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Cross cutting issue
"Reoptimizing/updating sample for PPI"

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Contents

1. General conditions / Preconditions

The Federal Statistical Office keeps a statistical business register in which all enterprises are assigned to an economic sector of NACE according to the economic focus of their activities. For the manufacturing industry, the so-called production statistics provide information on which companies produce which goods with which output. There are no comparable statistics with comparable coverage for the service sector. Therefore, there is only very little information about the secondary production and the importance of the primary and secondary products for the output of the enterprises.
This makes it very difficult to identify suitable enterprises for the reporting of producer prices for services.

To address this problem, two different approaches are taken, depending on whether it is an industry for which producer prices have been collected for a certain period of time or an industry for which the collection is being established for the first time.

1.1. Rotation in the current survey

For industries for which producer price surveys have existed for a certain period of time, the reporting population is divided into very large enterprises, which are indispensable for the price measurement, and medium to large enterprises, which are released from the reporting obligation after about five years and replaced by other enterprises of similar size. The stratum of very large enterprises is called the total stratum and is reviewed annually for new entrants. Their companies are only released from the reporting obligation if their turnover significance for the industry has decreased significantly.

Due to the fact that there is usually no information available on the turnover significance of the primary and secondary products in the services sector, the recruitment of new enterprises as part of the rotation of reporting agents is often unsuccessful. Either the enterprises report back that they do not or only rarely provide the services for which the Federal Statistical Office would like to collect prices, or they provide the services only within the group and at intra-group transfer prices.

This makes it necessary to ask many more companies to report within the framework of the rotation than finally can be successfully integrated into the current survey. Therefore, already in the sample design, the sample is planned to be considerably larger than the number of reporting units actually needed. How much larger depends on the experience with this industry in past waves of recruitment.

1.2. Setting up surveys for additional economic activities

When setting up new producer price surveys in the services sector, a great deal of information must first be collected on the services provided in this industry. For this purpose, a preliminary survey according to the Federal Statistics Act is conducted to distinguish the reporting population. With the help of these preliminary surveys, it is clarified

- which services are provided in the economic sector in question
- the significance of these services in terms of turnover
- who provides which services
- and in some cases, initial information on the structure of the index to be constructed according to price-determining characteristics can be obtained.

Thus, after such a preliminary survey has been carried out, the information is available that is needed to recruit suitable reporting entities. In other words, the rate of unsuccessful recruitment is much lower than in the case of rotation in existing surveys.

2. Sample of price observations For new surveys

In order to determine the number of price observations needed to measure price developments in an economic sector, one requires

- - the weights of the smallest aggregates
- - the dispersion of price changes in these aggregates
- - the desired maximum sampling error

However, the dispersion of price changes in the aggregates is not yet available at the time of the new design of a survey. Only after producer prices in an industry have been collected over the length of a base period can corresponding data be made available for the calculation of the sample size.

For this reason, the number of necessary price observations for the aggregates in the first base period can only be estimated. This is done on the basis of the number of price observations in current surveys in other sectors with similar conditions, especially with comparable turnover significance. The number of required price observations per aggregate is simply calculated by multiplying the total size of the sample by the turnover shares of product and stratum.

As a rule, the aggregates of the large cases have a significantly higher weight than those of the medium-sized companies. According to their weight, these aggregates must also be filled with a larger number of price observations. In order to fill the planned price observations with reports from reporting units, suitable companies are selected from the preliminary survey. In doing so, the companies contacted are requested to submit a different number of price reports, depending on the size of the companies measured by turnover, so that the LC aggregates can be sufficiently supplied with price observations.

2.2. For rotation in ongoing surveys

The work for the rotation of the companies below the so-called total stratum begins after the index revision is completed. In the case of industries for which the price surveys have already been conducted for at least one base period, the variance of price changes in the smallest aggregates can be calculated and thus also a sample size that takes into account the volatility of prices.

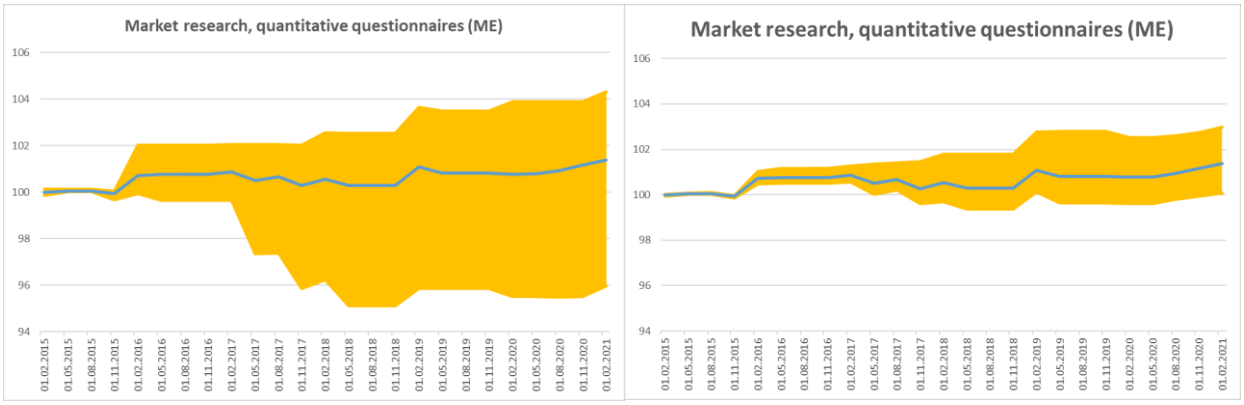
First, for all the smallest aggregates of the producer price statistics for services, the necessary number of price observations is calculated for a given sampling error. The table below shows a small extract of the results:

Market research	Weight	# Priceobservation prior to rotation	calculated sample size	robust sample size
quantitative questionnaires (ME)	1,30	138	7	30
quantitative questionnaires (LC)	1,61	104	8	36
qualitative questionnaires (ME)	0,50	43	2	20
qualitative questionnaires (LC)	0,62	44	4	22
IT-Services	**Weight**	**# Priceobservation prior to rotation**	**calculated sample size**	**feasible sample size**
publishing of software (ME)	5,73	35	51	51
publishing of software (LE)	3,52	29	17	18
publishing of software (LC)	11,28	40	174	134
⋮	⋮	⋮	⋮	⋮
IT consultancy & support (ME)	12,93	99	130	130
IT consultancy & support (LE)	7,95	111	61	61
IT consultancy & support (LC)	25,45	109	284	175
⋮	⋮	⋮	⋮	⋮

Two economic sectors were selected here that illustrate that the recommended numbers of price observations are not fully implementable.

In the case of market research, the calculation comes to the conclusion that for these aggregates with a relatively small weight in the overall index, a much smaller number of price observations is needed than have been collected so far. However, the question arises as to how robust a sub-sample of the proposed size is against outliers.

To investigate this, additional simulation calculations were carried out for a larger number of sub-samples of the previous observations. It turned out that the indices calculated for the smallest aggregates lie in a very wide corridor around the original elementary indices when the samples in the smallest aggregates are reduced to the proposed size.



The two charts show the range of variation of the index for one of the smallest aggregates when the number of price observations is reduced from 138 to 7 and 30 respectively. It can be seen very clearly that if the number of price observations were reduced to just 7, the index could follow a relatively random course. Therefore, it was decided to reduce the samples of price observations in the smallest aggregates for market and opinion research, but not as much as would correspond to their weight in the overall index.

Completely different difficulties arise when increasing the sample size. In the aggregates below the total stratum, the number of enterprises requested to report can also be increased for this purpose. However, this is not possible in the total stratum, because here all enterprises are already obliged to

report. And it is often precisely here that a significantly greater need for price observations is calculated due to the high turnover share of this stratum and the associated high weighting share.

An increase in the number of price observations can only be realised by each company reporting more prices. However, this is not always possible for a single product. Several prices of a single reporter for a single product then contribute to the quality of the index if the pricing is e.g. dependent on the customer or on the executing employees in the company. From a certain number of reports by the same reporter on the same subject, however, one only increases the number of price observations with identical price development. Therefore, it was also decided in these cases not to implement the calculated number of price observations completely, but only up to the size that was reasonably implementable.

In the case of IT services, for example, these were 134 instead of 174 price observations from the large case units for software publishing and 175 instead of 284 price observations for IT consultancy and support.

3. Sample of enterprises

3.1. For new surveys

For new surveys, a sample of enterprises is first needed for the preliminary survey to define the reporting population and to derive the weighting scheme. The total size of this sample is derived from the sample size for the current price survey of economic sectors with similar turnover importance. That is, we look at how many enterprises we need in comparable "large" industries for the current price survey and make the simplifying assumption that we will need a similar number of enterprises for the new industry. For the pre-survey, this number is tripled.

The cut-off point for small enterprises, which are not included in the sample, and for the total stratum, whose enterprises are all asked to report, depends on the structure of the industry.

In principle, the SPPI team aims to represent at least 75% of turnover in the price survey. The cut-off threshold below which no more companies are included in the survey is therefore chosen so that the companies above this threshold account for at least 75% of the turnover. The total stratum results from the procedure used to distribute the total size among the turnover strata, the so-called Neyman allocation.

As an example, the following table shows the structure of the economic sector "employment plaement agencies":

NACE 78.1 Activities of employment placement agencies					
Company size classes according to turnover		enterprises		turnover	
		number	percentage share	in 1000 €	percentage share
	total	**3 700**		**5 154 314**	
	unter 100 000	1 260	34,1	65 355	1,3
100 000 -	250 000	761	20,6	121 886	2,4
250 000 -	500 000	537	14,5	191 264	3,7
500 000 -	1 Mill.	586	15,8	448 573	8,7
1 Mill. -	2 Mill.	265	7,2	365 103	7,1
2 Mill. -	5 Mill.	186	5,0	591 823	11,5
5 Mill. -	10 Mill.	53	1,4	401 946	7,8
10 Mill. -	25 Mill.	31	0,8	463 812	9,0
25 Mill. -	50 Mill.	13	0,4	420 459	8,2
50 Mill. -	100 Mill.	4	0,1	281 265	5,5
100 Mill. und mehr		3	0,1	1 802 827	35,0

Here, 7 enterprises account for 40% of the total turnover. The companies with turnovers between 2 and 50 million euros per year represent another 36.5% of the turnover. As a result of the Neyman allocation, all companies in the two strata with the highest turnover are required. Thus, these 7 companies are defined as the total stratum.

In the next table, we see an economic sector with a completely different structure in the form of freight transport by air. Here, small and medium-sized companies play only a marginal role. The five largest companies account for more than 94% of the turnover. In cases like these, no random sample is drawn. The survey is conducted exclusively among the companies that clearly dominate the market.

NACE 51.21 Freight Air transport					
Company size classes according to turnover		enterprises		turnover	
		number	percentage share	in 1000 €	percentage share
	total	**69**		**6 198 699**	
	unter 100 000	9	13,0	281	0,0
100 000 -	500 000	7	10,1	2 102	0,0
500 000 -	1 Mill.	12	17,4	9 976	0,2
1 Mill. -	2 Mill.	8	11,6	12 673	0,2
2 Mill. -	5 Mill.	9	13,0	27 351	0,4
5 Mill. -	10 Mill.	11	15,9	85 377	1,4
10 Mill. -	50 Mill.	5	7,2	87 876	1,4
50 Mill. -	100 Mill.	3	4,3	162 026	2,6
100 Mill.	**und mehr**	**5**	**7,2**	**5 829 919**	**94,1**

3.2. For rotation in ongoing surveys

The sample size of current surveys depends on the number of price observations needed in the turnover strata.
If the recalculation of sample sizes in the smallest aggregates has resulted in a reduction in the number of price observations, the following considerations are made:

1. Is the definition of the total stratum still appropriate for the reduced number of reports required? Does it make sense to shift the boundary between total stratum and medium to large enterprises so that fewer enterprises have to report permanently and more enterprises can be rotated?
2. Or does the structure of the industry rather suggest to reduce the number of prices to be reported for the individual enterprises?
3. In addition, the sample size for the enterprises to be rotated is reduced.

The result is a new sample design, which is implemented by drawing enterprises for rotation.

In the case of a necessary increase in the number of price observations, consideration is also given to the extent to which this can be sensibly implemented by changing the number of price reports per respondent. As can be seen from the table on the proposed price observation figures for IT services, these increases cannot always be fully implemented, especially in the total stratum. Here, too, it must be considered whether it makes sense to shift the boundary between total stratum and strata to be rotated. This depends on the structure of the industry.

If the next turnover stratum also includes only a very limited number of large enterprises, this could be a viable way forward. However, if there is a large gap between a few very large enterprises with a very high share of turnover and numerous medium-sized enterprises with a much smaller share of turnover, this is not a suitable way. In this case, part of the proposed increase in the number of price reports in the total stratum aggregates must be abandoned.

The situation is different in the rotation strata. Here it is possible to increase the sample size of the companies in such a way that the increase in the number of price reports can be fully implemented. This is implemented within the framework of the request for new declarants for rotation purposes.

4. Recruiting procedure

With the first request for reporting, a paper questionnaire is sent for each price requested by the Federal Statistical Office. As soon as a company has reported for the first time, the price statistics will provide access data for the electronic reporting forms to be used in the future. Companies are legally obliged to use the electronic reporting forms offered.

In addition to the request to report and the necessary number of paper questionnaires, this initial contact will include

- a briefing on the legal basis for the survey
- instructions for the completing of the questionnaire and
- a completed sample questionnaire.

The questionnaires are essentially identical for most economic sectors. They are divided into 3 sections. First, the address field and the fields in which the contact details of the contact person in the company are to be entered - filled in here in the example with a red dummy contact person.

Erzeugerpreise für Dienstleistungen
Gewerbemieten

Ep40 **Bitte keine Eingangsstempel**

Statistisches Bundesamt, 65180 Wiesbaden

Musterfirma GmbH
Musterstraße 1
65xxx Wiesbaden

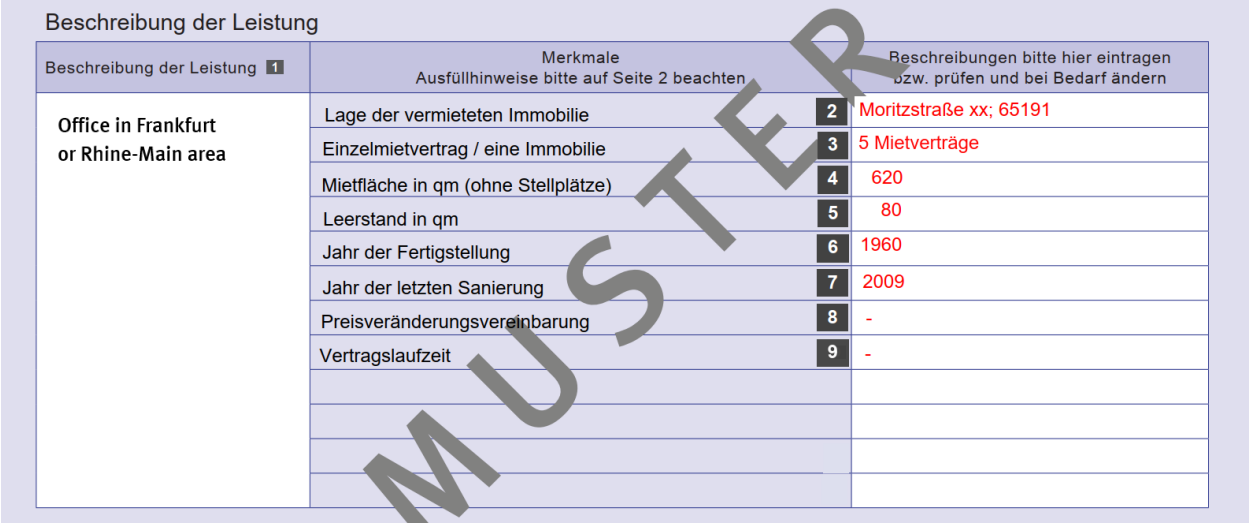
Ansprechpartner/-in für Rückfragen (freiwillige Angabe)
Name:
Frau Mustermann

Telefon oder E-Mail:
061xx/xxxxxx
m.mustermann@musterfirma.de

Falls Anschrift oder Firmierung nicht mehr zutreffen, bitte auf Seite 2 korrigieren.

Vielen Dank für Ihre Mitarbeit.

The second section is used to describe the service for which the price is to be collected. In the first field on the left, the product is described (in this case office space in the Frankfurt/Rhine-Main region), and in the middle the SPPI team lists the price-determining characteristics defined for this product. On the right-hand side, the company is asked to enter the values of the price-determining characteristics for a precise service.



Beschreibung der Leistung

Beschreibung der Leistung 1	Merkmale Ausfüllhinweise bitte auf Seite 2 beachten		Beschreibungen bitte hier eintragen bzw. prüfen und bei Bedarf ändern
Office in Frankfurt or Rhine-Main area	Lage der vermieteten Immobilie	2	Moritzstraße xx; 65191
	Einzelmietvertrag / eine Immobilie	3	5 Mietverträge
	Mietfläche in qm (ohne Stellplätze)	4	620
	Leerstand in qm	5	80
	Jahr der Fertigstellung	6	1960
	Jahr der letzten Sanierung	7	2009
	Preisveränderungsvereinbarung	8	-
	Vertragslaufzeit	9	-

MUSTER

This example is about commercial rents. The following characteristics were defined as price-determining for these services:

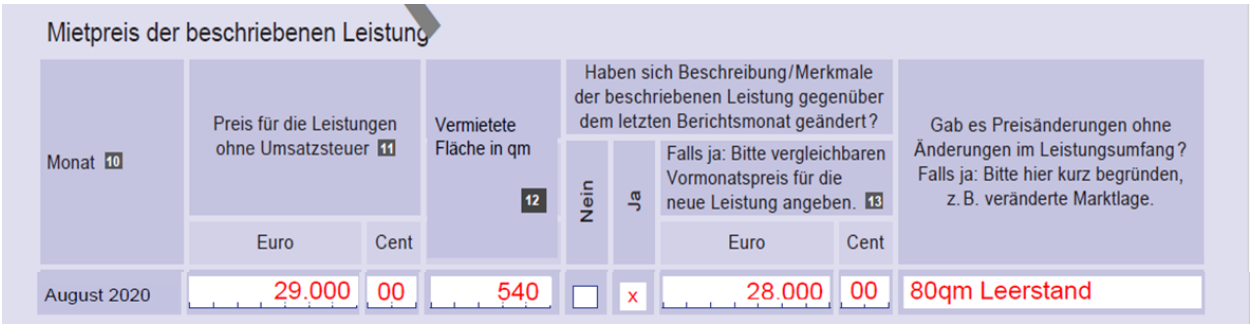
- the location of the property
- the indication of whether it is a single rental object in a property or a complete property with several rental objects
- the rental area in sqm
- the vacancy rate in sqm (in the case of properties with several rental objects)
- the year of completion
- the year of the last modernisation

- any agreements on price escalation
- and the duration of the contract

These so-called price-determining characteristics do not always have a significant influence on the price, but they also serve the reporting enterprises to identify the precise service for which they have reported prices in previous reporting periods. In addition, these characteristics of the specific services can help to carry out a quality adjustment if the service changes compared to previous reporting periods.

They vary from industry to industry and also within industries for different products. However, the questionnaire used (both on paper and electronically) remains unaffected because these characteristics are printed depending on the product.

In the last third of the questionnaire, the price of the specified service is asked. In the case of commercial rents, we always want to know the price in the current reporting quarter (in this case the middle month of the third quarter) and the space let at that time.



Mietpreis der beschriebenen Leistung

Monat 10	Preis für die Leistungen ohne Umsatzsteuer 11		Vermietete Fläche in qm 12	Haben sich Beschreibung/Merkmale der beschriebenen Leistung gegenüber dem letzten Berichtsmonat geändert?				Gab es Preisänderungen ohne Änderungen im Leistungsumfang? Falls ja: Bitte hier kurz begründen, z. B. veränderte Marktlage.
				Nein	Ja	Falls ja: Bitte vergleichbaren Vormonatspreis für die neue Leistung angeben. 13		
	Euro	Cent				Euro	Cent	
August 2020	29.000	00	540	☐	x	28.000	00	80qm Leerstand

We also ask whether the service has changed compared to the previous quarter. If so, we would like to know what the changed performance would have cost in the previous quarter. In this example, 80 square metres are currently vacant. If this vacancy had already existed in the previous quarter, the rent in the 2nd quarter would have been only €28,000. With the help of this information, the price statistics staff have all the necessary data for a quality adjustment.

The questionnaire on paper provides space for reporting prices for four quarters. And the first report actually asks for four prices, the price for the current quarter and for three previous quarters. During the rotation, this serves to incorporate the new report instead of a matching old report series. Special care is required here. If, for example, collective labour agreements have recently been changed in a sector, some companies have already passed on the tariff increases to their customers, while other companies have left the prices unchanged. By reporting prices for four quarters, it becomes clear whether the newly included company belongs to the first or second category. This information can be used to avoid the tariff increase being shown twice or perhaps not at all in the index.