

Article

# Producer Price Indices methods changes

Outlines the move from net to gross basis to measure the headline producer price index, removal of duty and the sources used to compile the weights required for chain-linking.

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# 1 . Executive summary

We are implementing annually chain-linked business prices in line with international best practice and to improve consistency with other price indices such as the Consumer Prices Index (CPI). This is a significant improvement to the weighting and linking of business inflation statistics, which we previously [announced](#) as part of a consultation in 2017. The implementation of [chain-linking is recommended by Eurostat](#) over the current method of rebasing for price statistics, as the weighting structures are updated more frequently.

This article outlines the move from net to gross basis to measure the headline Producer Price Index (PPI), removal of duty and the sources used to compile the weights required for chain-linking. This article is part of a collection of articles we are publishing. Other articles published are:

- [chain-linking in business prices](#): this focuses on the methodology and practical implementation of chain-linking for business prices, including the technical process of price updating sales data to forecast more representative weights
- [services producer price inflation methods changes](#): this outlines the sources used to compile the weights required for chain-linking and a change to the classification framework
- [producer price weight change impacts](#): this discusses the impact of introducing chain-linking and the other new methods on weights used in the PPIs
- [services producer price weight change impacts](#): this discusses the impact of introducing chain-linking and the other new methods on weights used in the Services Producer Price Index (SPPI)

To complete the collection of articles, we will publish a further two articles to provide the impact of implementing the new methods on the PPI and SPPI. We are planning to publish the PPI and SPPI using the new methods towards the end of 2020.

## 2 . Introduction

Business prices are a collection of inflation statistics that measure the inflation across the manufacturing and service sectors and include the Producer Price Index (PPI), Export Price Index (EPI), Import Price Index (IPI) and Services Producer Price Index (SPPI). To meet international regulations, the weighting structure has historically been updated every five years to reflect changes in the economy. Business prices are moving to a new annual chain-linking methodology, which is the method of updating weights on an annual basis and statistically linking them to produce a continuous time series. This article outlines the changes in other methods that have been implemented to support chain-linking and to ensure that the outputs continue to meet users' needs based on consultations completed in [2017](#) and [2019](#). The method changes described in this article apply to the following statistics:

- PPI
- EPI
- IPI

### **3 . Move from a net to gross measure within producer inflation**

Producer Price Indices (PPIs) can be measured on two different bases: gross and net of inter-sector sales. Gross sector PPIs include products sold by one business to another business classified to the same industry sector. Net sector PPIs exclude (net out) products sold by a business to another business classified to the same industry sector.

In the PPI, net figures are obtained by applying different sets of weights, which exclude turnover generated by sales of products to businesses within the same industry. For example, the sale of petrol to supermarkets is included in the net weight calculation, while the sale of steel to the car industry is not as this is a transaction that takes place within the manufacturing sector.

Currently, our headline figures for both output and input PPI are published on a net basis. As part of the package of improvements that we are introducing at the same time as implementing annual chain-linking, we will move our headline figures to a gross basis. The move from net to gross is in-line with international best practice, with users being consulted on the change in [2017](#) and [2019](#). It also increases consistency with the Services Producer Price Index (SPPI) headline figures, which are already calculated on a gross basis, having used this methodology since 2014.

### **4 . Removal of duty**

Taxes on products are generally excluded from Producer Price Indices (PPIs) in line with international guidelines (for example, Value Added Tax (VAT)). However, for some product groups, including petroleum products, alcohol beverages and tobacco, we produce two sets of series, one including and one excluding duty paid on both the sales and prices. Currently, the series including duty is used to calculate the PPI headline figure, but we are changing to use the series excluding duty thus ensuring the impact of government duty policies are removed from the headline PPI. This improves its use as an economic indicator. We will do this by calculating weights from sales with duty costs removed.

We will continue to publish the top-level PPI series including duty, but we will lead with the series excluding duty as our headline, in-line with international best practice.

### **5 . PPI, IPI and EPI weights sources summary and processing**

The same sources are utilised to compile weights required for Producer Price Indices (PPIs) for both the previous rebasing method and the new annual chain-linked method. This section summarises the data sources and processes used and provides information on where methods changes using these existing sources have been made to enable the introduction of annual chain-linking. [Section 6](#) provides a more detailed explanation of the methods changes.

Sales data are gathered from several different organisations and surveys to ensure full coverage and representativeness of all product groups. Weights in the chain-linked PPI, Import Price Index (IPI) and Export Price Index (EPI) are generated by price updating the value of annual sales, to represent sales values during the link period. This is described in [Chain-linking in business prices](#).

The following sections give an overview of the process used to calculate the weights as part of the annual chain-linking process. More detailed processing is covered in [Section 7](#).

## UK manufactures' sales by product (ProdCom)

As with rebasing, most sales values and volumes for UK manufacturing are collected by our [UK manufacturers' sales by product \(ProdCom\)](#) survey. ProdCom estimates the total sales of a product, which include export sales. Export sales values are removed from the reported ProdCom sales to estimate sales from UK manufacturers to the UK domestic market only. The source for the export sales values is HM Revenue and Customs (HMRC) trade data. The method for removal of exports from ProdCom sales values has been revised for chain-linking and is discussed in [Section 6](#).

The sales data excluding exports are then price updated as part of the annual chain-linking process to serve as weights in PPI gross sector output (GSO). This is described in [Chain-linking in business prices](#).

## Department for Business, Energy and Industrial Strategy (BEIS)

The ProdCom survey for annual UK manufacturing sales values does not cover crude oil, petroleum products, coal, gas and electricity industries. These industries annual sales values are instead sourced from the Department for Business, Energy and Industrial Strategy (BEIS). Export sales are removed using the same new method applied for ProdCom sales ([Section 5](#)). The only exception is crude oil, which has export sales removed based on BEIS source data. The sales data excluding exports are then price updated as part of the chain-linking process to serve as weights.

## International Steel Statistics Bureau (ISSB)

The ProdCom survey only offers partial annual sales values coverage of the UK steel industry in the PPI GSO; the remainder is covered by surveys conducted by the International Steel Statistics Bureau (ISSB). Export sales values are removed using the same new method conducted for ProdCom ([Section 5](#)) before being price updated as part of the annual chain-linking process.

## Annual Business Survey (ABS)

The Annual Business Survey (ABS) is a sample survey that collects annual sales data for UK businesses across the whole economy, including businesses within the manufacturing sector, and was also used during the last rebasing exercise. ABS data are used for calculating annual sales values that include duty, annual sales values for the water and forestry support service indices, and annual sales values for products that are not covered by other sources. Exports are removed using the same new approach as ProdCom ([Section 5](#)) before being price updated as part of the annual chain-linking process.

## Department for Environment, Food and Rural Affairs (Defra) and Marine Management Organisation (MMO)

The Department for Environment, Food and Rural Affairs (Defra) and Marine Management Organisation (MMO) provide annual sales values for the home-produced food indices in the PPI. Unlike sales values provided by other sources, export sales values are not removed as most raw foods are not exported without some form of operation or preservative treatment, and therefore become a UK manufactured food product. In addition, home-produced food indices are not aggregated with other indices in the PPI GSO, which do have exports removed from their sales estimates. Sales are then price updated as part of the annual chain-linking process.

## HM Revenue and Customs (HMRC)

HMRC supply the Office for National Statistics (ONS) with annual export and import sales value data for use as weights in the IPI and EPI. The coverage is split between trade to or from a EU and non-EU country, which correlates with the index structure in the IPI and EPI. HMRC exports provide the values to be removed from PPI sales sources to estimate UK production sales that remain in the UK. A limitation of HMRC data is that goods that are unrelated to manufacturing or do not remain in the UK after being imported can be included. This is because of restrictions on how HMRC records the identity of any given trader. Sales data are price updated as part of the annual chain-linking process.

## 6 . PPI, IPI and EPI weights methodology improvements

To implement annual chain-linking for the Producer Price Index (PPI), Export Price Index (EPI) and Import Price Index (IPI), a change to the process for producing weights is required. Previously, the weights were produced to enable five-year rebasing. In this section, we focus only on differences in the approach. The handling of sales data prior to updating for a chain-linked index series is the same as discussed in [Rebasing the PPI and Services Producer Price Index \(SPPI\) \(2010=100\)](#) and [PPI Rebasing 2010 – questions and answers \(Word, 34KB\)](#) document for the 2010 rebasing of the PPI, EPI and IPI, unless highlighted in this section.

### Change in classification for PPI, EPI and IPI

Previously, the PPI, EPI and IPI were collected using the statistical [Classification of Products by Activity 2008 \(CPA 08\)](#) framework. An improvement that has been made alongside annual chain-linking is the implementation of the [Classification of Products by Activity 2.1 \(CPA 2.1\)](#) framework. CPA 2.1 is the most up-to-date international product classification system, reflecting product change over time. Changes between the frameworks are only seen below the four-digit product level.

### Removal of export sales from sales for the PPI weights

Exports are removed from gross UK production sales that are to be used as weights for indices within the PPI gross sector output (GSO) to estimate the sales from UK manufacturers to only the UK domestic market. These are also known as homesales. The previous approach for removing exports applied an imputation method, when the HM Revenue and Customs (HMRC) export sales were greater than the gross UK production sales. Exports sales can be greater than UK production sales because of transient trade and wholesales activity. The imputation for homesales used for the 2010 rebasing caused unfounded discontinuities between yearly index weights.

A revised approach has been applied to minimise discontinuities between yearly index weights. These improvements are:

- imputation method has been refined to lower imputation bias
- where an imputed factor for removing exports is required but a non-imputed factor for removing exports exists in the previous three years for the same product, use the most recent non-imputed factor to remove exports
- if we have imputed an export removal factor, the amount of adjustment is limited relative to the proportion of exports removed in the previous year for the same CPA six-digit

## BEIS sales: UK demand compared with UK production

Prior to chain-linking, weights for petroleum products, gas and electricity in the PPI were provided by the Department for Business, Energy and Industrial Strategy (BEIS) on the basis of UK consumption, also known as UK demand, which was calculated as UK production plus UK imports minus UK exports. This was inconsistent with the sales basis for all other indices in the PPI GSO, which are based on gross UK production without exports. Since January 2014, the weights for these industries in the PPI have been based on the sales for gross UK production without exports.

## Removal of gold bars, gold rods and gold wire from HMRC sales

London is a significant location for the storage of gold bullion. This causes a significant bias for the IPI and EPI, as HMRC will report the movement of gold bullion across the border regardless of whether the gold changed ownership or if the gold was simply stored without entering any type of manufacturing industry.

In some years, this causes the indices for “gold: unwrought or semi manufactured” (CPA 2.1 24.41.20) and “Precious Metals” (CPA 2.1 24.41) to have an extreme weight in the IPI and EPI, which would have resulted in an erroneous effect on the system as these imports and exports are largely unrelated to manufacturing. The significant export sales generated from gold bars also impacted the weight for the corresponding PPI GSO indices when exports were removed from the gross UK production sales for “gold: unwrought or semi manufactured”.

For the 2010 rebased weights, the sales relating to any kind of unwrought or semi-manufactured gold were set to zero. However, for calculating chain-linked weights, only the HMRC import and exports sales for gold bars, gold rods and gold wires are removed from the sales figures for the PPI, EPI and IPI. This is because there are other gold-related sales data points reported by HMRC, so an improvement has been made to ensure the indices for “gold: unwrought or semi manufactured” and “Precious Metals” are still weighted in the PPI, IPI and EPI system.

## 7 . Appendix 1: Technical sales processing

This section provides technical details on the processing of the sales data used for chain-linking from 2014.

### Sales sources

Upon implementing annual chain-linked data for Producer Price Indices (PPIs), a challenge experienced for many data sources has been mapping their classification systems to the [Classification of Products by Activity 2.1 \(CPA 2.1\)](#) framework. This has been achieved by mapping sales data from suppliers' classification frameworks to [Classification of Products by Activity 2008 \(CPA 08\)](#) using the same methods used during the 2010 rebasing. A further step has now been introduced that ensures data sources are price updated and mapped to the CPA 2.1 classification framework. This method has been applied to calculate chain-linked weights up until 2020. From 2021, we have plans to introduce further enhancements where sales will be mapped directly from supplier frameworks to CPA 2.1 and then price updated. This will minimise the number of mapping operations and will increase accuracy as fewer assumptions will be required.

This section provides further details on sales processing for specific sources to align them to the CPA 2.1 framework. The processing is broadly in-line with the methods used for the 2010 rebasing, but enhancements have been made to improve the quality and ensure better representativeness of the manufacturing sector.

## **HM Revenue and Customs; Department for Business, Energy and Industrial Strategy; Department for Environment, Food and Rural Affairs; and Marine Management Organisation**

HM Revenue and Customs (HMRC) export and import sales are used for the Import Price Index (IPI) and Export Price Index (EPI) as well as for PPI gross sector output (GSO) export removal. Data are primarily mapped from Combined Nomenclature (CN) eight-digit to CPA using the annual correlation matrix supplied by Eurostat, split for EU and non-EU imports and exports. A provision has now been introduced for removing some CN eight digits (for example, gold bars) at this stage if deemed unsuitable to be included in the IPI or EPI, as discussed in [Section 6](#). There are no further changes when compared with the 2010 rebasing process.

The Department for Business, Energy and Industrial Strategy (BEIS) sales are supplied directly in a CPA six-digit format for the PPI GSO and PPI. For crude oil, export sales are removed using export figures generated by BEIS ([Section 5](#)). Sales for other products are supplied by BEIS on a gross UK production basis, where HMRC exports are removed using the same method that is used to remove HMRC exports from ProdCom, Annual Business Survey (ABS) and International Steel Statistics Bureau (ISSB) sales, as described in [Section 6](#). There are no further changes when compared with the 2010 rebasing process.

Department for Environment, Food and Rural Affairs (Defra) sales are supplied for PPI home-produced foods. A correlation matrix is used to map between Defra's Agricultural Price Index (API) classification system and indices in the PPI. There is a small imputation method agreed with Defra for handling five indices, which have had their sales merged with other products over time, to split out their respective sales. Sales are used as weights on the basis of UK production with exports ([Section 5](#)). The home-produced food section is independent of any other section of the PPI. There are no further changes when compared with the 2010 rebasing process.

Previously, Defra supplied sales on behalf of the Marine Management Organisation (MMO); the Defra data covered all fish landings by a UK vessel anywhere in the world. Processing metadata directly from MMO allows for isolation of all fish landings at UK ports only. Sales are used as weights on the basis of UK production with exports. The home-produced food section is independent of any other section of the PPI ([Section 5](#)). There are no further changes when compared with the 2010 rebasing process.

For the weights used for all periods during a given chain-linked year, Defra, MMO, HMRC and BEIS sales are required to be price updated from the annual sales totals that are one year prior to the link period. For example, Defra, MMO, HMRC and BEIS annual sales from 2019 will be mapped to indices and then price updated to estimate the economy in the link period (December 2020). These price updated sales will then be used as weights for all periods in 2021.

### **ISSB, ProdCom and ABS**

UK manufacturers' sales by product (ProdCom) sales are used for the PPI GSO weights and are supplied in CPA 2.1 from 2016 onwards; these are aggregated from eight-digit ProdCom question code to CPA six-digit by taking the sum of all eight-digits with the same first six-digits, in line with ProdCom methodology. Prior to 2016, sales were supplied on a CPA 08 six-digit basis, which is mapped to CPA six-digit from eight-digit ProdCom question code with the same method as described earlier. Bespoke ProdCom question codes are mapped on an individual basis.

ABS data are used to generate duty and aggregate levy ratios. These are then used to determine the sales used as weights for the modified CPA six-digits indices that include climate change levy, duty or aggregate levy. This method has not changed since the 2010 rebasing. ABS also provides sales for water services and forestry services. Previously, sales for water services were covered by the Water Services Regulation Authority (Ofwat), but since 2010 they no longer gather the required data.

ABS is also used as an alternative data source for CPA six-digit sales whenever required coverage has been lost from another data source of sales data for PPI GSO. The sales are mapped to CPA six-digit using an appropriate mapping decided on a case by case basis. For chain-linking weights used from 2014 to 2019, this includes only five CPA six-digits, four of which are relevant to nuclear materials and one represents industrial lubricants. This is in addition to the other uses of ABS, as established in the 2010 rebasing.

For all sales provided by ProdCom, the ISSB and ABS used in a given chain-linked year, exports are removed to estimate sales from the UK manufacturing sector to the UK domestic market only ([Section 6](#)). The only exceptions are forestry support and water services. Once exports have been removed, modified sales are calculated for the CPA six-digit entries that include climate change levy, duty or aggregate levy. Sales are then required to be price updated from the annual totals that are two years prior to the link period.

For example, ProdCom, ISSB and ABS annual sales from 2018 will be mapped to CPA six-digit and exports subsequently removed. The figures will then be price updated to estimate the economy in the link period (December 2020). These price updated sales will then be used as weights for all periods in 2021.

## 8 . Authors

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