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Documents

Price Index for Accounting, Bookeeping and Auditing Activities

Statistics Norway/Research Department

Table of contents

1. INTRODUCTION **2**

2. SUMMARY **3**

3. INTERNATIONAL EXPERIENCE **4**

4. INDUSTRY DESCRIPTION **5**

4.1 POPULATION STRUCTURE 5
4.2 SERVICES' CLASSIFICATION 7
4.3 CLIENTS 7
4.5 SAMPLE DESIGN 8

5. DEFINITIONS AND DESCRIPTIONS **12**

6. DATA COLLECTION **13**

7. INDEX CALCULATION **14**

7.1 MATHEMATICAL FORMULATION 14

8. DOCUMENTATION OF THE STATISTICAL PROCEDURES **17**

9. RESULTS **19**

9.1 INDEX RESULTS 19
9.2 DISTRIBUTION OF WEIGHTS 21
9.3 EVALUATION OF UNCERTAINTY 23
9.4 PUBLISHING 25
9.5 ESTIMATION OF DATA BACK TO 2006 25

REFERENCES **27**

1. Introduction

The Statistical Office of the European Community (Eurostat) granted financial contribution for the development of a Service Producer Price Index for Accounting, Bookkeeping and Auditing Activities (NACE 74.12/SN 2007 69.20). This is the final report on the development process of the index. Earlier, in September 2006, a feasibility study for this SPPI was done. This report takes that study as its point of departure.

The service sector of the economy has increased tremendously in recent decades and there is a manifest need to develop new statistics within this area. The European Community Regulation concerning short-term statistics covers producer prices for services. The regulation is based on NACE classification. A broader effort to develop producer price indices for services is being carried out in Statistics Norway. The aim of this project is to develop new price indices and to improve the quality of existing indices, and the development of a quarterly price index for accounting, bookkeeping and auditing activities is part of this effort.

The service price index is a producer price index and will serve several purposes. Its main purpose is within the Norwegian National Accounts system, where it is used for calculating fixed prices for production of services. The index is also used for planning and management, both at a political level and for economic life.

Throughout this report we will use the term Service Producer Price Index (SPPI). The joint OECD-Eurostat Task Force on output prices for services clarified the use of this term in their *Methodological guide for developing producer price indices for services* (OECD/Eurostat, 2005).

To establish a price index we need knowledge about the sector in question. Hence we need to acquire information about the structure of the sector (size and geographic concentration), the establishments' size and turnover and their number, among other things. One of the key factors we need to understand, when making a SPPI, is how the price-setting mechanisms work. Typical products need to be identified in a way that enables us to make a sound decision about what information we need. This is essential if we want to develop a good SPPI.

2. Summary

Developing a price index for NACE 74.12 Accounting, bookkeeping and auditing activities is a part of a broader project in Statistics Norway that focuses on price statistics. The development of this price index started in 2005, and is being published for the first time in the autumn of 2008.

In Norway we have divided this industry class into three industry subclasses. These are NACE 74.121 *Accounting and bookkeeping*, NACE 74.122 *Auditing* and NACE 74.123 *Tax consultancy*. The latter industry subclass is very small and we have decided to omit it from the SPPI. Nevertheless, tax consultancy services will be a part of the SPPI since both auditing establishments and accounting and bookkeeping establishments carry out this service. We have produced different questionnaires for accounting and bookkeeping establishments and auditing establishments. The main reason for this is that services within this industry class are clearly divided between the industry subclasses. Another reason is that the types of employees in the two industry subclasses are different. The classification of employees is important in terms of quality differences. The quality of a service is dependent of the knowledge and effort of the person who carries out the service. If quality is to be taken into account, the only way to do this is to classify the different types of employees. Separating the two industry subclasses also leads to two separate sample designs.

The method used in this price index can briefly be summarized as follows: the price measure in the survey is the average charge-out hourly fees in the particular quarter. The hourly fees stated are classified in two distinct dimensions: type of activity and job category of different types of employees. This method is characterised as a B – method, and is therefore an approved and acceptable method (Handbook on price and volume measures in national accounts, 2001). We started collecting data from the 1st quarter of 2007.

The prices are compared with the base period, which is the 1st quarter of 2007. The weights were gathered in the 4th quarter of 2007, and will be collected and updated every second year at the same time as we replace one third of our sample. In that same period, the index also will be chained, and the base period will be regenerated.

The results from the first six quarters indicate that the total index follows a reasonable development, with a continuous increase, as shown in table 9.1. From the 1st quarter of 2007 to the 2nd quarter of 2008, the total index has grown by 7.5 per cent.

3. International Experience

According to *OECD - Eurostat 2005 Inquiry on National Collection of Services Producer Prices* (OECD, 2005), there are a number of countries that have developed an SPPI for Accounting, bookkeeping and auditing activities; tax consultancy. *Methodological guide for developing producer price indices for services* (OECD/Eurostat, 2005) also briefly describes how Ireland, Canada, the USA, Australia, New Zealand, Japan, France, Great Britain, the Netherlands, Sweden and Germany developed their price indexes for NACE 74.12. The Voorburg Group has also treated this industry class.
A report was presented at the 2001 meeting in Örebro, Sweden, focusing mainly on the work of Statistics Canada (Bordé, François & Gaétan Garneau, 2001). Israel presented their SPPI for NACE 74.12 at the 2004 meeting in Ottawa, Canada.

"There are two main methods used for compiling an SPPI in this sector, model pricing and the use of hourly charge-out rates." (OECD/Eurostat, 2005: 102).

Model pricing involves keeping track of contracts/model over time. The companies are to report prices on the contracts/model as if they were up for renewal each quarter. The contracts/model should be representative of a significant portion of turnover and respondents are asked to explain the reason for price changes and if variation in the model occurs. Canada uses a variant of model pricing called "*Actual Specification Contract Pricing"* (Bordé, François & Gaétan Garneau, 2001:4). This methodology "…*relies on the assumption that survey respondents pick and choose representative accounting services contracts and monitor these very same contracts through time."* (Bordé, François & Gaétan Garneau, 2001:1).

However a more commonly used pricing method for this industry class is based on hourly charge-out rates due to the low respondent burden and the ease of data collection. It is important that the hourly charge-out rates are split by the most detailed possible classification of staff grade and experience(OECD/Eurostat, 2005).

Both methods have their benefits and drawbacks. As mentioned above, the respondent burden is lower in hourly charge-out rates compared with model pricing. It is important that the models-contracts remain representative through time, which is also time-demanding on the part of both the respondent and the statistical agency. However one disadvantage with the pricing method based on hourly charge-out rates is that it isn't always possible to distinguish between price and productivity changes. On the other hand, capturing actual price changes becomes relatively easy with model pricing. As we decided

to use hourly charge-out rates, it is important that the number of hours used on a client is strongly correlated with the number on the invoice.

4. Industry description

Early on in the process of developing this SPPI we met with the largest trade association in the industry class, namely Norges Autoriserte Regnskapsførerers Forening (NARF) [Norwegian Authorised Accountants Association]. The dialogues with NARF lead to greater insight into this industry class, especially for accounting and bookkeeping. We also contacted Den norske Revisorforening (DnR) [The Norwegian Auditor Association] and the Financial Supervisory Authority of Norway. The latter performs document-based supervision of this industry class (The Financial Supervisory Authority of Norway, 2006 & 2005). The reports from the document-based supervision helped us to detect which services dominated the industry class.

According to NACE REV. 1.1 (COMMISSION REGULATION (EC) No. 29/2002) the industry division 74 covers *Other Business Activities*. This index covers industry class 74.12 *Accounting, bookkeeping and auditing activities; tax consultancy*. But this classification is not specific enough for an SPPI. In Norway we have divided the industry class into subclasses, namely 74.121 *Accounting and bookkeeping*, 74.122 *Auditing* and 74.123 *Tax consultancies*.

4.1 Population Structure

Tables 4.1 and 4.2 are based on the structural business statistics from the year 2006. The tables provide a picture of the structure in the industry subclasses for 74.121 *Accounting and bookkeeping* and 74.122 *Auditing* respectively. There were 4 256 accounting and bookkeeping establishments and 1 102 auditing establishments in Norway in 2006. The number of employees was 11 535 in accounting and bookkeeping and 5 986 in auditing. In spite of the large difference in the number of establishments and employees, total turnover in the two industry subclasses does not differ proportionately. Accounting and bookkeeping establishments had a turnover of approximately NOK 7.4 billion (€ 860 million) in 2006. Auditing establishments had a turnover of approximately NOK 7 billion (€ 810 million) in 2006.

Accounting and bookkeeping establishments 2006 Population structure by number of employees						
Size by number of employees	**Number of establishments**	**%**	**Number of employees**	**%**	**Turnover (NOK Million)**	**%**
0	1 750	41.1	0	0.0	569.2	7.7
1-4	1 655	38.9	3 629	31.5	2 164.5	29.3
5-9	591	13.9	3 822	33.1	2 121.6	28.6
10-19	219	5.2	2 762	23.9	1 590.9	21.5
20-49	37	0.9	947	8.2	648.8	8.8
50 →	4	0.09	375	3.3	304.7	4.1
Total	**4 256**	**100%**	**11 535**	**100%**	**7 399.9**	**100%**

Table 4.1 NACE 74.121 – Structural business statistics 2006

The accounting and bookkeeping industry subclass consists mainly of small establishments. The same structure will appear if we look at these data for enterprises instead of establishments. More than 93% of all establishments had fewer than ten employees, and there were only four establishments that had fifty or more employees. The percentage distribution of the turnover also indicates that we don't have any large market leaders. This market structure is also supported by The Financial Supervisory Authority of Norway, which states (2005) that: "*...the accounting and bookkeeping industry (class) consists of a lot of very small enterprises*". According to this same report, only six enterprises had a turnover larger than NOK 20 million in 2003. One reason for this structure is probably that this industry subclass reflects the general industrial structure in Norway, and that enterprises prefer a close relationship with their accountants (The Financial Supervisory Authority of Norway, 2005).

The majority of auditing establishments were also small in size measured by the number of employees. 88.1% of all establishments had fewer than ten employees. In 2004 there were 172 845 enterprises in Norway that had appointed an auditor (The Financial Supervisory Authority of Norway, 2006). Most of these enterprises are small, and 83% of them paid a yearly fee to the auditing establishments of less than NOK 30 000. This fact may explain why we have a lot of small auditing establishments.

Auditing establishments 2006 by number of employees						
Size by number of employees	**Number of establishments**	**%**	**Number of employees**	**%**	**Turnover (mill NOK)**	**%**
0	412	37.4	0	0.0	276.2	4
1-4	410	37.2	849	14.2	937.7	13.5
5-9	149	13.5	964	16.1	921.6	13.3
10-19	81	7.3	1 091	18.2	1 092.3	15.7
20-49	38	3.5	1 102	18.4	1 246.9	17.9
50-199	8	0.7	652	10.9	849.8	12.2
200 →	4	0.4	1 328	22.2	1 631.3	23.4
Total	**1 102**	**100%**	**5 986**	**100%**	**6 955.8**	**100%**

Table 4.2 NACE 74.122 – Structural business statistics 2006

Like accounting and bookkeeping, the auditing industry subclass had four large establishments. These four establishments had almost ¼ of all employees and turnover in the industry subclass. 90% of the establishments on the Oslo Stock Exchange had chosen one of the four largest auditing enterprises (The Financial Supervisory Authority of Norway, 2006).

4.2 Services' Classification

To describe the product or service population for this SPPI, the Statistical Classification of Products by Activity in The European Community (CPA) is a good point of reference. For the industry class 74.12 Accounting, bookkeeping and auditing activities, we find the following classification in the CPA (COMMISSION REGULATION (EC) No. 204/2002):

74.121 Accounting and bookkeeping services

74.122 Auditing activities

74.123 Tax consultancy services

4.3 Clients

From our CPA study we see that the industry class of accounting and bookkeeping and auditing activities has only one large customer group, namely the private business sector (see table 4.3).

Households and non-profit organisations, the public sector and foreign customers are represented at a very low level in NACE 74.12.

Turnover by type of client, CPA study 2004		
Type of client	Accounting and bookkeeping 74.121	Auditing 74.122
Private business sector	97.4%	94.7%
Public sector	0.7%	3.4%
Private households and non-profit organisations	1.9%	1.8%
Total	100%	100%

Table 4.3 Turnover by type of client, CPA study 2004

	Accounting and bookkeeping	Auditing
Domestic	98.9%	96.4%
Intra-EU	0.6%	2.3%
Extra-EU	0.5%	1.3%

Table 4.4 Turnover by export, CPA study 2006

As we can see from table 4.4, there are almost no services exported. For the entire industry, 97.3 per cent of the services are sold in the domestic market.

4.4 Observation Unit

We are of the opinion that it would be suitable to choose establishments as the observation units for this SPPI instead of enterprises. This choice is motivated by purely practical reasons and has little or no significance on the ultimate outcome of this index, since the numbers of enterprises and of establishments for this industry class in Norway are roughly the same.

4.5 Sample Design

After meeting with the trade association NARF, it was clear that it would be wise to produce separate questionnaires for each industry subclass. We therefore decided to treat the industry subclasses separately.

We also found it appropriate to omit the tax consultancy industry subclass from this SPPI. This decision is based upon the results we obtained from the CPA study (see tables 4.5 and 4.6) and

structural business statistics for this industry class. There are fewer than one hundred establishments classified in NACE 74.123 *Tax consultancy*. The most likely explanation for this is that both accounting and auditing establishments also perform this service and hence there are very few establishments which have tax consultancy as their main service and can thereby be classified in 74.123.

Turnover of all the establishments in subclass 74.123 *Tax consultancy* accounts for only 0.3% of total turnover in the industry class 74.12. This is despite the fact that tax consultancy services generate a good 11.4% of the total turnover in the industry class 74.12. As suggested above, this is because only 1.2% of tax consultancy services are provided by the establishments classified in the industry subclass 74.123 *Tax consultancy*, while the remaining 98.8% are provided by the establishments classified in subclasses 74.121 and 74.122 (see table 4.5). We will therefore include the tax consultancy service in the index but not the industry subclass. Note that there are minor differences between the classification of services in the CPA study and COMMISSION REGULATION (EC) No. 204/2002.
Another vital finding of the CPA study is that nearly all accounting and bookkeeping services and payroll services are conducted by establishments classified in subclass 74.121 *Accounting and bookkeeping*. To the same extent, financial auditing activities are conducted by industry subclass 74.122 *Auditing establishments*. This reinforces our decision to make separate questionnaires for these industry subclasses. Tax consultancy services are divided evenly between these subclasses (74.121 & 74.122). The service sample will consist of these four services and they cover over 80% of turnover in NACE 74.12.

Industry Subclass / Service Type	**Accounting and bookkeeping 74.121**	**Auditing 74.122**	**Tax consultancy 74.123**	**Accounting, bookkeeping and auditing activities; tax consultancy 74.12**
Accounting and bookkeeping	98.3	1.4	0.3	**100%**
Financial auditing	2.5	97.5	0.04	**100%**
Payroll	99.3	0.5	0.2	**100%**
Tax consultancy	55.6	39.8	4.6	**100%**
Other accounting and auditing	43.9	55.9	0.2	**100%**
Total	**51.4**	**48.1**	**0.5**	**100%**

Table 4.5 Percentage turnover within type of service/CPA classified by industry subclass, CPA study 2006

Industry / Subclass / Service Type	**Accounting and bookkeeping 74.121**	**Auditing 74.122**	**Tax consultancy 74.123**	**Accounting, bookkeeping and auditing activities; tax consultancy 74.12**
Accounting and bookkeeping	66.8	1.0	18.6	**34.9**
Financial auditing	1.6	68.1	3.0	**33.6**
Payroll	8.9	0.0	1.6	**4.6**
Tax consultancy	5.9	4.5	53.8	**5.5**
Other accounting and auditing*	12.3	16.8	6.8	**14.4**
Other **non** accounting, bookkeeping and auditing activities; tax consultancy	4.5	9.6	16.2	**7.0**
Total	**100%**	**100%**	**100%**	**100%**
Turnover in NOK Million	7 402	6 937	68	14 408

Table 4.6 Percentage turnover within industry class and subclass classified by CPA/ type of service, CPA study 2006
*Other accounting and auditing consists of, among other factors, technical assistance on compilation of papers involving accounting and tax assessment. This is a factor that appeared in the CPA study for the first time in 2006, and is therefore not included in our SPPI. In view of its size (9.6% of total turnover in NACE 74.12), we will consider including it in the future.

Statistics Norway's Business Register thoroughly defines enterprises into legal and production entities. From this we obtained our population of establishments and drew our sample. The population comprises all the establishments in NACE 74.12 *Accounting, bookkeeping and auditing activities* that we can further divide into NACE 74.121 *Accounting and bookkeeping* and 74.122 *Auditing*. We will stratify our population by the size of the establishments. By size we mean the number of employees. The following tables show our sample design for the two industry subclasses:

Employees, size bands	Number of establishments in the population	Probability distribution	Number of establishments in the sample	Turnover in the sample in per cent of the population
0	1003	0	0	
1-4	2335	0.02	39	
5-9	595	0.025	14	
10-19	214	0.05	12	
20-49	35	0.75	24	
50-99	2	1	2	
100+	2	1	2	
Total	**4185**		**93**	**9.3%**

Table 4.7 Sample design NACE 74.121 Accounting and bookkeeping

Employees, size bands	Number of establishments in the population	Probability distribution	Number of establishments in the sample	Turnover in the sample in per cent of the population
0	172	0	0	
1-4	662	0.025	18	
5-9	154	0.1	14	
10-19	82	0.25	23	
20-49	36	0.5	22	
50-99	4	1	4	
100+	7	1	7	
Total	**1118**		**88**	**44.7%**

Table 4.8 Sample design NACE 74.122 Auditing

The sampling method is based on “probability proportional to size”, meaning that the probability of being drawn from the population is greater for large establishments. In the period in which the information for the index has been collected, a few companies have been removed from the sample, making the total number of companies in each subclass about 90.

5. Definitions and Descriptions

This is a Producer Price Index for Services (SPPI). That means that we will measure the price that the producers of the services charge their clients. The respondents will therefore be the accounting, bookkeeping and auditing establishments.

Definition and Description of Services

- Financial auditing services:

  Examination of accounting records and other supporting evidence of an organisation for the purpose of expressing an opinion as to whether the financial statement of the organisation present fairly its position as at a given date and the results of its operations for the period on that date, in accordance with generally accepted accounting principles.

- Accounting review services:

  Revision of the annual and interim financial statements and other accounting information. The scope of review is less than that of an audit and the level of assurance provided is thus lower.

- Compilation services of financial statements:

  Compilation of financial statements from information provided by the client. No assurance regarding the accuracy of the resulting statement is provided, preparation services of business tax returns, when provided as a package together with the preparation of financial statements for a single fee.

- Bookkeeping and payroll services:

  · Continuous classifying and recording business transactions in terms of money or some unit of measurement in the books of account.

  · Payroll computation and ledgers.

- Tax consultancy services:

  · Advice to companies for the purpose of minimising taxes.

  · Services consisting in assisting enterprises in tax planning and control, and preparing all documentation required by law.

Prices

We use two price measures, namely hourly charge-out rates and list prices. Both price measures are what the clients actually have to pay for the services. The price measures will not include VAT (value added tax).

Quality

Measuring quality in accounting, bookkeeping, auditing and tax consultancy services is difficult. The quality of the service mainly depends on the knowledge and effort of the employee performing the service. We try to capture this difference in quality by distinguishing between the types of employee. For NACE 74.121 we will separate authorized accountants from non-authorized accountants. This is how this industry subclass separates employees in Norway. For NACE 74.122 we will have five different types of employees, namely partner, senior manager, manager, senior and auditing associate.

Clients

It is only one important type of client for NACE 74.121 and 74.122, namely the private (business) sector.

6. Data Collection

Data will be collected quarterly for this SPPI. The sample design (tables 4.7 and 4.8) suggests that the number of establishments will be approximately 180. The first mailing of the questionnaires was in December 2007, where we collected data for all four quarters of the year. Before that, we carried out a pilot study, to see if the method we were using was functional. We also used the pilot study to control if the services we had included were the right ones.

The respondents receive the questionnaire a couple of days before the end of the quarter. The deadline for reporting is normally three weeks (there is a longer deadline after the 2nd quarter to allow for summer holidays). The firms can either answer the questionnaire by means of the paper version or IDUN (Statistics Norway's system for electronic exchange of data with business enterprises). If Statistics Norway has not received the questionnaire by the deadline, a reminder with a warning of a compulsory fine will be sent out. A new deadline (1 week) is set. If the questionnaire is still not returned, a decision to impose a compulsory fine is made. The respondent is then informed by letter that they have one final week to send in the questionnaire before the decision is made final. Because of Statistics Norway's ability to impose disclosure requirements and our online reporting facility, we have a response rate of close to 100 per cent. All the data we collect is transferred to ISEE (Integrated System for Editing and Estimation). In ISEE we are able to audit the data and calculate the indices.

Data on turnover in the last calendar year before the index period will be used to generate weights. This data will be collected through a questionnaire-based survey at the beginning of each year. The reason for not using the VAT register for this purpose is that we are not able to get data from this register until long after the end of the quarter and hence they cannot be used in our index if it is to be published within the target deadline. Another reason is that the VAT register does not distinguish among the types of the employees. As mentioned earlier, we intend to differentiate among the types of the employees, with the aim of capturing the quality differences between different types of employees.

For NACE 74.121 we have four different services (bookkeeping and payroll services, accounting review services, tax consultancy services and compilation services for financial statements) that we collect price data for. At the same time we have two different types of employees (authorized and non-authorized) leading to eight different price data. For NACE 74.122 we collect prices for one service only (financial auditing services) and five types of employees (partner, senior manager, manager, senior and auditing associate) leading to five different price data.

7. Index Calculation

This section explains the mathematical formulation of index calculation for the SPPI for NACE 74.12. Statistics Norway has developed an application for data revision and price index calculation, which is intended to be used for all SPPIs that Statistics Norway is planning to develop in the next few years and the SPPIs that Statistics Norway has already developed. This application will guarantee thorough and efficient data revision and price index calculation. The description of the steps in the index calculation will be in accordance with this general application, as developed by Zhang (2006).

7.1 Mathematical Formulation

Notation

- Weight basis period (b)
- Price basis period (s)
- Statistical/actual period (t)
- Index reference period (r)

Price relative and Elementary Index

Denote service j in elementary group i with (ij), for j = 1,..,n_i. p_{ij}^t is the price for (ij) at the statistical/actual period t, and p_{ij}^s the price in the base period. An example of an elementary group for this SPPI is: NACE 74.121 (industry subclass) — bookkeeping and payroll services (type of service) — non-authorized accountant (type of employee) — size band 0-4 (stratum). This elementary group consists of all price relatives from bookkeeping and payroll services, carried out by non-authorized accountants in stratum 1, within NACE 74.121. Furthermore let

$$I_{ij}^{s,t} = \frac{p_{ij}^t}{p_{ij}^s}$$

be a price relative. $P_i^{s,t}$ is the i elementary index[1], also known as micro index. An elementary index is calculated without the use of weights. This is the first step of the calculation, and the most commonly used elementary indices are:

- Carli index (average of price relatives)

$$P_i^{s.t} = \frac{1}{n_i}\sum_{j=1}^{n_i}\frac{p_{ij}^t}{p_{ij}^s} = \frac{i}{n_i}\sum_{j=1}^{n_i} I_{ij}^{s,t}$$

- Dutot index (ratio between two price averages)

$$P_i^{s.t} = \frac{\frac{1}{n_i}\sum_{j=1}^{n_i} p_{ij}^t}{\frac{1}{n_i}\sum_{j=1}^{n_i} p_{ij}^s} = \frac{\sum_{j=1}^{n_i} p_{ij}^t}{\sum_{j=1}^{n_i} p_{ij}^s}$$

- Jevons index (geometric average)

$$P_i^{s.t} = \left(\prod_{j=1}^{n_i}\frac{p_{ij}^t}{p_{ij}^s}\right)^{\frac{1}{n_i}} = \exp\left\{\frac{1}{n_i}\sum_{j=1}^{n_i}\log p_{ij}^t - \frac{1}{n_i}\sum_{j=1}^{n_i}\log p_{ij}^s\right\}$$

We have decided to use the Jevons index, and calculate a geometric average. With the new application for index calculations it was easy to calculate all three, and we found it therefore sensible to see if there was any major difference in the total SPPI for the different elementary indices. We also looked at the strengths and weaknesses of the indices, using theory from The Producer Price Index Manual (IMF, 2004). Table 9.1 in the PPI Manual (IMF, 2004) shows us that the choice of elementary index

can make a substantial difference to the results obtained. First, it is well known that an arithmetic mean or average (Carli index) is always[2] greater than the geometric average (Jevons index). The Dutot index may be greater or less than the Jevons, but tends to be less than the Carli index. The PPI Manual also states that the differences between the results obtained by using the different elementary indices tend to increase as the variance of the price relatives increases. For NACE 74.121 *Accounting and bookkeeping* we do not think that this will be a big problem. The industry subclass changes prices on an annual basis at more or less the same rate, set by the largest establishments. This may be of greater importance for NACE 74.122 since the realized hourly rates will depend on the market (number of new and existing contracts/tenders) and the competitive strength of the different establishments.

A weakness with the Carli elementary index is that it is not transitive. The example in the PPI Manual shows that a chained Carli index that has the same prices for all products in the base period and the actual period does not give the same index value in the two periods. We are chaining the indices for this SPPI so this may be a reason to prefer the Dutot or the Jevons elementary index.

The PPI Manual recommends us to use several criteria when choosing an elementary index. The two main approaches are the axiomatic and the economic approaches. From the results of the tests we did and from theory, we found that a Jevons index would best fit our index.

Weights

We aggregate the elementary indices up to a "total" SPPI with the use of weights, w_i^b for elementary group i in the weight basis period b. We have:

$$w_i^b \rangle 0 \quad \text{and} \quad \sum_{i=1}^{M} w_i^b = 1$$

In addition to calculating the "total" SPPI we will calculate some sub-indices. To calculate elementary indices up to a sub-index at aggregation level G, we need the weight $w_{i(G)}^b$ for i ε G. Sub-index weights are calculated as follows:

$$w_{i(G)}^b = \frac{w_i^b}{\sum_{k \varepsilon G} w_k^b}$$

[1] The elementary indices are actually an estimate for an unknown parameter called the theoretic elementary index.
[2] Only in the odd case where all of the price relatives are equal will the arithmetic average be equal to the geometric average.

Index Calculation

For this SPPI we will calculate a Laspeyres index.

$P^{s,t}(b)$ becomes a true Laspeyres index if b = s and $P_i^{s,t} = I_i^{s,t} = \frac{p_i^t}{p_i^s}$, and we will calculate the SPPI as follows:

$$P^{s.t}(s) = \sum_i \frac{q_i^s p_i^s}{\sum_k q_k^s p_k^s}\left(\frac{p_i^t}{p_i^s}\right) = \frac{\sum_i q_i^s p_i^t}{\sum_i q_i^s p_i^s}$$

8. Documentation of the statistical procedures

To ensure that the data we collect from the respondents are reliable and a true reflection of reality, we need quality assurance. Every questionnaire is closely examined and edited if necessary. This process requires both judgement and knowledge about the index. This examination is performed manually, supported by electronic auditing applications.

The review comprises essentially two methods: micro-based and macro-based. The first of these assesses each piece of information received from the respondents. For this, a data editing application called Dynarev is used, which allows controls to mark a data field with "error" if the item of information does not meet the right criteria. This functions only as an alarm; the actual editing has to be performed manually. There are two particular types of controls that we employ with each item of price information:

- Value compared with previous period. This control raises an alarm when there is a large change in price compared with the previous quarter. A large change might indicate a discontinuity.
- Continuity. This control raises an alarm if the value has remained unchanged over five quarters. A source of error in the index calculation that may be difficult to detect is where observations remains unchanged over a long period. This may be due to a respondent's lack of commitment to the accuracy of the survey, or it may be attributable to natural causes. Here, we usually contact the respondent, either by phone or e-mail. It is not unusual for a company to have unchanged prices over several periods, especially in the case of smaller companies located outside the major cities. It may at some stage be appropriate to extend the number of periods of unchanged prices needed to trigger an alarm.

In the macro review, we control which price observations have the strongest effect on the calculated indices. We employ Rstudent and DFFITS to rank the most outlying and influential values. We also have to make assessments as to whether the observations are actually problematic.

Rstudent Control

WEIGHT	PRICE	ORGANISATION NUMBER	BASE PRICE	Group	Studentized Residual without Current Obs	ref_rstudent
0,091963	1346	986147xxx	1866	1;2	4,16494	2
0,084744	661	987668xxx	1000	5;1	2,74379	2
0,083874	729	974074xxx	1054	4;3	2,58948	2
0,082130	1472	987668xxx	1032	1;1	-4,59946	2
0,078971	2078	974074xxx	2474	1;3	2,71009	2
0,078971	1833	974824xxx	2334	1;3	3,78626	2
0,078971	1800	972142xxx	2200	1;3	2,85467	2
0,068284	1120	974074xxx	1558	3;3	3,47587	2
0,068284	1046	974824xxx	1358	3;3	2,34746	2
0,068284	970	972142xxx	1428	3;3	3,72488	2

Table 8.1 – Rstudent control

Rstudent is a standardized residual (with constant variance) by regression of the present price over the basis price. With this control we can see which observations may have errors. Only Rstudent values

that differ by more than +/-2 are shown in this table, and these will need closer examination. From the table we can see that the company can be easily identified from the column "organisation number". DFFITS is a diagnostic meant to show how influential a point is in a statistical regression. In other words, it is a method we use to detect price relatives that have strong influence on the index calculation.

9. Results

9.1 Index results

Table 9.1 shows how the producer price index for the industry class accounting, bookkeeping and auditing activities; tax consultancy has developed from the first quarter of 2007 to the second quarter of 2008.

	Index accounting and bookkeeping (74.121) **2007=100**	Index auditing (74.122) **2007=100**	Total index (74.12) **2007=100**
1st quarter 07	**99.1**	**98.1**	**98.6**
2nd quarter 07	**99.8**	**98.2**	**99.0**
3rd quarter 07	**100.4**	**100.6**	**100.4**
4th quarter 07	**100.8**	**103.3**	**102.0**
1st quarter 08	**104.6**	**105.0**	**104.8**
2nd quarter 08	**105.6**	**106.6**	**106.0**

Table 9.1 – Index results

Figure 9.1 gives a graphic depiction of the index. We see clearly here that the two elementary indices increase in different quarters, as we expected from dialogues with trade associations from both industry classes. In the 3rd quarter of 2007 we see a big leap in the industry of auditing activities. This effect is mainly due to an annual price increase in the industry, and we also see the same trend in comparable countries, such as Sweden and Finland. In the 4th quarter, and through the rest of the period, this subclass' price level grows gradually.

In the other subclass, accounting and bookkeeping, we see a different tendency. From the graph we observe that there is stable growth in the first four quarters, while we get a leap as we turn into 2008. Again, if we look at comparable countries, this index makes a lot of sense, and, according to the trade associations, the 1st quarter is when most of the annual price increases take place.

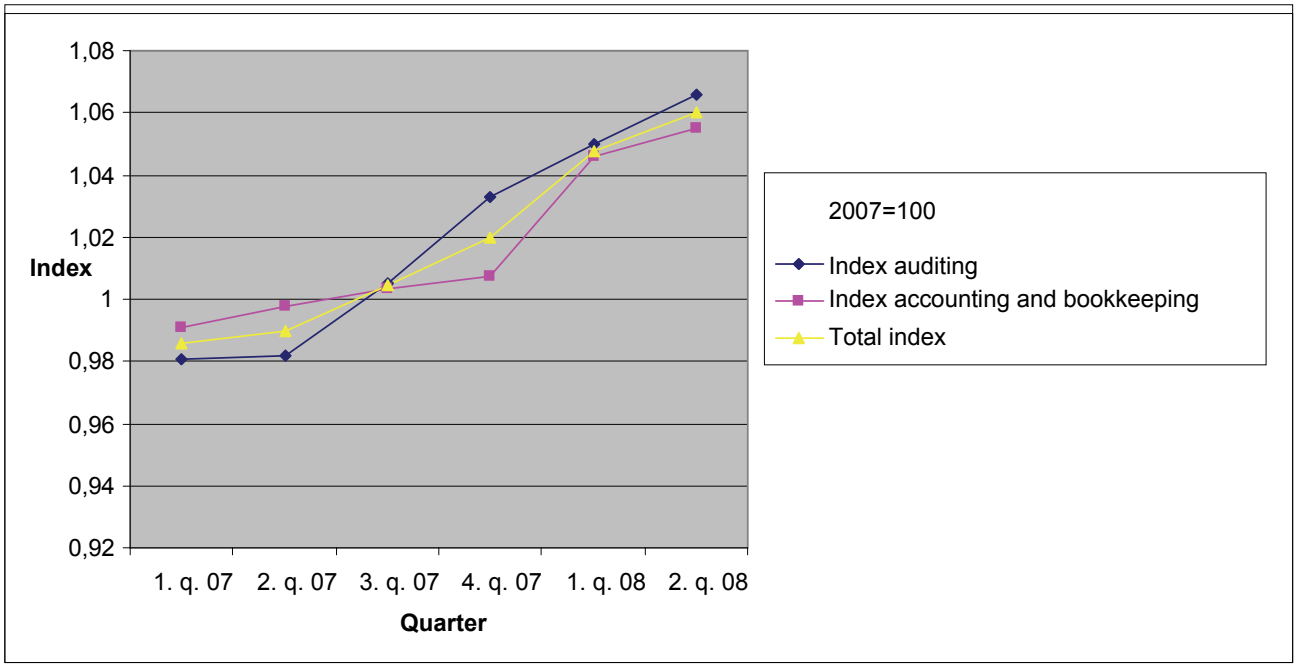

Figure 9.1 – Index results

The total growth is for NACE 74.12 is approximately 7.5 per cent, with auditing activities increasing a little over 8 per cent and accounting and bookkeeping increasing by just over 6 per cent for the entire period.

Even though we collect data for the distinct fields of activity for auditing activities, our intention is not to publish any of them as official statistics at the moment. In the first four quarters, all the sub-indices remain close to each other, while in the 1st quarter of 2008 they begin to diverge. Partner and Manager have a big leap, Senior levels out and Senior Manager and Trainee decrease. In the 2nd quarter of 2008 they all increase. Senior Manager has a big leap, while the others have a moderate rise.

For accounting and bookkeeping, we have only included the most important sub-indices in this report, in figure 9.2. Together these four sub-indices account for over 80 per cent of the total index. We see that the prices for annual accounts, performed by a staff member, have had the biggest growth of the four, with an increase of a little over 9 per cent over the period. Also worth mentioning is that all of the sub-indices have their biggest leap in the 1st quarter of 2008. As mentioned earlier, this is mainly a result of the annual price adjustments in the industry.

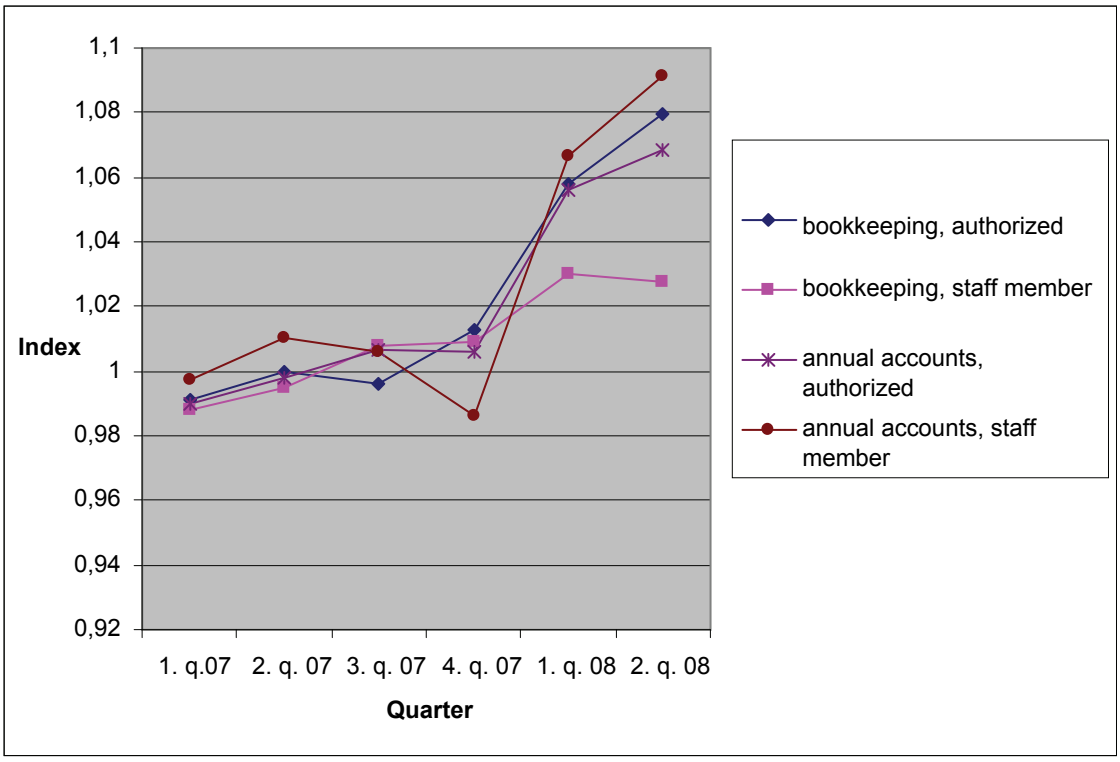

Figure 9.2 – Sub-indices for accounting and bookkeeping

9.2 Distribution of weights

For the total index (NACE Rev 1.1 74.12), the services of accounting and bookkeeping account for 51.6 per cent, while auditing activities make up the remaining 48.4 per cent. These percentages are calculated by dividing the turnovers in the different subclasses into the total turnover in our sample.

When it comes to the distribution of weights in the sub-industries, we also use turnover as our measure. We use it to calculate what kind of work and type of employee constitute the largest and most important group. For accounting and bookkeeping, as mentioned earlier, bookkeeping services account for about 70 per cent of the total turnover in this sub-index, which is shown graphically below in figure 9.4. The rest of the groups are divided almost equally, with most of them having around 5 per cent of the total turnover.

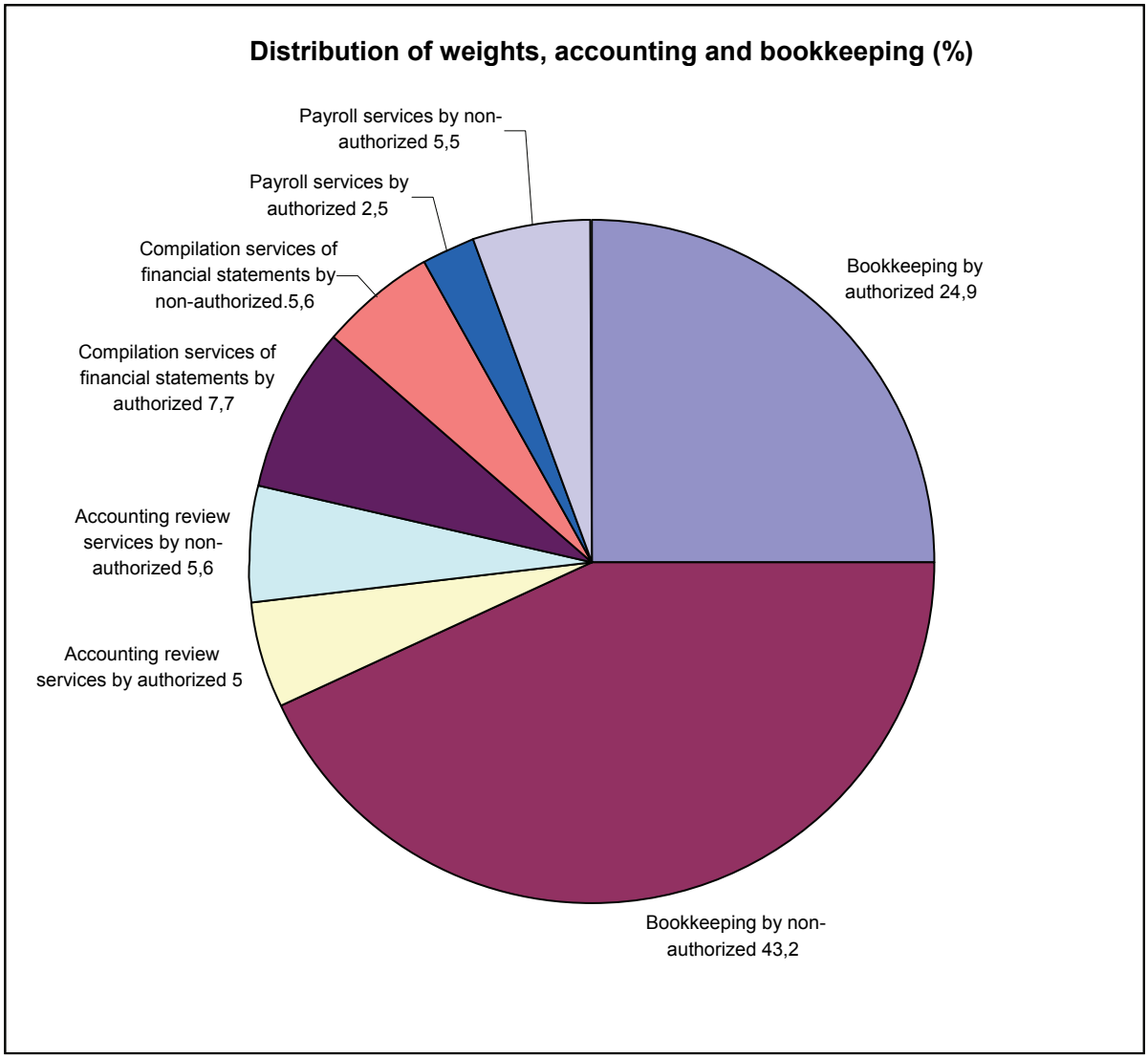

Figure 9.4 – Distribution of weights, accounting and bookkeeping

For auditing activities, we have three kinds of employees that are equally large, as shown in figure 9.5. Partner, Senior and Trainee each account for roughly 25 per cent. Senior Manager and Manager have a lower turnover and account for 10 and 14 per cent respectively.

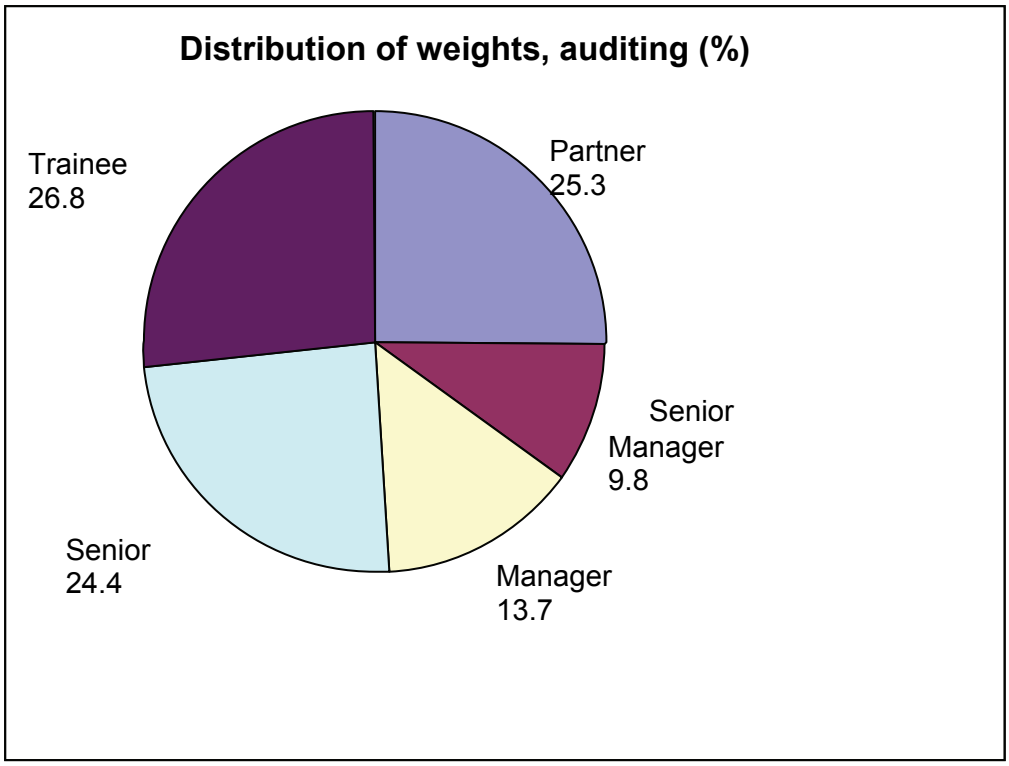

Figure 9.5 – Distribution of weights, auditing activities

9.3 Evaluation of uncertainty

We have a stochastic approach in the calculation of this price index, an approach to index number theory that treats each price relative as an estimate of a common price change. The advantage of this approach is that uncertainty is quantified, by estimation of probability distributions for the results. This uncertainty can be estimated with model variance, which is the weighted sum of variance in the elementary indices. The variance that we measure will mainly be affected by variance within single price observations, as well as the number of price observations that are included in an elementary index.

Price index and standard error				
	Accounting and bookkeeping		auditing	
Period	Index	Standard error	Index	Standard error
1st quarter of 2007	100	0	100	0
2nd quarter of 2007	100.7	0.0033	100.1	0.0021
3rd quarter of 2007	101.3	0.0055	102.5	0.0043
4th quarter of 2007	101.7	0.0050	105.3	0.0062
1st quarter of 2008	105.6	0.0088	107.1	0.0110
2nd quarter of 2008	106.5	0.0108	108.7	0.0092

Table 9.2 – Standard errors

From the table above, we can see that the standard error increases as the quarters go by. Because we use the 1st quarter of 2007 as our price base period, this is not an unexpected development. If we had instead used the previous quarter as the price base period, the standard errors would be significantly lower.

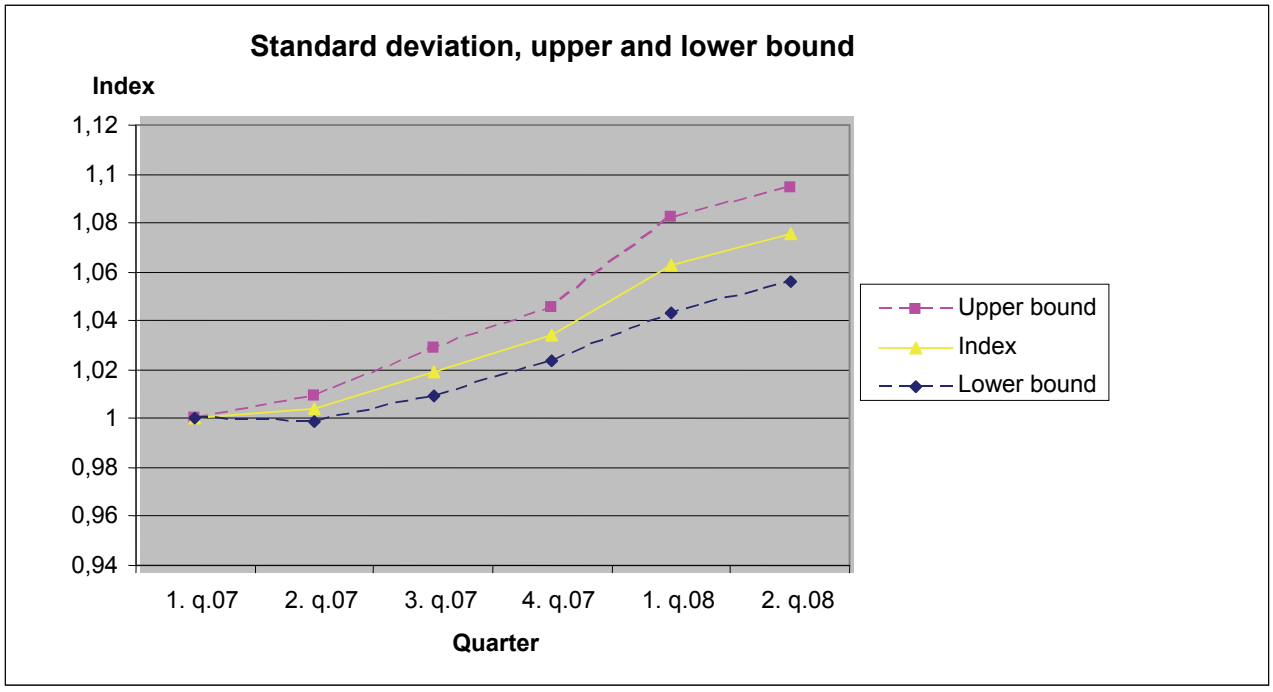

Figure 9.6 – Standard deviations (total index)

We calculate the 95 per cent confidence interval by taking the index value and adding or subtracting the standard error multiplied with 2. Similarly to the standard errors in table 9.2, the confidence interval indicates an increase as time progresses. However, the difference between the lower and upper

limit levels out in the 2nd quarter of 2008. This might be an indication of a stabilizing trend for the confidence interval.

9.4 Publishing

As we mentioned in the introduction to this report, the main purpose of this index is for use in the Norwegian National Accounts system. To ensure topicality, we publish our indices within 45 days of the end of the quarter, and 60 days for the second quarter, when the deadline for respondents is extended due to the summer holidays.
From the first quarter of 2009, the price index for Accounting, bookkeeping and auditing activities will be published together with other indices from the same Standard Industrial Classification (SIC2007). The index belongs to classification M, professional, scientific and technical activities, and will be published together with the indices for 71.11 Architectural activities, 69.10 Legal activities and 70.20 Business and management consultancy activities.

9.5 Estimation of data back to 2006

According to COUNCIL REGULATION (EC) No. 1165/1998 of 19 May 1998 concerning short-term statistics AMENDED by the REGULATION (EC) No. 1158/2005 of the EUROPEAN PARLIAMENT and of the COUNCIL and by COMMISSION REGULATION (EC) No. 1503/2006, the first reference period for transmission of the output price variable No. 310 is not later than the first quarter of 2006. Since we began our data collection in the 1st quarter of 2007, we have to estimate data back to 2006, in order to set the base year to 2006.

To avoid as much uncertainty as possible we have employed Statistics Norway's statistics on average quarterly earnings within the industrial classification of legal, accounting, bookkeeping and auditing activities (NACE Rev 1.1 74.1). Another reason to use the wage statistics was to avoid further respondent burden. We took the original index (2007=100) presented in table 9.1 and estimated these figures backwards by means of annual growth in quarterly earnings from 2006 and 2007.

Price index for accounting, bookkeeping and auditing activities 2006=100	
1st quarter 2006	98.7
2nd quarter 2006	99.0
3rd quarter 2006	100.4
4th quarter 2006	101.8
1st quarter 2007	105.0
2nd quarter 2007	105.3
3rd quarter 2007	106.8
4th quarter 2007	108.3
1st quarter 2008	110.5
2nd quarter 2008	112.3

Table 9.3 Price index for accounting, bookkeeping and auditing activities, 2006=100

With index figures from the four quarters of 2006 we were able to set the base year to 2006. The calculation procedure will proceed as usual, but since we don't have actual data from 2006 we have to multiply the future index outputs we get from our calculation application (PRIS) with the index output we estimated in the 1st quarter of 2007. Accordingly we will obtain index figures adapted to the desired base year.

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Prices for Accounting and Book-keeping Services

1. What was the average hourly charged-out rate for book-keeping services carried out by authorised and non-authorised accountants in 1., 2. and 3. quarter of 2007? Also report the total turnover for these same services in 2006.

	1. quarter 2007	2. quarter 2007	3. quarter 2007	Turnover 2006	
Authorised Accountant					000
Non-authorised Accountant					000

2. What was the average hourly charged-out rate for accounting review services carried out by authorised and non-authorised accountants in 1., 2. and 3. quarter of 2007? Also report the total turnover for these same services in 2006.

	1. quarter 2007	2. quarter 2007	3. quarter 2007	Turnover 2006	
Authorised Accountant					000
Non-authorised Accountant					000

3. What was the average hourly charged-out rate for compilation services of financial statements carried out by authorised and non-authorised accountants in 1., 2. and 3. quarter of 2007? Also report the total turnover for these same services in 2006.

	1. quarter 2007	2. quarter 2007	3. quarter 2007	Turnover 2006	
Authorised Accountant					000
Non-authorised Accountant					000

4. What was the average hourly charged-out rate for payroll services carried out by authorised and non-authorised accountants in 1., 2. and 3. quarter of 2007? Also report the total turnover for these same services in 2006.

	1. quarter 2007	2. quarter 2007	3. quarter 2007	Turnover 2006	
Authorised Accountant					000
Non-authorised Accountant					000

5. Which kind of charge-out rate did you use to answer question 1-4

Real charge-out rates ☐
List-prices ☐

Prices for Financial Auditing Services

1. What was the average hourly charged-out rate for financial auditing services carried out by different types of employees in 1., 2. and 3. quarter of 2007? Also report the total turnover for financial auditing services in 2006.

	1. quarter 2007	2. quarter 2007	3. quarter 2007	Turnover 2006	
Partner					000
Senior Manager					000
Manager					000
Senior					000
Auditing Associate					000

2. Which kind of charge-out rate did you use to answer question 2?

Real charge-out rates ☐
List-prices ☐