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The Charge-out Rates Applied to the Swedish Computer Consultancy Services

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Forward

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“To add to the Pricing Thesaurus examples of how people in various countries actually apply the different definitions of pricing methodologies (for 2008, an example will be added by France and Sweden on how they apply charge out rates methodology). ”

It was decided that the Computer services and related activities (72, NACE Rev 1.1) will serve as a base of examples for France and Sweden.

It is necessary to stress in advance that charge-out rates approach is commonly used by a majority of countries producing SPPI¹ for the significant part of Computer services and related activities, namely consultancy, despite that this method does not capture changes in productivity.

The method is classified as B-method by the Handbook on Price and Volume Measures in National Accounts (Eurostat 2001) for consultancy also within other services industries like legal services, accounting, book-keeping and auditing services, architectural, engineering and related technical consultancy services among others.

A and B methods are acceptable methods and SPPI using this methods are suitable to be used as deflators within the European System of National Accounts as it is stated in Annex A to Council Regulation 2223/96, Commission Decision of 17 December 2002.

In 1999, the UN Statistical Commission asked the Voorburg Group to focus on the measurement of the prices of services provided to enterprises in a hope of the overcoming of methodological difficulties within services price measurement by a broad cooperation among countries involved. Also within the framework of the OECD-Eurostat Task Force on service prices in short-term statistics (STS), which began in 2002, experiences can be shared between different countries and the methodologies used in each country can be reviewed and discussed.

As statistics on services are a priority area, Eurostat offered the possibility of applying for grants for the development of service price indices, both within STS (short-term statistics) and NA. The financing of pilot studies is also helping countries to begin work.

Thanks to all efforts mentioned above, many countries are developing SPPI today. The international regulations, instructions and cooperation facilitate the process. The problem seems to have moved to the production of SPPI, where expanding number of indices to produce often does not correspond to the economic resources allocated to this issue. At the same time a lot of methodological difficulties remain to be solved.

The inside description why and how the charge-out rates method is used in Sweden might bring the understanding for the remaining difficulties.

¹ Services Producer Price Index

The Charge-out Rates Applied to the Swedish Computer Consultancy Services

This paper briefly describes the development of SPPI for computer services and the difficulties that occurred. The reason why charge-out rates or hourly fee approaches are used within SPPI (Services Producer Price Index) for Computer and related services in Sweden and how they are applied is also discussed. Furthermore the result of the first review of SPPI in this industry is mentioned. Some remaining needs of the Swedish System of National Accounts are pointed out. The possible advantage of the calculation of SPPI in Sweden in times of globalisation is mentioned in the concluding remarks.

The annex includes the overall requirement of System of National Accounts on SPPI as deflators and selection of procedures for production of SPPI in Sweden.

The main purpose of developing SPPI was to create producer price indices for services designed for use in the Swedish System of National Accounts in calculating the production values of services at constant prices. This is carried out on the product group level in concordance with the European Union's recommendations. (Private services represent more than 50 percent of GDP in Sweden.)

The National Accounts division of Statistics Sweden has commissioned the development of price indices for services. This work was carried out in project form at a departmental level from January 2000 to December 2003. The first work, which the project ordered from the cooperating National Accounts division, was an inventory of the A, B and C methods then used for deflating services (at the product group level). From this inventory, the project was able to gain a clear picture of the number of product groups that awaited an improved deflator. There were over 100 product groups, where the deflator needed to be replaced. The development of SPPI for 4 existing product groups within Computer and related services was given the highest priority by Swedish National Accounts.

The Swedish computer services industry

According to Swedish Business Statistics, there were 32 758 enterprises in the Swedish computer services industry in 2006. Enterprises classified as NACE/ISIC 72 employed 89 800 employees (2005). Of the total net turnover of SEK 147.9 billion (2005), sole employers represent about 12 percentage of total occupied in NACE/SIC 72. Operating profit stays for 11 percentage of turnover and labour cost represent 18 percentage of turnover. Most of the enterprises are small with less than 10 employees. The concentration is high, according to the survey of IT consultants, the 10 largest enterprises account for 30 percentage of the total turnover in the industry. In addition, many major corporate enterprises have many subsidiaries in the same industry. More than half of the computer services enterprises are located in or close to one of the three largest Swedish cities. In terms of customers, enterprises and public utilities account for $\frac{3}{4}$ of the total turnover while households only account for 0.2 percentage. Government and municipal authorities account for 14 percentage while export account for 10 percentage.²

² For further information see Cerda M. & Glanzelius M. (2001) Service price index for computer and related activities SE-SIC 92 group 72, TPI project report no.2

Exports amounted about 23 percent of the production value within product group 7220 Software supply services and other related services, or 19 percent of the total use. Imports represented about 10 percent of the total supply within the product group. (Based on current prices 2004.)

According to the figures obtained from the International trade division of Statistics Sweden the amount of exports of computer services and related activities in current prices increased by 40 percent (2007Q2/2005Q2).³

The computer and related services industry in Sweden provides services in three main areas: computer consulting services, operational services, and maintenance and repair services. Large computer enterprises often offer all kind of services available within the industry.

Software consultancy and supply (72.2) is the part of 72 with the largest share of enterprises, employees, net turnover and value added in relation to the total value for each of these variables.

The cooperation efforts during the development stage

SPPI for computer and related services was developed during 2001 and the first price collection started during the first quarter of 2002. Whenever a SPPI is developed for a new product group within services, access to detailed information is necessary. The development was carried out as a development project at the Economic Statistics department level. Three organisational divisions of Statistics Sweden were involved, namely the National Accounts (as customer and provider of guidelines), Prices (the developer of SPPI with price index expertise) and Services (the producer of services statistics with great knowledge of the structure of services industries in general and computer services in particular). Good cooperation inside the development project together with the high level cooperation between the project and Computer companies industry organisation (SITO) as well as numerous visits at major big enterprises contributed to the broad and efficient insight into the industry.

Main reasons for the choice of charge-out rates⁴

The selection of a price measurement method was done thanks to knowledge about the industry. It was found that:

Enterprises working with **Computer consulting services** usually charge their clients by the hour. Charges include not only salaries but also other costs and calculated profit. In accordance with that information on the average invoiced hourly rate for the following categories of consultants: project manager, system analyst, IT architect/system designer, system programmer/programmer and system engineer was collected. Each consultant category was divided into 5 different levels of experience and the hourly rate for consultants at experience levels 2 to 4 was requested.

Since most consulting assignments are fairly short (less than 2 years), the length of the contract was not taken into account.

In the majority of cases, it was possible for the enterprise to collect the requested information relatively easy from its bookkeeping system which also was an important part of the choice of pricing-method. By keeping the burden of a every single responding enterprise low, the quality of to Statistics Sweden delivered figures assumed to be of acceptable level⁵. In addition it was also possible to keep the production costs of this particular SPPI within the frame of budget restriction by saving time for otherwise additional contacts with the enterprise. (Compared with the situation when a lack of transparency of the pricing method used requires many time-consuming and repeatable contacts and when the result still is of a questionable quality.)

³ More about the industry, see Norrman, V. (2007)

⁴ The description of the classification of NACE 72 and the four existing product groups within national accounts in Sweden, see Norrman, V. (2007)

⁵ Prices for SPPI are surveyed mandatory.

Large enterprises have the largest burden as respondents. The hourly rate for programmers was affected by which programming language was used. That is why respondents were asked to report the programming language when reporting the hourly rate for programmers.

It is necessary to point out that tracking the price changes in hourly rates does not capture changes in productivity. It is a particularly drawback in the industry with many quick changes and products innovations. (Both software and hardware are constantly developing. An enterprise's base of knowledge increases with the number of consulting assignments, which enable quicker and more efficient completion of future assignments.)

Within **Operational services** were operating contracts divided into their main parts and the respondents have to determine the prices of the different parts. The prices were collected for following services: server monitoring (model pricing), support (hourly rate), monitoring of computer communication (model pricing), physical and electronic data storage (price per unit), and backup services (price per unit).

Since operational services often consist of a package price that includes monitoring, backup, support, etc., many enterprises have difficulties with breaking down the operating contract to the level for which prices were requested. But since customers also increasingly request detailed price information for the services they purchase, the majority of enterprises were working to set prices for the different components of operating contracts.

It was found that large enterprises sometimes have separate companies that internally take care of operational services. Import of operational services from one or several country/-ies is also fairly common. It can be called near-shoring or far-shoring depending of the geographical place of country services are imported from. For example there are differences of levels of difficulties within support services; far-shored support can deal with most easy and common appeared cases, near-shored support with those of higher level of difficulties and the enterprise based in Sweden with the most complicated cases of support needed. The organisation of operational services varies among companies.

Maintenance and repair of office, accounting and computing machinery and data processing equipment (72.500) is rather small part of NACE 72. Both contract prices and actual transaction prices of repair services are used. Prices for maintenance, repair, and installation of computers, printers and servers are collected. The problem of quality adjustments arises when the model of computer, printer, or server changes.

Sample selection

Sweden's business register is used as a sampling frame. This is done during the month of November. Sole employers are not included, since the computer industry is characterised by rapid changes, new enterprises start at the same time as others stop their activity, and mergers and acquisitions are common occurrences. Including these enterprises would increase the risk of no response.

The total sample size was from the beginning about 120 enterprises and is now 100 enterprises. The sample size for each NACE group is proportional to the NACE group's weight according to the National Accounts. A cut-off on 10 employees is used to ensure the burden on data providers is not too heavy. The enterprises in the sample can themselves select the services that are representative of their activities.

Since the computer services industry consists of many small enterprises, the sample is taken using a probability sample. Probability sampling makes it possible to use statistical theory to study the properties of the estimates. A π PS sample⁶ with size measure s "number of employees plus one" is taken from the relevant NACE group. For an enterprise active in multiple sectors, the

⁶ π PS is a special sort of PPS (Probability Proportional to Size) sample

size measure is multiplied by the share in the relevant sector. "Number of employees plus one" is used as the size measure since the number of employees is a more stable variable than the net turnover, which is missing for a number of enterprises and is often out-of-date in the business register. For enterprises active in several sectors, thus, the size measure, s , is "share in the sector" multiplied by "number of employees plus one".

The correlation between the number of employees and the net turnover is relatively high, which indicates that the number of employees is a reasonable proxy for the net turnover. The proxy is more suitable for large enterprises than for small enterprises.

To ensure that the burden of respondents is not too large and that changes in the industry are not missed, new samples are drawn every year when 20 percent of enterprises also rotate out of the sample.

Index calculation and the weighting system

An regular SPPI is calculated for each of 4 national accounts product group **by first computing an index for each enterprise and then weighting all enterprises together geometrically, where large enterprises have their own weights.** This is the procedure concerning 3 national accounts product groups. An additional step is added for the 4th remaining product group, namely operating services, in which 4 different NACE groups (72.100, 72.300, 72.400, 72.600) are weighted together arithmetically to give a index with weights. Finally, all the main groups are weighted together arithmetically to form a total index of NACE 72.

Results of the industry review⁷

During 2007 the review of SPPI for Computer and related services was done. Ambitious targets of this review were:

- 1) To check the possibility of replacement of charge-out rates by a method better reflected the productivity changes
- 2) To discuss the increasing problem "offshoring"
- 3) To solve of the problem of uncoverage among operating service

Visits (mostly to the large enterprises in the industry) have been made to examine the types of services supplied, pricing, etc. In addition the industry organisation has also been contacted. The review of the industry has been again coordinated with the needs of Swedish National Accounts. National Accounts representatives have participated in the visits so that they could give their requirement on price measurement. Besides that, statisticians working with the review of SPPI for computer and related services also participated in international meetings, seminars, conferences to collect as much information about the industry as possible.

The visits carried out during the review process brought new light on the stage of conditions among enterprises operating in Swedish computer service industry.

Some findings of interest:

The globalisation process involves nowadays even medium-size enterprises, which can operate on time-follows scheme around the world. So-called Lego-production is more used.

Expression as "export" and "import" are less understandable among companies that speak more in terms of "abroad based activities of the production processes".

The updated Swedish classification of products SPIN2002 provides wide better base for the structure among services accounted under NACE 72.

Since the current used method of hourly charge-out rates for different categories of staff (as project manager, systems designer, programmer and computer technician) with varied consultant's experience has to be computed as average of a quarter, the burden on respondent large enterprises is rather high (as it was expected and assumed during the development process already). Some of the visited enterprises complained on that fact and suggested themselves to

⁷ See Tareke, M, Johansson, U (2007), Review of Computer and Related Activities

provide Statistics Sweden with model-based figures in the future. The willingness to cooperate on the design of the representative and detailed model was appreciated by price statisticians and found as promising.

The actual result of the review

Beside the findings mentioned above which brought new insight about Swedish Computer and related services industry, **The new form for SNI 72.2 (Software consultancy and supply)** was designed. During 2007, the companies in SNI 72.2 *Software consultancy and supply* have been given the opportunity to choose the new form for computer consultants. The companies affected were asked to choose some service which they feel are representative and repetitive for their activities and then submit average prices invoiced for these services.

A third of the companies have used the new form and these are equally distributed between SNI 72.210 *Publishing of software* and SNI 72.220 *Other software consultancy and supply*. The companies have used the option of choosing the consultant categories relevant to their activities.

However, those who have submitted data on the new form have submitted hourly rates for different consultancy categories, apart from one company that submitted prices for services. The form needs further adjustment and more contact with the enterprises needs to be taken.

Requirements of national accounts on SPPI for exports and imports

With ongoing globalisation process the needs of the coordination of statistical sources to better reflect system of national accounts are more obvious than ever. Since exports and imports account for a significant part of many services and NACE 72 is one of those, **exports and imports SPPI are needed** for Supply/Use (S/U) tables and improvement of quality in the calculation of GDP.

In theory the price of value added should be based on the prices of output and the prices of intermediate inputs. It is called double deflation when prices of intermediate inputs are taken into account. When a system of price indices is not sufficiently complete and prices for intermediate inputs are not known, one often opts to solve the problem (the lack of price indices) by using of modified price indices for output.

The use of price indices described above can create some additional problem to the System of National Accounts when relative prices of output and intermediate inputs differ for a particular industry and country. For example, it might be the case that while the observed gross output prices in country A are the same as in country B, the unobserved intermediate input prices are lower in A. In that case value added in A is overestimated relative to B when using single deflation, because the price gain from the lower input prices is now reflected in A's volume measures of value added. Secondly, differences in relative prices of primary factor inputs and intermediate inputs can lead to differences in the use of intermediate inputs, leading to substitution effects. Relatively lower intermediate input prices will lead to a higher use of intermediate inputs compared to the use of capital and labour inputs in the production process in country A.

When using single deflation, this substitution effect between intermediate inputs and value added is not reflected in the relative volume measure of value added. The main point here is that as long as relative intermediate input prices do not move in tandem with relative output prices across countries, measures of single deflated value added will be biased. The assumption of above is hardly in concordance with the observed reality. The double deflation procedure does not suffer from this bias and therefore most European countries and the US recently adopted double deflation techniques in the compilation of value added time series in their National Accounts.

However in practice double deflation has a large requirement on data; among them on appropriate price indices. Even if the measurement of new price indices can introduce a new

possible source of error to the system of national accounts, what seems to be the worst situation? One without any measured information about movements of prices for different parts of S/U tables or an additional possible source of error by the introduction of new appropriate price indices as deflators?

Conclusions

Despite the willingness of the cooperation between Statistics Sweden and visited enterprises, **the replacement of charge-out rates, by any other method of those that are supposed to better reflect the productivity changes, seems to be difficult to achieve within the consultancy services in Sweden.** This is at least true concerning computer consultancy within this currently finalised review.

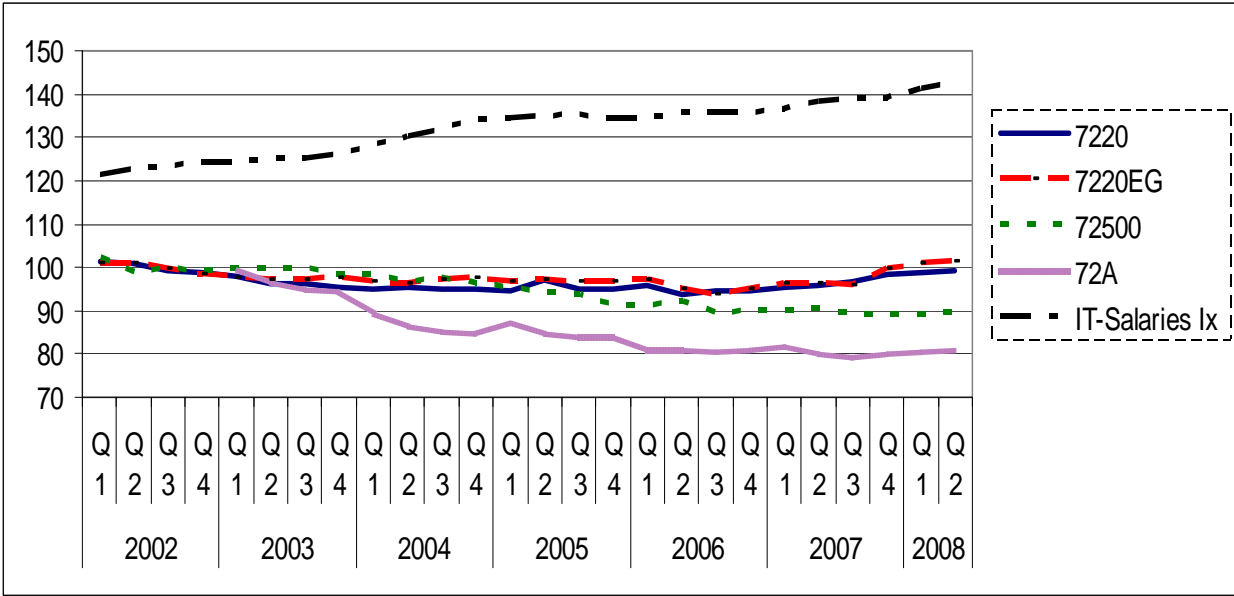
New efforts have to be undertaken to replace the charge-out rates method both in Sweden and internationally. International cooperation on methodological issues and exchanges of experiences will continue.

What remains to be discussed among the price statisticians is whether and when the development of SPPI for exports and imports will receive the priority to meet the requirements of the System of National Accounts.

One plausible advantage of the computation of SPPI in Sweden might have decreased the effect of increasing globalisation in conclusion with charge-out rates used:

The drawback of the charge-out rates method used in Sweden can possibly be eliminated by the procedure of index calculation at the first computation level which is applied to all SPPI in Sweden. Since **the index for each enterprise is computed at the first stage level**, ongoing changes in services supplied by an enterprise can hardly be significantly different between two following quarterly price collections.

Diagram 1: SPPI as deflators for four computer and related services product groups⁸ compared with the IT-Salaries Index⁹ which was used as deflator in the past; 2002 – 2008, Sweden.



⁸ B-methods
⁹ C-method

Annex 1

Requirements of national accounts on a price index used as deflator

The Handbook on Price and Volume Measures in National Accounts, Eurostat (2001), gives international recommendations for the selection of methods for calculating deflators. The handbook classifies different methods of suitability as A, B and C methods. The A method is the most suitable method, the B method is another method that can be used, and the C method is one that should not be used. The handbook gives recommendations on the method selection, specifically for the different product areas and transaction categories.

In general, the handbook says that the A method for deflating of production (output) is to use a producer price index (PPI) that briefly fulfils the following. The price index should refer to the exact product group in question, taking quality changes of products into consideration as well as price concept (known as base price), and be suited to concepts of national accounts. The B method could be to use a PPI, which partly but not fully fulfils these requirements, such as a PPI that is not adjusted for quality changes. These general principles are more specifically developed for special product areas in the handbook.

For transactions in services, it is often difficult to specify the characteristics that determine the services, since services vary by type of customer and are less pure when repeated. ESA 1995 places high demands on the homogeneity and quality adjustments when registering changes during different periods.

Requirements on SPPI in Sweden

The a basic work strategy applied to both the development of indices for new service industries and the outline of existing indices consists of four guiding principles:

- The SPPI is a **producer price index** that describes the average price development at the producer level for service industries, where services are delivered from domestic service producers. The index figure refers to a quarter period and the price data represent **an average** per quarter.
- Measured services should be **representative and stable**.
- Measurements should refer to **transaction prices**. The transaction price is the true price for the good/service that the buyer pays and at which the seller sells, i.e. the price after deduction of all discounts.
- **PPS** (Sampling by Probability Proportional to Size) is the main sampling methodology.

Cooperation with industry organisations and companies is necessary since price changes should be observed and described. Initially, a special industry competence has to be developed. These special service industry competences require much time, but both cooperation and competence are extremely essential components of the work for each service industry where a price index should be developed.

Management Principles of SPPI in Sweden¹⁰

The rapid expansion of development of SPPI in Sweden with the high requirements of National Accounts division have led to the choice of the following arrangement of production:

A. New π PS sample selection every year

B. Updating of the weight structure every year

C. New questionnaires every year

D. Ongoing methodological review of industry indices every 3 – 4 years

¹⁰ For the whole overview see Norrman, V. (2007)

References

- Allen, R.G.D. (1975), Index numbers in theory and praxis, Basingstoke: MacMillan.
- Cerda, M. (2004), Producer Price Index for Computer Services in Sweden, 19th Meeting of the Voorburg Group on Services Statistics (*).
- Eurostat (2001), Handbook on Price and Volume Measures in National Accounts, <http://europa.eu.int/comm/eurostat/Public/dashop/print-product/EN?catalogue=Eurostat&product=KS-41-01-543--N-EN&mode=download>
- Norrman, V. (2004), Quality Adjustment for Small Countries, Example Sweden, 19th Meeting of the Voorburg Group on Services Statistics (*).
- Norrman, V. (2006), Tools for Managing High Data Quality in Development and Production of Services Producer Price Indices in Sweden, The European Conference on Quality in Survey Statistics, Cardiff 2006.
- Norrman, V. (2007), Computer Services and Related Activities (NACE 72) in Sweden, The Economic Reality, Statistics and some Apparent Aspects of Measurement, 22nd Meeting of the Voorburg Group on Services Statistics (*).
- Rosén, B. (1996), On Sampling with Probabilities Proportional to Size, Statistics Sweden, R&D Report 1996:1.
- Rosén, B. (1998), On Inclusion Probabilities for Order Sampling, Statistics Sweden, R&D Report 1998:2.
- Rosén, B. (2000), A Users Guide to Pareto π ps Sampling, Statistics Sweden, R&D Report 2000:6.
- Rosén, B. (2001), Order π ps Inclusion Probabilities Are Asymptotically Correct, Statistics Sweden, R&D Report 2001:2.
- SPPI can be found on Statistics Sweden's website <http://www.scb.se/pr0801-en>
- Statistics Sweden (2003), National accounts, Constant Prices Inventory, Chapter 1. http://www.scb.se/templates/Standard_64062.asp
- Svanberg, S. (2003), Urval i TPI, Statistics Sweden.
- Tareke, M, Johansson U, (2007), Review of Computer and Related Activities, Statistics Sweden.

(*) Paper can be found on Voorburg Group website:

<http://stds.statcan.ca/english/voorburg>