Federal Statistical Office of Germany

Dvision Prices
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The new architecture of the German PPI (producer price index) concerning survey sampling, data collection and processing

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1 Introduction

The German PPI is part of the system of German price statistics which comprises the price trend of the chain of value added of products, from production and trade to consumption. What is calculated in addition to PPI of industrial goods is indices of agricultural and wood production prices and construction price indices, as well as producer price indices of services.

The producer price is defined as the amount the producer obtains at the time he signs the contract of sale. While excise duties and fees similar to taxes are included in the producer price, value added is not.

The PPI delivers monthly data on the price development of domestic products in the mining, manufacturing and energy sector that are sold within Germany. It is published as an overall index of all industrial products as well as on a more detailed level for different aggregations. Thus it is possible to analyse the results of certain economic sectors and to examine the influence of price developments at the production level on further levels such as consumption.

2 Universe

The universe of the PPI is theoretically built by all performed contracts of sales of products

- that belong to certain groups of products
- that are concluded by companies belonging to a certain economic sector
- that are concluded by companies that are situated in Germany, produce in Germany and sell their products within Germany

To render possible the calculation of PPI, monthly data on prices are collected that are achieved through a specific contract for a specific sale. The companies that are included in the survey describe representative sales which should be realised constantly.

The reference day of the PPI is the 15th of any month. So the respondent may concentrate on that special day.

3 Organization

3.1 Selection of survey units

The main data sources used for sampling and weighting are turnover and production statistics.

For assessing the weights of the PPI, the domestic turnover of local kind-of-activity units is used. The quarterly production statistics delivers information on turnover by economic sectors subdivided by particular sorts of products.

The first step of selecting companies is to fix the number of price series for each item of the sample basket. The basic rule is to get one price representative per 0.1‰ of weight. If an item shows a great variability more price series will be fixed.

The second step, the decision on whether a company is selected for the sample, is based on its output. That information is made available by the production statistics which does not include companies with less than 20 employees. This means a cut off method in selecting companies. Smaller companies show a greater fluctuation. Larger companies are expected to be able to deliver constant information for a longer time, so this cut off method is reasonable. The output of the selected companies should cover a maximum percentage of the whole turnover of an item of the classification. This is most probably achieved by selecting the largest companies if possible.

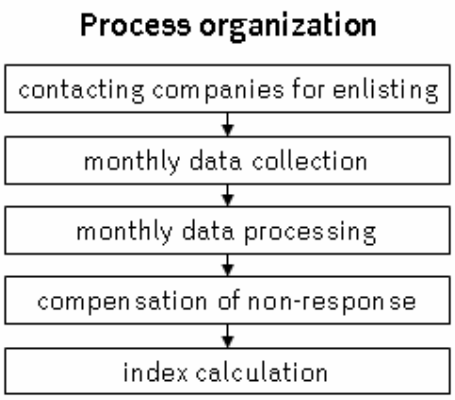
Thus the sampling of companies is a combination of targeted selection and cut off method.

The representativeness of the PPI depends on the composition and up-to-dateness of the sample basket. At intervals of 5 years, the sample basket is adjusted to the economic development and changes in the structure of production. At the same time, the base year is changed to a new year. The current base year is 2000.

3.2 Process organization

Since processing of the German PPI was centralized in 2006, the German PPI has been processed based on a new processing programme which covers all steps of the survey beginning with recruiting companies for participation in the survey and ending with the evaluation of the data.

Figure 1:



Each staff member of Destatis (Federal Statistical Office of Germany) is responsible for a certain group of products. So it is possible for him/her to achieve special knowledge of the products he/she is responsible for. Judging special price developments and implausibility is much easier being an expert for a range of products.

The responsible person works on his/her price series starting with the recruitment of companies to take part in the survey up to finishing the monthly price report. He/she is supported by the new processing programme that works dialogue assisted. So the staff member has a full overview of the process all the time of processing.

3.3 Contacting companies for enlisting

Once a company has been selected for the survey, a dataset with the necessary information is created in the database at Destatis to support the staff member in contacting the company and checking if and when the company will answer the request to take part in the survey. If a company does not respond to the request the staff member will send a reminder with technical support by the new programme.

The selected company is asked to define a certain product of its product assortment that is consistent with a certain item of the classification. The price representative should have a high and stable importance regarding turnover. That will assure that the product will remain on the market for a longer time, will have an unchanging quality and be sold at constant sales conditions. The development of the price of the chosen product should be representative of similar products that are not included into the sample.

When defining the price representatives, the company is supported by the responsible staff member of Destatis.

The transaction has to be described in detail to guarantee statistical comparability over a time period. The description includes the exact specification of the chosen product itself but also the description of the sales conditions which are the economic level of the purchaser, the mode of dispatch, reductions, packaging, the unit of quantity, the quantity of purchase and the payment practice. Both form an integrated whole called price setting characteristics.

Defining the product in that exact way makes it easier for the staff member - in case of price changes - to distinguish between changes of the product itself (quality, sales conditions) and a pure change of the price. Only pure price changes may be accounted for when calculating the index.

Here are the sales conditions as given in the questionnaire and some examples:

Sales conditions	**Example**
Economic level of purchaser	Wholesale, retail
Mode of dispatch (transportation)	Own motor truck, forwarding agent, rail freight, pickup by the customer
Delivery terms	Ex factory, ex stock, delivered free
Discount	Quantity discount, aggregated rebate, factorage, additional charge
Packaging	Bag, box, tank, barrel, can, pallet
Unit of quantity	Kilogram, ton, meter, cubic meter, piece
Quantity delivered	Total quantity that is delivered constantly: container, pallet
Payment practise	30 days, cash discount, net cash

Figure 2:
Detail of the questionnaire designed for description of the price representative

Firmennummer	**Genaue Verkaufskonditionen**	(Bitte prüfen und ggf. hier ändern!)
GP-Nr. 2414 44 500		
Genaue Warenbeschreibung [1] (Produktbezeichnung, Ausführung/Typ, Artikel-Nr. usw.)	Wirtschaftsstufe des Käufers [2]	Weiterverarbeiter
Trimethyl-Hexamethylendiiso-Cyanat (TMDI) zur Herstellung licht-u. wetterstabiler Polyurethane	Versandart (Transportmittel) [3]	Spedition
	Frachtlage [4]	frei Haus/frei Empfänger/frei Lager
	Preis gilt: - nach Abzug/unter Einbeziehung folgender Rabatte/Zuschläge [5]	2 % Rabatt
	- ohne/einschl. Verpackung, Verpackungsart ggf. angeben [6]	Fässer
	- je Mengeneinheit [7]	1t (1000kg)
	- bei Abnahme-/Liefermenge [8]	2t
Bitte prüfen Sie, ob die von Ihnen gemeldete Ware noch repräsentativ ist. Nehmen Sie ggf. Änderungen hier vor.	- Zahlungsbedingungen [9]	30 Tage netto

The current sample consists of about 7 100 companies which deliver about 12 900 prices related to the 1 627 items of the sample basket. Depending on the product range, some companies report only one product, while others report more. Price information on some specific items of the sample basket is collected by using other sources such as the European Energy Exchange for the prices of electricity for special contract customers.

As a first step, incoming information is checked whether the required detailed information on the product itself and its sales conditions is given by the respondent and whether the price representative is indeed part of the item of the classification that forms the basis. Data of the respondent are recorded in the database.

Price information should not be derived from average prices (the quotient of turnover and the amount of sold products within a group of products). It depends on the structure of the sold amounts that may vary from one period to another and may cause a change in the average price although the price of the single product stays constant.

3.4 Data collection

As the reference day for the survey is the 15th of each month, respondents deliver price information for contracts that were signed that day.

There are two principal ways of data collection:

3.4.1 Survey questionnaire

The survey questionnaire is the same for all sorts of products. There are data fields to enter price information not only for one month but for a whole year. After the processing of one month the questionnaire is sent back to the respondent next month for adding the new price information. Proceeding this way means that the respondent as well as the responsible staff member has an overview of the previous development of the price representative. This may help to avoid mistakes. The respondent is asked to give information about the reason of an uncommon development. When the specification of the product itself or of its sales conditions has changed the respondent is asked to change the description in the questionnaire too.

When paper questionnaires are used, they are sent to the respondents before the 10th of each month.

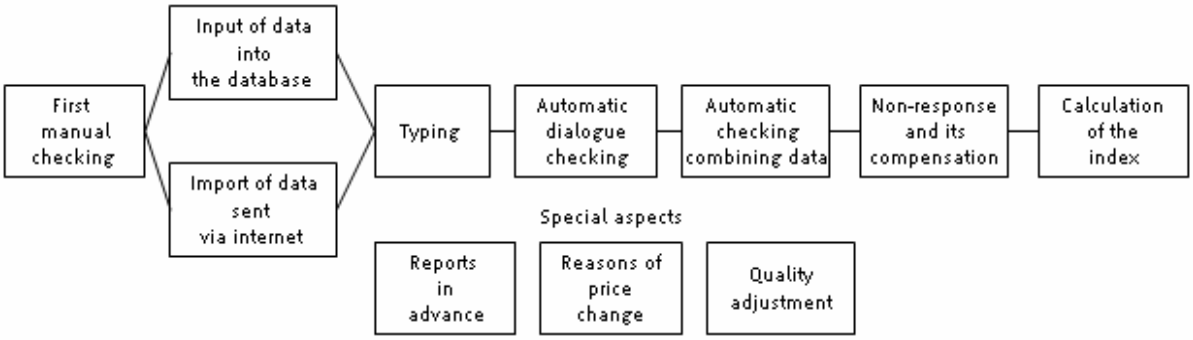
3.4.2 Online method

Since the end of 2006, respondents have had the opportunity to send price information online by using an online questionnaire which was generated by Destatis. The system is called IDEV ("Internet Datenerhebung im Verbund"). By using a trusted connection the respondent is shown the historical data he delivered before. So the advantage of the paper version is maintained also when using the internet. The respondent fills in the internet questionnaire and sends the data to Destatis via internet.

When using the online method, the respondent receives an email around the 10th of each month to remind him of his duty.

3.5 Processing of the data

Figure 3: Overview



3.5.1 Data checking - checking whether information is complete

The first checking of incoming information consists of checking whether the questionnaire has completely been filled in.

At the same time the staff member checks whether the description of the product or the sales conditions have changed since the preceding month.

3.5.2 Input of the data into the database

The questionnaire is printed with a bar code label by the new processing programme before it is sent to the respondent. When the questionnaire is sent back to Destatis, the staff member scans the bar code on the questionnaire to display the dataset on the screen showing all the information already stored in the database. Thus he/she is able to check the new price information conclusively.

As the displayed information comprises the price reports that were entered into the database the previous months, the staff member may recognise special price developments when entering the data.

Price information that is reported via internet is imported by a special interface. By using a special menu the user may switch to a list of all data sent via internet to view and check them.

When entering the new data into the database and when checking the data sent via internet the user is assisted by different tools that are integrated into the processing programme. The main tools are typing of the data and integrated automatic checking.

3.5.3 Typing

When the current price is entered the tool for typing calculates the following information, displaying them on the screen:

- the simple index (price relative) for the current month as a result of the new price and the base price
- the percentage change between the simple index of the previous month and the new one
- the percentage change between the simple index a year ago and the new one
- period of time during which the price has not changed
- period of time during which the simple index has not changed
- period of time during which the respondent has not reported price information

That information may assist the user while assessing the reported information.

If the price of a product remains the same for a long period (see typing, above) it will become necessary (sooner or later, depending on the product) to contact the respondent and verify the information (maybe the respondent forgot to inform about a change of price). Standard evaluations are implemented to show, among other information, how many of the price series did not change, structured by different periods of time. Those evaluations on one hand act as a quality test and, on the other hand, help to find price series with unchanged price information that should be verified and corrected with the help of the respondent, detached from the monthly process when the staff members are pressed for time.

3.5.4 Prenotation (reports in advance)

In some sectors prices usually do not change every month. Often the respondent knows a long time in advance when the next price adjustment will occur. In that special case the respondent may give the information up to which time the price will be valid. The staff member will enter the data into the database and may finish the processing of this price series up to the indicated month. The respondent will receive the questionnaire not before the indicated date. Giving the respondent the possibility to use this method may disburden him from the monthly reporting duties. Despite this possibility the processing programme won't accept notifications in advance that exceed a prescribed period of time.

3.5.5 Reasons of price changes

Changes in the price index cannot result from changes in quality. The index only represents pure price changes without quality change.

If the staff member recognises special price changes over time, he/she has to check whether the reason for it was a change in the specification or whether it was a pure price change. When there are changes of the specification often the staff member has to call back the respondent to calculate the amount of the pure price change.

In case of noticeable price developments the user of the processing programme may switch to a list that shows all price series of the same item of the sample basket to decide whether to accept the current price information as the actual trend or to contact the respondent to check with him.

With the new processing programme the reason for price changes will be coded and saved with the data. Thus it will be possible to analyse the reasons for price changes later on. The staff member has to check whether price changes and the reasons that were given for it are plausible. When they are not, the respondent has to be contacted promptly.

3.5.6 Checking of the data

The checking of data means checking of the internal logic of the price that was reported. Checking is done in two steps:

3.5.6.1 Online checking of the current price

Online checking concentrates on the single price representative. The reported price must seem logical within the price series. The checking of each price reported is done while entering the prices that were reported on a questionnaire and while importing the reports from the online system. At the latest when the user tries to save the dataset an error message is displayed on the screen when automatic checking detected a possible mistake.

There are two kinds of errors: errors that must be corrected and errors that may be corrected or may not be errors indeed.

Some of the implemented automatic checking is listed below:

Description	Error condition	May be/ Must be corrected
A price notification cannot be given more than 24 months in advance.	• Notification in advance • More than 24 months	Must
When the price of the previous and the current month are not the same the user has to specify the reason for it.	• The price of the previous and the current month are not the same • The user has not specified the reason	Must
The difference between the previous and the current month exceeds a limit that was fixed before.	• The difference between the previous and the current month exceeds a limit.	May be

For checking the data certain limits for plausible price changes may be defined for each group of products. Exceeding those intervals leads to an error message that often requires a call-back to the respondent. Different limits are defined for each group of products because price changes that may be normal for one group may be abnormal for another.

Errors that occur within the fixed intervals may not be recognised by using this method only. The judgement of the staff member who knows the market and its special conditions may not be replaced by the automatic checking. But this method may facilitate his/her task.

3.5.6.2 Checking of price report in combination with others

The checking of the entered data in combination with others is done when all price reports are entered into the database. It repeats the checking that is done while entering the data. But the main check is the deviation of each price change from the average of the products of the same item of the sample basket. This checking is not possible before all price reports for the current month are on hand.

Description	Error condition	May be/ Must be corrected
The difference of the current price report from the previous to the current month differs much from the other price reports of the same item of the sample basket.	• Calculation of the average difference of all price reports of the same item of the sample basket • Calculation of the difference between the average difference of the item and the difference of the current price report • That difference exceeds a limit that was fixed in advance within the second level of the classification of production statistics	May be

A development of prices that are similar within an item of the sample basket is accepted as a real price change that has taken place within the whole sector.

A special checking is carried out when an unusual price change is registered only for one price representative within a whole group before the unusual price change is included into the survey.

Before proceeding in processing all implausibilities have to be eliminated to avoid subsequent adjustment.

3.5.7 Quality adjustment

Using a Laspeyres index requires a constant compilation basic. Strictly speaking, that means absolute stability of the chosen transactions with regard to commodity descriptions and selling/purchasing conditions. In reality there are dynamic markets with permanent structural changes, i.e.:

- technical composition of commodities
- disappearing of old commodities, market introduction of absolute new goods
- changes in typical purchasing/selling conditions
- changes in the population of enterprises: insolvencies, start-ups, mergers and demergers, changing of production or trade assortments.

Though respondents are asked to choose the most representative commodity variant, the problem of handling transitions from old to new variants has to be solved. Because the contents of the sample basket should represent the current production, innovative products that can be assigned to an item of the current sample basket should be included within a base period as well.

In the case of changes within the price-setting characteristics of the product, methods of quality adjustment have to be deployed to calculate the pure price change of the product. Price changes may therefore be divided into two constituent parts: Genuine price change and quality change.

The following list shows methods of quality adjustment that are used for the German PPI.

- Direct price comparison
- Linking
- Overlap pricing
- Matched model approach
- Expert estimation
- Hedonic approach

The best way to do quality adjustment is the method of overlap pricing which can be used when the respondent is able to deliver the price for the new product that was achieved or could have been achieved the previous month. The questionnaire is designed with an additional column so the respondent may fill in that price too. Overlap pricing can only be used as a method of quality adjustment when old and new commodity variants were available at the market in an overlapping period of time.

3.5.8 Non-response

Not all of the price representatives may be updated every month with new price information either because of missing data on the single commodity or because of problems concerning the whole company. The problem of non-response may also be subdivided into temporary and permanent non-response.

3.5.8.1 Temporary non-response

The reason for temporary non-response may be for example that no contracts were signed that month, company holidays or internal problems within the company. The latter may cause a non-response of a whole company.

In the case of temporary non-response, missing prices are extrapolated with qualified extrapolation indicators. The price series and the respondent company remain part of the survey. The German PPI uses different ways of extrapolation. The staff member decides on which one is to be chosen for the current non-response. Sometimes it is even possible to estimate the price that would have been achievable on the market with the help of the respondent.

3.5.8.2 Permanent non-response

The reason for permanent non-response may also be non-response of the company (for example outsourcing into a foreign country or bankruptcy) or non-response for only one representative.

If a single price series is lacking, a substitute within the company itself is searched for. Often a company produces a follow-up model or different qualified versions of a product. If the company cannot switch to such a similar product a new company will be searched for.

When a total company is missing another company is searched for as a substitute. The substitute must produce the same sort of products because the new representative must suit the item of the sample basket. It may take a lot of time to find a substitute because the company has to be contacted first. In the meantime the price series is extrapolated.

To facilitate substitution of permanent non-response for many items of the classification, there are standby series that are reported every month, too. They are not included into the monthly index but they may be exchanged in the short term when single price series change to permanent non-response.

3.5.9 Compensation of non-response

After clearing up all errors that occurred during data entry, all price series with a special weighting that are marked as non-response have to be compensated because all weighted price series are part of the calculation of the overall index and therefore may not be left without price information.

The German PPI uses mainly two different methods of compensation:

- The simple index of a non-response price series is calculated by using the average price change of the same item of the classification (sometimes even on a higher level than the item itself) as price change of the missing price series
- Taking the price of the previous month presuming the price would not have changed

When the staff member has chosen the best method for each missing price series, the processing programme calculates the missing values on its own. The processing programme does not allow to proceed with processing as long as there are missing values that are not compensated.

3.5.10 Calculation of the index

The index is calculated with the help of SAS procedures which can be started within the new processing programme. The implemented SAS procedures use the data that are stored in the database.

The calculation of the overall index is made in several steps:

- For each representative a simple index is calculated. This method guarantees the elimination of the element of amount of the commodity and converts the absolute price change into a proportional one.
- Calculation of an elementary index for an item of the classification
- Aggregation of the elementary indices into different hierarchical levels of the classification and also into non-systematic aggregates and the overall index by using the Laspeyres formula

The results of the calculation of the index are

- tables that are published on Destatis web sites where they can be downloaded free of charge
- data that are stored in the information database of Destatis called Genesis Online
- tables for methodological checking

The results of the PPI are published around the 20th of the month following the month the data were reported for. So timeliness is guaranteed. At the same time data are transmitted automatically to Eurostat which incorporates the German results into the overall result on the level of the European Union.

4 Conclusion

As the results of the PPI are used in many different fields (i.e. integral parts of many long-term contracts refer to the PPI on different levels (stable value clause), for deflation of GDP) it is very important to politics, the administration and the

economy to deliver reliable results. So the ambition of Destatis is to publish results of high quality and to work on further improvement.