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Cross Cutting Issue:

Guidelines document on Approximations of deflators when SPPIs are not available

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1. Regulations and manuals

For a long time, the economic importance of the service sector stood in profound contrast to its statistical coverage in many countries. In price statistics, the service sector was very inadequately represented, particularly at the producer level. Only a few countries, notably the United States, Canada, Australia, Japan, the United Kingdom and France, had developed strong activities to collect producer prices in the service sector prior to the revision of the European short-term statistics regulations. For this purpose, the OECD and Eurostat have jointly developed guidelines[1], which were updated in 2014. Among other things, these producer price indices serve as deflators for measuring prices and volumes in national accounts and for calculating real developments in production values in economic statistics.

With the revision of the European economic statistics regulation in 2005[2], the collection and calculation of producer price indices for services became mandatory for EU member states – but not for the entire service sector, only for selected areas. The obligation was limited to those industries that had a particularly high share of gross value added and/or where the share of Business-to-Business (B2B) services was particularly high.

In the European Union, the development of the SBS Regulation[3], which came into force in 2020 and provides a legal framework for all European business statistics, significantly expanded the scope of producer prices for services. At the same time, however, Member States were also allowed to supplement the collection of actual producer prices for the additional industries required by using appropriate estimates:

"Indices based on actual producer prices are preferable. If those are not available, approximations may be used for (NACE) H49, H50, H52, I55, I56, J58, J59, J60, L68, M74, N77, N79, N81 and N82. Products (CPA) may be used to approximate activities." (see Table 5; row "Use of approximations and quality requirements" in the Commission Implementing Regulation[4])

For a long time, national accounts have had to deal with the fact that very few producer price indices were collected and calculated for the service sector. As a result, this area has always been concerned with the issue of approximating deflators for the purpose of measuring volume.

[1] Eurostat-OECD Methodological Guide for Developing Producer Price Indices for Services
[2] Council Regulation (EC) No 1165/98 of 19 May 1998 concerning short-term statistics
[3] Regulation (EU) 2019/2152 of the European Parliament and of the Council of 27 November 2019 on European business statistics
[4] Commission Implementing Regulation (EU) 2020/1197 of 30 July 2020 laying down technical specifications and arrangements pursuant to Regulation (EU) 2019/2152 of the European Parliament and of the Council on European business statistics

At European level, the 2016 Manual on Price and Volume Measurement[5] provides guidance on this issue. It describes the requirements for suitable price indices and classifies the necessary approximations if suitable producer price indices are not available.

With the introduction of the Regulation on European Business Statistics (EBS), the calculation of a new economic indicator, the service production index, also became mandatory. This is intended to show the real, i.e. price-adjusted, development of the production values of the industries in the service sector on a monthly basis. Assuming that some of the deflators required for this are not fully available or are not available in time, Eurostat, together with the Member States, has drafted a manual[6] describing how the service production indices can be calculated and, where necessary, approximated in the case of incomplete basic data. The rules for approximation laid down in this manual are explained in more detail in the following section.

2. Brief outline of the rules for approximating deflators from the Eurostat manual

The manual for compiling service production indices dates from before the European Statistics Regulation was replaced by the EBS Regulation. In accordance with the legal basis at that time, the SPPIs reflected price developments for B2B services. However, service production indices should reflect total service production, i.e. services provided to other companies, consumers, the government and for export. This means that the deflators selected must also adequately reflect the total transactions of an industry.

The recommendations in this manual on the use of approximated deflators for calculating service production indices therefore focus primarily on the problem that, at the time, the SPPIs mostly only reflected price developments for B2B services.

Regardless of the industry, three different solutions are envisaged here:

- Use of B2B Service Producer Price Indices (SPPIs) as approximations for Business-to-All (B2All: Business-to-Business, Business-to-Export, Business-to-Consumer);
- Use of Consumer Price Indices (CPIs) as approximations for B2All SPPIs; and
- Combination of B2B SPPIs and CPIs.

Which of these three approaches is the most appropriate depends largely on the share of B2B and Business-to-Consumer (B2C) services in the industry in question.

As a rough rule of thumb for the exclusive use of B2B deflators, a share of turnover of less than 10% with private households can be considered negligible. Conversely, in areas where the share of B2B turnover is very small, a CPI alone could serve as a proxy, if available.

[5] Eurostat, Handbook on prices and volume measures in national accounts, 2016 edition
[6] European Commission, Eurostat: Guide on developing an Index of Services Production (ISP), 2015

If a CPI is used as a proxy for an SPPI, it should ideally be calculated without value added tax and similar taxes. In particular, the effects of changes in tax rates should be corrected.

In many cases, B2B indicators and (VAT-adjusted) CPIs must be combined, weighted according to the relative (business and consumer) shares of turnover.

The manual then goes on to discuss the NACE 2-digit codes and their sub-aggregates, the importance of B2B and B2C services in the sub-aggregates and the availability of data for these.

The replacement of missing sub-aggregates in producer prices for services that are not characterized by an unusually high B2C share is not covered by this manual, although the EBS Regulation allows this in principle. However, in addition to the approximation methods mentioned above, other estimators for price developments from other sources are conceivable. These will be examined in more detail in the following chapter.

3. Brief summary of the classification criteria from European Manual on Price and Volume Measurement

This Manual describes the various methods used to express economic variables in constant prices for the purposes of national accounts. It defines A, B and C methods for price and volume measurement. The criteria for classification into A, B and C methods are summarized briefly below.

An index used for deflation is classified as an A method if:

- it is an index of the (domestic market and export) price(s) of exactly the same goods (groups of goods);
- the index takes into account changes in the quality of the good(s);
- price developments are considered at producer prices;
- the underlying concepts correspond to those of the national accounts.

In principle, deflation of the production value using a suitable SPPI is considered an A method. All products should be deflated separately using an appropriate SPPI.

All methods for which complete equivalence with the use of SPPIs can be demonstrated are also to be regarded as A methods. This could be, for example, a CPI for a service that is only used by private households, where there are no trade margins and taxes or subsidies do not change.

If no suitable SPPI is available, several alternative indicators may be considered. The following, for example, will generally constitute B methods:

- a less suitable SPPI, e.g. an index without quality adjustments or an index with a smaller or larger coverage than the goods item;
- a consumer price index (CPI). The same three criteria apply here as for SPPIs (CPIs are normally adjusted for taxes, subsidies and trade margins in order to obtain a valuation at

producer prices); in addition, the weighting should be appropriate and the concepts should correspond to those of the national accounts;

The use of some other possible indicators of the type listed below is generally considered a C method:

- Input methods (both input price and input volume indicators);
- secondary indicators, i.e. indicators not directly related to production;
- SPPIs, CPIs that do not correspond at all to the good(s) in question, e.g. the overall CPI. Indicators of this type generally satisfy the four criteria to a much lesser extent than B methods.

4. Types of estimators

4.1. sub-aggregate of the consumer price index

- Description/definition
  As mentioned above, the use of CPIs, whether alone or in combination with another price measure, can be helpful as a proxy for B2C transactions.

- Minimum requirements
  For a CPI to be suitable, there needs to be some consumer facing activity not already covered by the B2All SPPIs. Data (such as turnover) should be available to calculate weights for the CPI and any other prices being used.
  There needs to be good alignment between the CPI used and service covered, without duplication if being combined with another price measure.
  Ideally, changes in tax rates such as VAT should be removed.

- Strengths and weaknesses
  Including the CPI can improve coverage of the deflator when the SPPI does not sufficiently cover B2C activities. CPIs are often calculated by the same organization as calculates SPPIs and National Accounts and so are often readily available for deflation purposes. The quality of some CPIs may be greater than SPPIs (for example with larger sample sizes).

  However, the CPI may be based on a different classification system (such as COICOP) to any SPPIs which can cause challenges in identifying a suitable CPI.

- Examples
  In the UK, a sub-aggregate of the CPI is used in multiple places where an SPPI may be preferrable. Within GDP(O) some services which are primarily consumer facing use the

most relevant CPIs. This includes veterinary services, consumer airfares and hotels. Sometimes, these are combined with SPPIs where available and appropriate. For example, the CPI is used for consumer airfares, and the SPPI for business travelers.

Prior to an expansion of SPPI coverage in 2021, an average of the all-items CPI and Average Weekly Earnings was used as an alternative to the SPPI in the output measure of GDP. This was based on the assumption that intermediate consumption and wages were the primary costs in services and therefore heavily related to these prices. These measures have been gradually replaced by SPPIs where available, but are still in place where SPPIs are unavailable, such as deflating CPA 72, Research and Development (R&D), output.

4.2. sub-aggregate of another price statistic

- Description/definition
  Although consumer price statistics look at price developments at a different economic level than producer price statistics, they often observe the same products. It therefore makes sense to look for suitable estimators among the sub-aggregates of the CPI. However, where no genuine SPPIs are available, national accounts have in the past often made use of price developments for products at the producer level that can be assumed to be similar to those for which no suitable price index is available. This is highly likely if a product is the main input for the output of a service.

- Minimum requirements
  Of course, the input of a service consists of more than just a product. Wages are therefore likely to always play a certain role in the service sector. In this respect, limiting the approximation to the price development of one input component can only be justified if this component accounts for a very large share of the total costs. This should be verified before deciding not to conduct a genuine regular survey of producer prices.

- Strengths and weaknesses
  Assuming that the price development of output can be reflected by the price development of a single input component is a very simplistic assumption. In the case of an estimate using another producer price index, the main advantage is that the same rules apply to the inclusion or exclusion of fees and taxes.

  Even if it is certain that the price of the output depends to a large extent on the price of a single input component, the question of the time lag arises. How immediately do the prices of the input have an effect? In the case of purchases, as in the following example, the service provider is not immediately forced to pass on price increases to its customers. He purchased his inventory, e.g. machinery, at an earlier point in time, and replacements

may not be immediately necessary. Looking at the market as a whole, only a certain proportion of the input is newly procured. The highly simplified assumption that price developments are closely linked is therefore to be viewed critically.

- Examples
  In Germany, due to the lack of more suitable deflators, most price developments for leasing are approximated under this assumption. Thus, for NACE 77.1 'Rental and leasing of motor vehicles', NACE 77.31 'Rental of agricultural machinery and equipment', 77.32 'Renting of construction machinery and equipment' and 77.33 'Renting of office machinery, data processing equipment and facilities', the corresponding producer price indices for industrial products are used.

  In the UK, as mentioned above, we use the relevant Average Weekly Earnings (AWE) series as an input into the deflation of some services output where an appropriate SPPI is not available. In addition to R&D, this is the case for services such as CPA 59 (Motion picture, video and television program production services) and CPA 90 (Recreation and cultural services), where the AWE is combined with the top-level CPI.

4.3. recalculation of an estimator from microdata of another price statistic

- Description/definition
  It may happen that prices are collected for other price statistics, such as the CPI, which would also have to be collected in a similar manner for producer prices for services in order to calculate an SPPI. In the interests of avoiding unnecessary burdens on respondents and keeping the resource requirements of the statistical office to a minimum, efforts are made to avoid such double collection. This inevitably raises the problem of defining the markets for which these prices are collected or would have to be collected.

  The producer price indices for services measure, on a representative basis, the development of prices for services provided by domestic producers to commercial and private customers in the various branches of the service sector. An essential market demarcation is therefore the location of the service provider. Only prices of domestic providers are collected. In addition, prices of companies are collected for the calculation of producer price indices. Consumer to Consumer (C2C) services are not included in price measurement. For the CPI, prices may be collected that go beyond this narrow demarcation. For example, unlike the SPPI, prices from foreign airlines are collected for the CPI for the sub-aggregate passenger transport by air, because private households also buy tickets from foreign airlines. Similarly, prices for services offered by private households are included in the CPI. For example, a significant proportion of rental apartments are offered by private landlords.

In addition, the question arises as to whether the price development of a product or product group should be measured, or the price development of the offers of companies whose economic focus lies in a particular industry. The market definitions used in the collection of prices for the CPI are not based on the industry classification of the suppliers. It is therefore possible that prices from suppliers in many different industries are included in the price survey for the CPI.

- Minimum requirements
  As with most other estimators, a key requirement for the use of individual data collected for the CPI is the adjustment for value added tax.

  In addition, the definition of the products for which prices are collected naturally plays a decisive role in this type of approximation. A recalculation using a subset of the prices collected for producer price index purposes is only useful if both the required aggregate of producer price statistics and the aggregate of consumer price statistics focus on the same products, which in the best case are also predominantly demanded by private households.

- Strengths and weaknesses
  The advantage of recalculation based on microdata rather than using, for example, the CPI aggregate is that the microdata for the recalculation is adjusted to the definition of the market being observed. It can be filtered according to the location of the service provider, the industry of the provider or according to B2B, B2C or C2C. By calculating an estimator from a subset of the microdata, it may be possible to get much closer to the SPPI that one would like to collect and calculate according to pure theory.

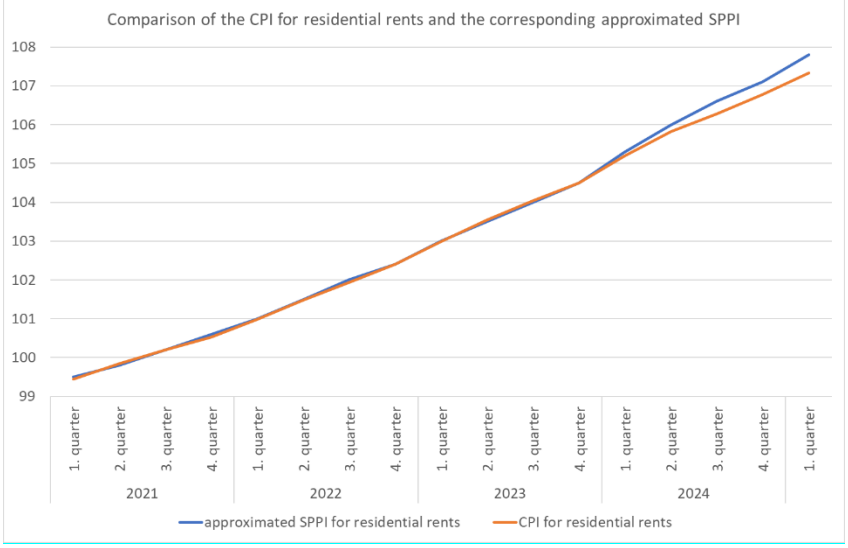
  The method is less suitable if a significant proportion of the services in the industry under review are B2B services which, for various reasons (different quality, different price conditions due to the quantities demanded), have a different price development than B2C services. A good approximation by recalculating with a subset of the prices collected for the CPI is therefore only possible for the B2C share.

  However, this requires that the filter criteria needed to define the market appropriately are available in the collected data.

- Example
  In German price statistics, residential rents are only collected once for the consumer price index. This relatively large sample, which covers the rental market in Germany very well, includes both apartments rented from private individuals and apartments let by commercial landlords. C2C rents are not included in the SPPI calculation. The aggregate calculated using commercial rents, together with the price development of commercial property rents, forms the SPPI for NACE 68.2. For the sake of simplicity, it must be assumed that the price development for dwellings is the same for providers whose economic activity is mainly in this industry as in the rental market as a whole (excluding C2C).

  Before the SPPI for NACE 68.2 was first published, the price trends for residential rents charged by commercial landlords were compared for the market as a whole and for the subset of landlords whose economic activity is mainly in this industry. It became clear that the differences in price trends are not significant. Since restricting the microdata to data sets from landlords in 68.2 would significantly reduce the sample size, it was decided to include the entire commercial residential rental market in the calculation in order to achieve greater coverage.

  The difference in the price development of residential rents including private lettings and excluding C2C rents is shown in the following chart:



  At first glance, it appears that the development of rents for commercial landlords and private landlords is almost identical. However, we can see that the two indices for residential rents overall and residential rents from commercial landlords will diverge from 2024 onwards. As the national CPI will not be switched to a new base year until the

beginning of 2028, this divergence could become even more pronounced in the next two and a half years. This was precisely the scenario that was anticipated when it was decided to calculate a new index from the SPPI microdata for the approximation of the SPPI.

4.4. Other countries' SPPIs

- Description/definition
  There may be situations where the use of other countries' SPPIs is helpful as a proxy for a domestic SPPI. This can be to supplement domestic price indices, or in place of them. Similarly to the other methods discussed, leveraging existing data sources can help alleviate pressures in producing domestic SPPIs.
  This is most useful in situations where the trade (and particularly the import) of services is significant.

- Minimum requirements
  Depending on the country chosen, there may be challenges around mapping between different classification systems. Having a clear alignment between the SPPI chosen and how it's used is essential.
  There should also be considerations of quality and availability; using another countries' data introduces a risk of them discontinuing the series or changing methodology. It may be helpful to discuss the use of the data with the other NSI to try to ensure continuity.
  If the country in question uses a different currency, there should be some consideration of currency exchange rates. Ideally, this should account for the currency these services are traded in, which may not be the currency of that country.

- Strengths and weaknesses
  As with other examples given, drawing from alternative data sources can be useful in supplementing domestic SPPIs. Without specific Trade in Services deflators, using other countries' SPPIs as an indicator of the prices of imports of services can be constructive.
  As mentioned above, there may be some risk that the SPPI is discontinued, or classification changed such that it no longer meets requirements when used as a proxy. This can be somewhat mitigated through collaboration and communication between NSIs.

- Examples
  In the UK, we have used other countries' SPPIs in situations a relevant deflator is not available and there's evidence of imports being a significant source of the service. For example, in our GFCF deflator for computer software, we would conventionally use the SPPI for domestic computer software publishing (CPA 58.2). This is not available, and

research showed that most of our pre-packaged software was imported from the USA. As a result, we use the USA's SPPI for pre-packaged software in place of a domestic series.

We are also currently in the process of introducing the use of SPPIs from other countries more widely as a proxy for import SPPIs. This is in place of other countries' CPIs which had been used.

4.5. External data sources

- Description/definition
  This estimation approach could cover any number of alternative data sources and methods which may have a use in the creation of SPPIs. It is likely to be most helpful on occasions where standard survey-based price collection has limitations, whether for coverage or other reasons.

- Minimum requirements
  The data source should be from a reliable provider and delivery should be guaranteed. Using administrative data sources are likely to be the most suitable as it is likely to continue to be collected and be of good quality. There may be the need to establish some form of data-sharing agreement to create a reliable flow of data.

  In order to be useful for creating deflators, the data needs to be of a suitable level of granularity to meet the purpose needed. This can be challenging given data is collected for different purposes so a detailed understanding of the alternative data source is necessary.

- Strengths and weaknesses
  Leveraging existing alternative data sources can allow for better outcomes than relying on traditional surveys and methods, as well as potentially reducing the need for some standard SPPIs.

  Introducing a reliance on external data sources can have limitations in availability and reliability; if an external organization decides to stop collecting or publishing data, the NSI is unlikely to have the ability to counter this. Other data providers are also likely to produce and publish data on different timescales to SPPIs, so there may be a lag in data availability which needs to be planned for.

- Example
  In the UK, we have developed an alternative to the SPPI for Telecommunications Services (CPA 61). This is due to the rate of quality change in Telecoms, which the SPPI was unable to keep pace with. Using data from Ofcom (the national regulator of communication

services), a unit value method was derived based on prices and volumes of calls, SMS messages and data usage. This led to a deflator showing extreme price falls as the quality of the service improved quickly. More information on these methods and considerations can be found in this paper: Telecoms Deflators: A Story of Volume and Revenue Weights (ESCoE DP 2020-11) - ESCoE : ESCoE.