equipment*
  - Transport equipment
    - Aircraft / - Ships / - Railway trains and carriages
    - Other transport equipment
  - Other machinery and equipment
    - Machinery and equipment excluding communications equipment office machinery and computers / - Communications equipment / - Office machinery / - Computers
  - Cultivated assets

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A/B/C METHODS BY TRANSACTION CATEGORY (14) – Gross fixed capital formation

Intangible assets

- Mineral exploration
- Computer software
- Entertainment, literary and artistic originals

Major improvements to tangible non-produced assets

Cost associated with the transfer of ownership of non-produced assets

Methods that do not reflect adequately the level of product detail suggested above are C methods.

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A/B/C METHODS BY TRANSACTION CATEGORY (15) – Changing in inventories

In practice, the data available for the calculation of changes in inventories do not allow a 'perfect' estimation. Assumptions and approximations have to be made. The estimation methodology for CI (both at current and constant prices) is highly dependent on the kind of information on inventories that is available.

4 types of inventories are distinguished:

- materials and supplies
- work-in-progress (includes livestock raised for slaughter)
- finished goods
- goods for resale.

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A/B/C METHODS BY TRANSACTION CATEGORY (15) – Changing in inventories

The ideal case

Consider the estimation of CI of a certain product of a certain agent**. In the ideal case, information is available on the exact times** and quantities **of additions to and withdrawals from the inventory** and the price of the product at those times. Then it is in principle straightforward to calculate the CI at current and at constant prices. **Additions and withdrawals have to be valued at the prices prevailing at the times at which they take place**. The sum of all additions minus the sum of all withdrawals then gives the value of CI over the year. The mathematically correct method is therefore dependent on the path of prices and quantities in the course of the year. **In practice, this calculation should be done on a monthly or quarterly basis**. The annual value is the sum of CI in the months or quarters.

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A/B/C METHODS BY TRANSACTION CATEGORY (15) – Changing in inventories

As a second alternative, estimates of changes in inventories can also be obtained as the difference between stocks of inventories held at the end and the beginning of the period, respectively.

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A/B/C METHODS BY TRANSACTION CATEGORY (17) – Changing in inventories – A/B/C methods

A true A method can only be achieved if good information is available from enterprises. This can be either direct quantity information or value information combined with knowledge about the bookkeeping system. Furthermore, **appropriate price information** is required (which does not necessarily have to come from enterprises in an inventory survey but could come from price statistics). If prices and quantities vary considerably within the year, it becomes important to calculate CI and holding gains on a quarterly or monthly basis (either from information on additions and withdrawals or from levels at beginning and end of quarters or months), and calculate the annual total by summing the quarters or months.

If assumptions have to be made concerning the bookkeeping system, or if deflation is undertaken with less appropriate price indices, the calculation method becomes a B method. Less appropriate price indices are for example indices that do not exactly relate to the products in question, a consumer price index for the deflation of inventories of finished goods, etc.

If deflation of CI is carried out with proxy or inappropriate indicators then the method becomes a C method.

In the worst case, CI in constant prices is calculated as a residual at the macro-level.

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A/B/C METHODS BY TRANSACTION CATEGORY (15) – Changing in inventories

The price indexes used should be in accordance with the kind of inventory in question.

For inventories of **finished products**, PPIs at basic prices are the appropriate choice.

For inventories of **materials and supplies**, similar indices as used for intermediate consumption should be used. These are preferably genuine intermediate consumption prices, but in practice mostly PPIs *adjusted to purchasers' prices*.

For inventories of **goods for resale** a PPI will usually be a good indicator (for retailers, strictly speaking, a PPI should be adjusted for wholesale trade margins).

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A/B/C METHODS BY TRANSACTION CATEGORY (16) – Changing in inventories

Closely related to the calculation of changes in inventories are holding gains. Holding gains are the result of price changes during the period for which the inventory is held. **Such gains are not part of output**. Holding gains can be negative, in which case they are called holding losses. If there are no price changes during the accounting period, the holding gain is zero. Holding gains can be calculated using the following identity:

value of inventory at end of accounting period

- value of inventory at beginning of accounting period

= change in inventory + holding gains.

Other important identities are:

output = sales + CI of finished products + change in work-in-progress

intermediate consumption = purchases - CI of materials and supplies.

For a wholesale or retail trader:

output = sales - purchases (of goods for resale) + CI of goods for resale.

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A/B/C METHODS BY TRANSACTION CATEGORY (18) – Valuables

The following 3 categories of valuables are identified:

- Precious metals and stones
- Antiques and other art objects.
- Other valuables (for example jewellery and collectors items).

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A/B/C METHODS BY TRANSACTION CATEGORY (19) –Valuables

A, B and C methods

The A method applicable to production of valuables is if there is a suitable PPI for an industry producing valuables, which is adjusted properly for changes in quality (this may be possible for the jewellery industry for example).

B methods for measuring constant price flows for production of valuables are comparison with closely related products (either domestically or internationally) such as a painting by the same painter, and decomposition into constituent elements (more suitable for jewellery and complex products).

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A/B/C METHODS BY TRANSACTION CATEGORY (20) – Exports and imports of goods and services

Imports and exports of products are recorded at border values.

Total imports and exports are valued at the exporter's customs frontier, referred to as free on board (f.o.b.). Foreign transport and insurance services between the importer's and the exporter's frontiers should not be included in the value of goods, but recorded as services.

However, it is not always possible to obtain f.o.b. values at the detailed product level and details of foreign trade are then shown valued at the importer's frontier. In this case, all transport and insurance services to the importer's frontier are included in the value of imports, referred to as cost, insurance and freight (c.i.f.).

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A/B/C METHODS BY TRANSACTION CATEGORY (23) – Exports and imports of goods and services

Goods

There are different methods that are potentially suitable for the estimation of goods. These are:

- Actual export and import prices
- Unit value indices (UVIs)
- PPIs,
- Export prices of a foreign country.

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A/B/C METHODS BY TRANSACTION CATEGORY (24) – Exports and imports of goods and services

Goods

Actual export and import prices

Export and import price indices can be compiled based on the prices actually charged by exporters of goods, in the case of exports, or paid by consumers, in the case of imports. Prices have the advantage that they cope better with the problem of heterogeneous products as the price index is constructed to reflect a fixed specification that allows price effects to be isolated and quality changes to be controlled.

However, this can result in incomplete coverage of the actual exports and imports of products to which they are applied as deflators.

Price indices are costly to produce and represent a burden on respondents.

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A/B/C METHODS BY TRANSACTION CATEGORY (25) – Exports and imports of goods and services

Goods

Unit value indices (UVIs)

UVIs are readily available from trade statistics being derived as the ratio of value to volume (weight or quantity). They do not generally control for changes in the product mix within one item, leading to quality changes mistakenly included in the price component. Their coverage of products is generally complete, but even at the most detailed level of trade classification can often include a range of different products. Where the products within an item of the trade classification may appear to be homogeneous this may in reality not be the case as products of similar description may be of very different quality. It may be possible to construct more homogeneous UVIs if the country of origin (or destination) is also taken into account. UVIs are clearly unsuitable for products that are unique or change quickly in specification.

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A/B/C METHODS BY TRANSACTION CATEGORY (26) – Exports and imports of goods and services

Goods

Adjusted PPIs

It is also possible to use domestic PPIs to deflate current price estimates for exports and imports in the same way as actual export and import prices may be used. PPIs reflect prices on the domestic market and may not be a good reflection of the prices charged for exports or imports in some circumstances, for example luxury goods, where competition between domestically produced products and imports is of minimal importance and has little impact on price. However, there may be little difference between domestic prices and those of imports or exports where these compete directly with each other in the market. In these conditions, the use of PPIs for exports or imports may be acceptable.

A/B/C METHODS BY TRANSACTION CATEGORY (27) – Exports and imports of goods and services

Goods

Adjusted export prices from foreign countries

In this approach the export prices from a foreign country are used to deflate imports. Imports need to be broken down by product group and country to make best use of this method.

Adjustments may be necessary to account for exchange rate movements, on the assumption that movements in exchange rates impact directly and immediately on the price of the imports.

A/B/C METHODS BY TRANSACTION CATEGORY (28) – Exports and imports of goods and services

Goods – A/B/C methods

A methods should be based on the use of quality adjusted price indices for all exports and imports. So, ***Actual export and import prices index are considered A method, if they are*** consistent with the product classification used in the value data being deflated.

Deflation with price indices that do not adequately reflect changes in quality should be considered B methods.

For product groups that are sufficiently homogeneous over time, UVIs can also be considered B methods. The volatility of the UVIs should be examined as a test for suitability rather than simply relying on the understanding of the content of any particular trade group.

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A/B/C METHODS BY TRANSACTION CATEGORY (29) – Exports and imports of goods and services

Goods – A/B/C methods

Where prices on the domestic and import market are similar, because of competition, then the direct use of PPIs can be considered as suitable, as there will be little difference in price (A method).

Where ***market conditions*** are such that domestic prices do not reflect adequately the price of imported or exported goods then PPIs will need to be adjusted to reflect these differences before they can be considered suitable as B methods.

If movements in the exchange rate are the only factor that influene xport or import prices then PPIs would need to be adjusted for this to be considered a B method. Where other factors influence prices then more complex adjustments to the PPI would be necessary before they can be considered suitable. The usefulness of the method relies on the fact that the less representative the adjustment factor to the total the lower in quality will be the result.

All other methods should be considered C methods. This would include the use of UVIs for insufficiently homogeneous product groups.

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A/B/C METHODS BY TRANSACTION CATEGORY (30) – Exports and imports of goods and services

Services

Exports and imports of services consist of a large range of different services. The estimation of prices and volumes for exports and imports of services is an area where existing methods are less well developed. This is not unexpected considering methods for domestically produced services are also less well developed. It seems sensible when making proposals for the classification of methods for export and imports of services that these should be guided by those recommendations for similar domestically produced or consumed services.

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A/B/C METHODS BY TRANSACTION CATEGORY (31) – Exports and imports of goods and services

Services

A/B/C Methods

For the expenditure of non-residents (either individuals or governments) on the domestic territory these should be deflated using CPIs consistent with the range of products that are purchased by nonresidents for this to be an A method. If CPIs that have a narrower or wider coverage of products than those purchased by non-residents are used, this would be a B method.

For the expenditure of domestic residents abroad (individuals or government), the use of detailed and appropriate CPIs for the country visited, adjusted for exchange rates, would be an A method. The use of foreign country CPIs that have a wider or narrower coverage would be a B method.

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A/B/C METHODS BY TRANSACTION CATEGORY (32) – Taxes and subsidies on products

Taxes and subsidies on products play an important role in an integrated system of price and volume measures as being (part of) the difference between the basic price of a product and its purchasers' price.

Taxes and subsidies on products may be of two basic forms:

- based on the value of products (known as 'ad valorem')
- based on the quantity of products.

Within the ad valorem category, VAT is a special case.

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A/B/C METHODS BY TRANSACTION CATEGORY (33) – Taxes and subsidies on products

Tax based on a quantity of product

The concept of volume is relatively easy to understand for a tax levied on a quantity of products. **Tax revenue is simply derived by multiplying the tax rate and the quantity of the goods,** which are subject to the tax (volume of the tax base). The volume of the tax can be calculated by applying the tax rate prevailing in the base year to the volume of products in the current year. This idea of volume of tax is in line with the Laspeyres philosophy. **It implies that the volume index of the tax is equal to the volume index of the product**.

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A/B/C METHODS BY TRANSACTION CATEGORY (34) – Taxes and subsidies on products

Tax based on a quantity of product

If a new tax is introduced or the scope of a tax is extended to include more products the above Laspeyres methodology implies that this is recorded as a price effect rather than a volume effect.

In this case, because the tax rates of year T-1 are applied to the quantities of year T the volume measure of the tax remains unchanged and the entire rise in tax revenue is attributed to a price effect. This is equivalent to saying that the tax for users of the products has increased - before they had a tax-free product, now they have to pay tax.

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A/B/C METHODS BY TRANSACTION CATEGORY (36) – Taxes and subsidies on products

A, B and C methods

If different taxes or subsidies are fully separable (for example two different taxes are set on a particular) then the methods become **A** because we can define price and volume change.

If different taxes or subsidies are not fully separable (for example two different taxes are set on a particular product but there is no separate information available on each) then the methods become B/C methods because this would mean that the price and volume elements of taxes would not be correctly separated.

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A/B/C METHODS BY TRANSACTION CATEGORY (35) – Taxes and subsidies on products

VAT

VAT is a special case in that it is deductible when products are used for intermediate consumption (by non-exempt units), exempt for products that are specifically identified as non-deductible (in the EU, those activities covered by the Sixth VAT Directive). **The same general principles apply as above** –

It implies that the volume index of the VAT is equal to the volume index of the consumption.

However, when calculating the volume element of VAT, it is important to bear in mind the distinction between deductible and nondeductible VAT.

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A/B/C METHODS BY TRANSACTION CATEGORY (37) – Taxes and subsidies on products

Gross domestic product at constant prices is obtained by adding to the value added at basic price, the total indirect taxes on products (including VAT and taxes on imports), less total subsidies on products.

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The end

- Thank you for your kind attention