

Session Number: 7
Session Title: Other non-market services
Session Chair: François LEQUILLER

**Paper prepared for the joint OECD/ONS/Government of Norway workshop
"Measurement of non-market output in education and health"**

London, Brunei Gallery, 3-5 October 2006

Volume calculations
of individual government production
in the National Accounts of Sweden

Birgitta MAGNUSSON, Statistics Sweden

For additional information, please contact:

Author name(s): Birgitta MAGNUSSON
Author address(es): Statistics Sweden, Box 24300, SE-10451 STOCKHOLM, Sweden
Author E-mail(s): firstname.surname@scb.se
Author fax(es): +468 5069 4296
Author telephone(s): +468 5069 4551

This paper is posted on the following website :

http://www.oecd.org/document/34/0,2340,en_2649_33715_36450978_1_1_1_1,00.html

Contents

INTRODUCTION	3
PURPOSE	3
CURRENT CALCULATION OF NON-MARKET PRODUCTION IN THE NATIONAL ACCOUNTS	4
THE SIZE OF THE PUBLIC SECTOR	4
NEW METHOD OF CALCULATION FROM 2006 ONWARDS	5
THE VOLUME INDEX IS USED INSTEAD OF THE PRICE INDEX	5
WHICH INDICATORS SHOULD BE USED?	6
GENERAL REQUIREMENTS FOR INDICATORS	6
CLASSIFICATION OF METHODS	6
ONGOING ACTIVITIES FOR VARIOUS AREAS AND QUALITY ADJUSTMENT	7
EXAMPLES FROM THE CALCULATIONS OF THE NATIONAL ACCOUNTS	7
REFERENCES AND FURTHER MATERIAL	19

Introduction

Over twelve years have passed since the release of the most recent reports on productivity in the public sector; among other things, Sweden has since then become a member of the EU. Requirements for harmonised calculations of the National Accounts have increased markedly within the union. Since 1996, an EU regulation on the European System of National Accounts, ESA95 has been in effect. During the first years of membership, work has focussed on harmonising calculations of the Gross National Income in current prices, because this is an important basis for deciding how much countries should contribute in membership fees.

Considering that GDP volume development is the most widely used indicator from the System of National Accounts, and the requirements of the Stability Pact, increased demands have been made on harmonisation principles for calculations of changes in prices and volumes. A supplementary regulation within this area was taken by the Commission in December 2002. This regulation was preceded by development work in several international working groups to draw up guidelines for the calculations. The working groups treated the areas where changes in prices and volumes were assessed to be particularly difficult to measure, such as: health and medical care, education, public administration, computers and software, financial services, renting and other business services. Results have been put together in a handbook on methods to measure prices and volumes, which include recommendations and principles on which calculations should be made¹. However, the handbook is of a rather general nature, and it is a great challenge to find relevant material and perform the calculations.

Project team

Within the National Accounts Unit at Statistics Sweden, several people have been engaged in various stages of the development of methods and compilations according to the Eurostat guidelines. Jan Redeby, Christina Liwendahl, Angelica Arellano, Cecilia Sörensen, Jonas Larsson, Ingegerd Hörnström, Ann-Lous Päivinen and Jenny Davidsson have all contributed to different parts of this work. Birgitta Magnusson has put the material together in this report.

In this work we have also had discussions with authorities that are responsible for the official statistics and have expert knowledge within each area. We are grateful for valuable information and comments on our work from the personnel within these organisations. Contacts have been established with the National Board of Health and Welfare, the Swedish Association of Local Authorities and Regions (SALAR), the Swedish National Agency for Education, the National Agency for Higher Education, the National Council for Cultural Affairs, the Swedish Migration Board and the National Board of Institutional Care.

Purpose

This report describes the development work that is being done within the National Accounts at Statistics Sweden. As an introduction, a brief presentation of the current procedures is given, followed by a summary of those EU requirements placed on the methods of calculation. Thereafter, we will take a look at the information and methods used within the different areas. The preliminary results obtained so far are presented and comments are given on some of the problems of the information and calculation methods.

¹Handbook on Price and Volume Measures in National Accounts, ISBN 92-894-2000-6.

Current calculation of non-market production in the National Accounts

The greater part of the production of the public sector is non-market production, meaning that there are no market prices for the services produced. Therefore, the calculations are based on the principle that production value is equal to the sum of the costs for the production in question. The production value thus consists of the sum of salaries, employers' social contributions, depreciation, and intermediate consumption of various goods and services.

Constant prices are also calculated according to the cost method as the sum of the parts. In order to calculate production in constant prices, i.e. measure the change in volume adjusted for inflation, the various components are recalculated to constant prices. Intermediate consumption, consisting of goods and services that are purchased, are re-calculated with respective price indices. The same price indices as for the investments in question are used for depreciation. Salaries and employers' social contributions are extrapolated from the constant price value of the previous year with volume development of the number of hours worked within each area of activity. Since production requires a great deal of personnel, the largest part of the constant price calculation is done with the aid of labour input. The method involves an assumption that the change in volume of input is representative for the change in the produced volume. But it is not at all certain that an increased input results in more production.

Since labour productivity is calculated by using the ratio between value added and the number of hours worked, this way of calculation results in unchanged productivity. When using production costs to roughly measure production, it is not possible to analyse conditions for productivity, which in many cases may be unsatisfactory. Some countries make their calculations on an assumption of a certain increase in productivity, but this general assumption is not made in Sweden or most of the other countries.

The size of the public sector

In Sweden, as in many other European countries, public authority production accounts for a large proportion of GDP. The value added of general government comprises slightly more than 20 percent of the total value added in the Swedish economy, and municipal activities account for nearly 75 percent of public authority production. Government activities are grouped according to an international classification called Classification of Functions of Government, COFOG. The various proportions of the functions in relation to GDP and the total public consumption are illustrated in the table below. Total public consumption accounts for about 28 percent of GDP

Table 1 Classification of the various functions and their weights

<i>COFOG</i>	<i>Description</i>	<i>Value Current prices 2003, SEK millions</i>	<i>% of public consumption</i>	<i>% of GDP</i>
01	General public services	63 551	9.2	2.6
02	Defence	44 794	6.5	1.8
03	Public order and safety	33 899	4.9	1.4
04	Economic affairs	43 249	6.3	1.8
05	Environmental protection	1 661	0.2	0.1
06	Housing and community amenities	4 104	0.6	0.2
07	Health	168 485	24.4	6.9
08	Recreation, culture and religion	18 507	2.7	0.8
09	Education	162 669	23.5	6.6
10	Social protection	150 773	21.8	6.1
	Total public consumption	691 692	100	28.1
	GDP	2 459 413		

New method of calculation from 2006 onwards

According to the European Commission's decision 1990/2002, all member states² from 2006 onwards must report calculations according to the new method of public sector production that is directed towards individuals. For collective services, the costs method may need to be used even in the future due to a lack of reliable quantity indicators. In the ESA95 those services which are regarded as collective or individual are clarified. Services directed towards individuals are mainly found in the 07-10 areas of COFOG.

The current calculation method is no longer accepted. Instead, production should be calculated with the help of output methods. Those countries that do not change their calculations will receive notices to do so. However, Eurostat is aware that this requires a significant changeover, and will not be completely satisfactory from the beginning. But the objective is that each country will do its best, and later when better information and calculation methods have been developed, these can be introduced and previous calculations can be revised.

The change implies that the production value shall be calculated in constant prices based on the volume change of production. Value added in constant prices will then be received as production minus intermediate consumption, similar to the calculations for market production. Production in current prices will also be calculated in the future as the sum of production costs.

The new way to make calculations will involve a methodological break in the time series of the National Accounts. Presently, it is unfortunately not possible to obtain the necessary data on different activities and their costs at the desired level of detail for any longer time period back in time. In most cases, calculations can only be done from 2001 onwards. For certain areas, this is currently not possible even from 2001 onwards.

The volume index is used instead of the price index

Since there are no market prices on production, it is not possible to obtain any price indices to recalculate to constant prices. In cases where no price indices are available, the national accounts can instead provide methods that are based on calculations of volume changes of the topical products. However, it is essential that the products are homogenous and are not objects for significant quality changes between calculation periods.

Eurostat consequently recommends that volume indicators should be used for projections of production value. In the Eurostat handbook indicators for inputs, activities, outputs and results (outcome) are discussed. The current method based on indicators for input, is not acceptable for Eurostat regarding production that has an individual approach.

²Except Denmark, which has been granted a postponement until 2012.

Which indicators should be used?

The handbook takes up the advantages and disadvantages of the various probable indicators. The output indicator method is clearly preferred in the handbook. Some of the viewpoints brought forth are presented in the following paragraphs.

Activities. Examples of activities mentioned in the handbook include the number of operations that are conducted at a hospital. Activities reflect the actions of the producers, based on the inputs that they have. But if new improved treatment methods reduce the number of operations, this indicates a lowered production volume and a worsened productivity. This is not reasonable if patients have received equal help by the use of a new treatment method that does not include an operation.

Indicators for output are therefore the measurements that should be used. However, it is not always easy to exactly define what a unit of output consists of, i.e. the breakdown that should be done for all production. In principle, it is possible for specific goods and services, with the actual delivery of output that occurs in the transfer from producer to consumer. Within education, it is for example the amount of teaching that is consumed by the pupils in a certain training course. Within health and medical care, it is the care/treatment that the patient receives, and for cultural services, it could be the number of theatre performances that the consumers have seen.

Indicators for outcome can finally be exemplified by the level of education in society, or life expectancy. However, the problem with these kinds of indicators is that they can be influenced by factors that do not have anything to do with the activity itself, and are thus not generally representative for output. In some cases however, they can be of help as indicators for quality of output.

General requirements for indicators

To be considered as acceptable methods, output indicators should fulfil the following requirements:

- cover all services that are produced for external users
- be weighted with costs of the reference year for each type of output
- be defined in as much detail as possible
- be adjusted for quality

In addition, an exact report of costs for the various services that are produced is needed to reflect the costs for each separate service in a correct manner.

Classification of methods

Eurostat's handbook includes a description of potential/suitable methods to use under different circumstances. The methods are then classified as A, B or C methods³ where

- “A methods” are the most appropriate methods.
- “B methods” can be used in case an A method cannot be applied.
- “C methods” are those methods which shall not be used.

A B method could be the use of an indicator that has not been adjusted for quality. Accordingly, calculations should thus at least be on the B level. Quality adjustment components are very difficult to grasp. Indicators that are otherwise relevant but are not adjusted for quality are considered as acceptable alternatives.

Classification of methods is different for different types of services. The intention is that this classification shall form a basis for a harmonised approach to improve accuracy and comparability of price and volume measurements within the National Accounts.

³ Commission Decision 98/715/EC.

Ongoing activities for various areas and quality adjustment

With help of the source material that the National Accounts have succeeded in gathering, work has been going on for several years now to develop methods and make calculations according to the new guidelines. In our work we have involved people from associations and authorities that have special knowledge within each area. Cooperation is necessary and very valuable, firstly to obtain help with statistical information and data quality, and secondly to discuss and obtain viewpoints on models and calculation methods. Discussions are also held about changes and additions to the information. We also like to have viewpoints on whether or not the calculation results appear to be reasonable.

We have begun with those activities that have the greatest significance proportionally. These activities are health and medical care, education and social services. But work is also going on to try to calculate the remaining parts of public service production aimed at individuals. However, we have had problems in finding suitable information for some areas, and generally there is a need for more statistics that is more in line with our needs for these compilations.

It is important to receive information on those indicators that best reflect the production carried out. From the perspective of a time series, it is also important to calculate quality changes in the production carried out. The selected indicators shall reflect that which has actually happened within each area in a correct way. In order to use the best methods, volume indicators are adjusted for changes in quality. The handbook admits that this is a delicate problem, and it is also here that we run up against the most difficult problems of all.

Because it is optimal to be able to break down the information to a very low level, it is important to have access to detailed information. As a result, good calculations will be obtained. By making calculations with the help of indicators that reflect activities on a detailed level, structural changes occurring in the activities are included. Changes are then reflected in relation to the various sub-activities and comprise a part of the change in quality. It is also important that costs and output are connected so that the weighted total between the various sub-outputs is correct.

Calculations within the area are now ongoing in most of the European countries, and some countries have already introduced volume calculations for parts of the production in the public sector.

Examples from the calculations of the National Accounts

1. Model for compulsory school

Eurostat's handbook discusses methods for volume calculations in a specific section for each area. The section on education says for example that a distinct feature of education is that it is often given to groups varying in size from very small groups with extensive guidance to lectures for more than 100 participants. Classes in schools usually consist of 20-30 pupils. The output-indicator to be used should be the number of pupil-hours for education. Output of education can be defined as the amount of teaching that is given to pupils and students, adjusted for changes in quality for each type of education.

The number of pupil-hours broken down by the levels of education and the various types of schools and educational programmes can at least be regarded as a B method. If this number is adjusted for quality it can be regarded as an A method.

One potential quality indicator is the number of pupils that leave compulsory school with acceptable grades and eligibility to upper secondary school. Average grades can also be weighted.

Services that do not involve teaching, such as school meals, school healthcare and school transport can be calculated separately at constant prices.

Our calculations of volume measurements within the school system include specifications of the following six services. Volume indices are calculated for each of these and are then weighted together with the costs as weights.

- A. Teaching
- B. School meals
- C. School transport, travel compensation and board and lodging
- D. Pupil welfare (school nurse, school doctor, study and vocational guidance)
- E. Other services
- F. Pre-school class

A. *Teaching* can be divided into two components:

- a) Normal teaching (all teaching except mother tongue⁴ and Swedish as a second language)
- b) Mother tongue and Swedish as a second language

a) *Normal teaching*. The volume measurement is the number of pupil-hours. Now only the number of pupils broken down by classes is available. The current curriculum lists a total of 6 665 hours (60 minutes) for all of compulsory school, but does not list how these hours are distributed among the various classes. Teaching time has thus been broken down according to conditions prior to the new curriculum:

1st year class	20 hours per week
2nd year class	24 hours per week
3rd year class	30 hours per week
4th year class	34 hours per week
5th-9th year classes	35 hours per week

The number of pupil hours has been adjusted with three quality indicators:

- The number of pupils who have left 9th year class who lack final grades. There is also a small number of pupils who left compulsory school in 7th and 8th year classes without grades, for example because compulsory school attendance has been discontinued. This number is so small that it is insignificant.
- The merit rating for a pupil who has left compulsory school with final grades is the sum of the grades for pupil's 16 best grades, where G (pass) = 10, VG (pass with distinction) = 15, and MVG (pass with special distinction) = 20. The merit rating for subjects that a pupil has not completed successfully is of course equal to zero.
- The percentage of pupils who have left compulsory school and are eligible for upper secondary school. These pupils have grades in all three of the subjects Swedish, English and mathematics.

b) *Mother tongue and Swedish as a second language (SVA)* is considerably more expensive per hour than other teaching. Therefore volume indices have been calculated separately for these two activities with the number of pupils as a volume measurement. Data for the number of hours is missing. Costs for SVA are presented separately up to and including 1997. Weighting factors have been used for the following years after 1997. The figures are about 1.5 percent for mother tongue and 2.5 percent for Swedish as a second language.

B. *School meals* Total number of pupils in compulsory school is used as a volume measurement. By and large, all pupils eat at school.

⁴Previously called home language.

C. School transport, travel compensation and board and lodging. There is no longer any information on the number of pupils who have school transport. In addition, this cost item also includes travel compensation and board and lodging. However, the last-mentioned item ought to be insignificant for compulsory school. In cases where volume indicators are missing, constant prices are calculated by deflating the weight cost with a price index calculated as a weighted average value of the price index for constant-route bus traffic (0.8) and taxis (0.2). A volume index for this item is then calculated based on the deflated values.

D. Pupil welfare All pupils, regardless of their class year, are assumed to visit the school doctor and school nurse equally. However, study and vocational guidance is only assumed to occur in year nine. A volume index for pupil welfare is thus calculated as the total number of pupils with the number in year 9 counted twice.

E. Other services All pupils are assumed to use these not specified services equally.

F. Pre-school class The number of children in pre-school class is used as a volume measurement. The fact that more resources are needed for pupils with language support is also taken into consideration. This is done by increasing the number of these pupils with a factor of 0.2.

2. Model for upper secondary school

Four different services can be specified for calculations of volume measurements. Volume indices are calculated for each of these and are then weighted together with the costs as weights.

A. Teaching

B. School meals

C. School transport, travel compensation and board and lodging

D. Pupil welfare (school nurse, school doctor, study and vocational guidance)

E. Other services

A. Teaching. Separate volume measurements are calculated for each programme and are then weighted together. The average cost per pupil differs sharply among the various programmes. Calculations for each programme are made as follows:

Current prices (CuP) as the number of pupils per calendar year (= average of two study years)

× average cost per pupil in current prices

= cost per programme in current prices

Constant price (CoP) as the number of pupils per calendar year (= average of two study years)

× average cost per pupil in prices for previous year

= cost per programme in prices for previous year

A volume index is then calculated as: $\frac{\sum \text{CoP}_t}{\sum \text{CuP}_{t-1}}$

The number of pupils has been adjusted by using two quality indicators:

- The percentage of pupils in year 3 with final grades. Pupils in year 3 without grades include those who supplement studies in certain subjects and receive final grades later. We can still regard the

percentage of those with final grades as a measurement of quality in teaching. Pupils who achieve the results required to continue do not change programmes to supplement courses.

- Average grades for pupils who have completed upper secondary school with final grades. Fail (IG) = 0, pass (G) = 10, pass with distinction (VG) = 15 and pass with special distinction (MVG) = 20. The merit rating for subjects that a pupil has not completed successfully is of course equal to zero.

No adjustment has been made for the percentage of pupils who left upper secondary school and were eligible for university studies. This measurement interacts to a high degree with average grades. Adjustment for changes in this would thus be counted twice. However, discussions are now ongoing with the Swedish National Agency for Education about whether there is any other information that is more relevant for quality adjustment of the produced teaching. To produce an A method, the volume of teaching should be adjusted for quality.

B. School meals. In contrast to compulsory school, school lunches are not served to all pupils in upper secondary school. Constant prices are thus calculated by deflating the weighted cost with the index for institutional catering for municipalities. A volume index for school meals is then calculated based on the deflated values.

C. School transport, travel compensation and board and lodging. In cases where volume indicators are missing, constant prices are calculated by deflating the weight cost with a price index calculated as a weighted average value of the price index for constant-route bus traffic (0.8) and taxis (0.2). A volume index for this item is then calculated based on the deflated values.

D. Pupil welfare. All pupils, regardless of their class year, are assumed to visit the school doctor and school nurse equally. A volume index for pupil welfare is thus calculated as the total number of pupils.

E. Other services are calculated by the use of the total number of students.

3. Model for university education

Undergraduate education

The number of pupils, or actually the number of full-time students, is used as a volume indicator, meaning the number of registered students for two terms (40 credits) or the registrations of several students for smaller amounts of teaching that add up to 40 credits. Forty credits equal one year's full-time studies. Discussions with National Agency for Higher Education have been held concerning volume indicators and possible quality measurements.

There is also some commissioned education at universities. Commissioned education is often tailor-made education for staff at various companies. Employers pay for the education. Information on most of this type of education is available at the National Agency for Higher Education. The number of full-time students engaged in commissioned education was about 5 000 for the years 2000-2002, compared to about 270 000 full-time students engaged in regular education for the corresponding years. Calculations have been made both including and excluding commissioned education.

Discussions with the National Agency for Higher Education have revealed that there are actually no good quality measurements and that for the time being, it is better to exclude this aspect in the calculations. There are a number of measurements that at first glance could be used to obtain quality in the calculations. Because of the nature of the higher education system and the many different types of education, together with the fact that it is largely the labour input and use of time by the student that affects the number of degrees or completed credits, it is very complex to attain quality. It is also difficult to show differences in quality based on the number of teachers or the

level of education of teachers. Even if some of these measurements would be acceptable, there is no data that states that calculations can be done.

The Eurostat handbook on constant price calculations recommends that costs should be weighted to the greatest possible extent. Universities and institutes of higher education in Sweden are mostly financed through appropriations, and government appropriations are paid out per area of education, full-time student, and full study year. This information is used as weights for students in various fields of education.

Compensation for full-time students and full study years differs of course, depending on the area of education. A student who studies law does not cost as much as a student who studies design. In 2002, 45 percent of all full-time students in regular education were in the educational areas of humanities, theology, law and social sciences. Thirty-two percent were in the areas of natural science, technology and pharmacology, 8 percent in health care education and 7 percent within the area of teacher training. This distribution has been relatively stable over time.

Postgraduate education

Unfortunately no information is available to allow weighting indicators for the various subject fields. The alternative for output has been active postgraduate students and the number of full year equivalents. Full year equivalents or *the number of full-time terms*⁵ were chosen. This should be a better measure of output since one is considered as active as soon as one has an activity level of 10 percent. Presently we have not found any suitable measurements for quality of postgraduate education.

Requirements for an A method are not met for university education unless quality adjustments have been made.

4. Model for pre-school activities and care of school-age children

Open pre-school

There is no information on the number of attendants at open pre-school (where children are accompanied by their parents). Results are measured in terms of availability, i.e. the number of open pre-schools and opening hours per week. Since longer opening hours give better availability, the open pre-schools with varying opening hours have been given different weights in the model. Open pre-school with a maximum of 15 hours open per week has been given a weighting factor of 1.0, open pre-schools open 16–20 hours 1.5 and pre-schools open 21 hours or more 2.0. The sum of the product of the number of open pre-schools in each category times the number of the topical weight gives the volume measurement.

Pre-school

Information is available on the number of registered children in pre-school, broken down by age. This information is used to obtain a volume measurement. Since resource intensity varies depending on the age of the child, the number of children has firstly been re-calculated in staff equivalents. This is based on an old recommendation from the National Board of Health and Welfare: 0.4 staff for each child aged 0-2 years, and 0.2 staff for children aged 3-6 years. A staff equivalent has also been added for children who receive home language training, 0.2 staff for each such child. The sum of all staff equivalents (0-2 years, 3-6 years, children with mother tongue support) provides the volume measurement. However, the National Agency for Education is hesitant about this calculation since the recommendation from the National Board of Health and Welfare does not seem to be relevant anymore. Alternative approaches are now being discussed.

⁵Information on the number of full-time terms has been compiled by Statistics Sweden.

Family daycare homes 0-12 years

Volume measurements for family daycare homes are calculated in the same way as for pre-school, based on the number of registered children. Re-calculation to staff equivalents is done in the same way also. School children aged 7-12 are only counted as taking up one-half of a full-time position, and a staff equivalent of 0.17. Information on the number of registered children receiving home language training is available, but since the number is very small it is not included in the model. The sum of all staff equivalents (0-2 years, 3-6 years, and 7-12 years) provides the volume measurement.

Open leisure time activities

There is no information on the number who take part in open leisure time activities. Results are measured in terms of availability, in the same way as for open pre-schools. Weighting factors are the same as those for open pre-schools. The sum of the number of open leisure time activities, in each category, multiplied by the topical weight provides the volume measurement.

Leisure time centres

Information about leisure time centres is available on the number of registered children and is used to obtain a volume measurement. Information on the number of registered children is broken down by age groups, but in this case there is no reason to differentiate between age groups, and the total number of registered children serves as a volume measurement. Because the measurement period for the number of registered children is 15 October, the calendar year is calculated as the average value of the number of registered children on 15 October the previous year, and 15 October for the current year.

5. Model for care of the elderly and disabled persons

Care of the elderly

For the municipal care of the elderly four different services can be identified. They are:

- A. Services for elderly persons living in normal housing
- B. Services for elderly persons living in specific housing
- C. Services for elderly persons in short-term housing
- D. Permits for elderly persons to use special transportation services

A. *Services for elderly persons living in normal housing.* There is information on total costs and number of persons but also on number of hours of help. Compilations were made on both alternatives. They showed very different results, which is an indication to be very careful in the choice of volume indicator. We thought that hours would be the most accurate indicator and put it forward as our main alternative.

However, the National Board of Health and Welfare, who is the responsible authority for statistics within this area, came to the conclusion that hours of help was not a good enough indicator to be used. *The hours recorded in the statistics constituted the hours as deemed by the social officers.* There is no clear-cut relation between the actual number of hours of service carried out and the number of hours of service granted. Furthermore, in some cases two personnel is needed to handle one elderly person, as there may be cases of heavy lifting involved. Studies made in some municipalities also show that there is a wide variance between hours granted and hours carried out. There were also great differences between groups of people with various needs for help. Therefore the calculation based on hours has been rejected for the moment.

B. Services for elderly persons living in specific housing. For this group only information on total costs and number of persons is available. This is also a problem, as different persons may have various needs. Some maybe only need help a few times a day while others may have to be assisted in most activities.

C. Services for elderly persons in short-term housing. The volume indicator is based on the number of persons for which short-term housing has been provided. There is neither information on the length of the visits nor on the care provided.

D. Elderly persons with permits for transportation services. A volume index can be calculated from the information on the number of persons that carry a permit to use special transportation services. The production of the municipalities in this case is only for administration of the permits. The municipalities buy the actual transport service from private taxi and bus operators.

Disabled persons

A volume measurement on care for disabled persons carried out by the municipalities can be made in a similar way to that described for elderly care. Apart from the above-mentioned services A, B and D, four more services can be specified for this group.

Disabled persons with daily activities according to the Act concerning Support and Services for Persons with Certain Functional Impairments

Disabled persons with housing according to the Act Concerning Support and Services for Persons with Certain Functional Impairments

Disabled persons with a personal assistant according to the Act Concerning Support and Services for Persons with Certain Functional Impairments

Disabled persons with other services according to the Act Concerning Support and Services for Persons with Certain Functional Impairments

The same problems regarding the relevance and usefulness of the available statistics is true also for this group.

Alternative methods

Close cooperation occurs with the National Board of Health and Welfare concerning the area of elderly care and care for disabled persons. The statistics have been analysed and improvements have been proposed. Discussions and development of methods are ongoing, among other things regarding quality adjustments for access to one's own room. We have also looked into the possibilities of putting a higher weight to the group of persons that are considered to need a higher amount of hours of help.

Calculations on different alternatives are shown in the following table. They all relate to elderly persons in normal housing. As we can see, the results are very sensitive to the indicators used.

Volume change/year	2001/2000	2002/2001	2003/2002
1. number of persons	0.2%	0.7%	0.5%
2. number of total services	0.6%	2.1%	3.6%
3. weight of care based on granted hours in intervals	-0.8%	3.4%	3.9%
4. total number of hours granted	0.7%	5.6%	-0.1%

The services given to the elderly and disabled persons and the needs to be met by the services are individual and must be adapted to the particular person who receives the services. The frailer a person becomes the more care and help he/she will need. Detailed knowledge of care for the elderly and disabled persons is needed to correctly measure the services and the changes in their needs. It is particularly important to observe changes over time. When the weight of care per person changes, the unit price is affected, but not the volume, if volume is measured in the number of persons. The volume index would then be incorrect.

The calculations included in this paper for normal housing are based on the number of persons having received different services. For persons living in special housing the number of persons is used together with a quality adjustment for a private room. We are well aware that this is not the optimal model. A better measurement would thus be the number of hours of help carried out and with a quality indicator for the change in the services between the different periods. If the help changes from home services to care services, for which more qualified staff is needed, the services should also be broken down into hours of care and hours of home services. If the statistics are unable to show these changes, rationalisations within the public sector would involve a drop in productivity, even though the opposite may be true.

Changes in the contents of the services are difficult to pinpoint in a calculation, but these changes can be very significant for calculation results. In general it is apparent that service within elderly care has changed in that more people today have a greater need for care than was the case a number of years ago. Work is now going on to produce supplementary information to better reflect the changes occurring within the area, which will in turn lead to an adjusted calculation within the area.

6. Model for other social services

For administration of social insurance schemes, information is available on the costs and the number of beneficiaries in different areas.

Calculations have also been made in the area regarding care for substance abusers. The indicator is based on the number of persons treated.

Regarding reception of refugees and asylum seekers, the number of matters dealt with have been used.

As no quality adjustments have been used in these cases, the models will be B methods.

7. Model for health and medical care

According to the handbook for volume calculations, the quantity of health care that a patient receives should be measured in terms of complete treatments. A complete treatment is an activity that contains a basket of various services such as care by a doctor, paramedic, etc. If a patient is admitted to a hospital, food and lodging is also included in the treatment.

The focus for calculations of production volumes lies in measuring the value of the actual flow of medical care services and not on the results achieved by the treatment. Information on the results can be used for quality adjustment of different forms of treatment after the changes made in the production process.

A number of visits is included for each type of treatment. According to the manual, the greater the number of visits the more expensive the treatment is.

Theoretically, all medical care services should be as homogenous as possible concerning content and expense so that they can be compared over time. Ideally, all medical care that a patient receives should be related to a diagnosis and reported as a complete treatment.

Hospital care

Various treatments within the area of hospital care are registered with the help of Diagnosis Related Groups, DRGs. The method was first developed in the US for quality control of hospital care, and later also as an instrument for cost control and economic management. The DRG system groups medically similar types of treatments, which are also approximately equal in cost. Sweden uses a common Nordic system called NordDRG, which includes about 500 groups for hospital care. NordDRG is adapted to diagnosis coding according to ICD-10 (International Statistical Classification of Diseases and Health, 10th revision). It includes 10 000 diagnoses for hospital care and coding for procedures according to NCSP (Nomesco Classification of Surgical Procedures). Grouping is done from the data that has been registered in the administrative data system for patients of hospital care, namely a code for diagnosis, codes for any other diagnoses and treatments, together with age, sex and the manner of discharge. The resource consumption per DRG is calculated in the CPP system (cost per patient).

DRG weight⁶ is a relative measurement of care and treatment costs for an average hospital stay per each DRG. Higher weights indicate higher costs. The average cost for all hospital stays is given as DRG weight 1.0, and the weight for each DRG is obtained by dividing its average cost with the cost that corresponds to DRG weight 1.0. DRG point is actually only another name for DRG weight and is often used to describe how much medical care that has been "produced" at a hospital or within a region.

Swedish Association of Local Authorities and Regions (SALAR) published a report⁷ that among other things presents consumption and costs per DRG concerning different age groups. The sensitivity analysis shows that the difference in average cost per age group is insignificant after adjusting for case-mix⁸. An even greater equalisation occurs if the extremely expensive cases are removed. The study also includes a comparison of consumed DRG points concerning age structure between the least favourable County Council and the average corresponding points for the entire country. The analysis shows that the county council that has the least favourable age structure can reduce costs per DRG points by SEK 37 (0.1%) given that the county council has an age structure corresponding to the national average. The information allows the calculations to be classified as a B method.

However, after these calculations have been made, it is apparent that information on costs and activities are not connected, and the calculations that are presented here will therefore be adjusted when more correct information has been received.

Out-patient care

The calculations are based on a number of visits (not adjusted for quality) for a certain level of care. The information is broken down by visits made by different occupational categories. Presentation is made by visits to general practitioners and physicians by special area, nurses, other specialists and other care staff. It is assumed that a specialist/physician uses more resources (hourly pay) for visits than nurses or any other category of staff. Weighting factors⁹ that SALAR recommends are based on what is known as expert assessment. Visits to other staff categories than doctors correspond to 40 percent of all visits to doctors. A home visit has been given the weight of two visits to an office/clinic, and contact by telephone the weight 1/3 of a visit to an office/clinic.

Information is thus available on the number of visits regardless of the type of treatment and the number of additional visits. As a result, the information can neither identify the various parts of a certain treatment nor the related additional visits for treatment. This limits the possibilities to observe changes in the quality of services. Thus quality adjustments are excluded from the material. This shortfall in the material is handled by assuming that a visit is equal to a complete treatment. In practice this assumption only applies to general practitioners, according to the manual.

In summary, it can be said that the method fulfils the requirements for the "B method", i.e. the acceptable alternative. Medical care services can be calculated by the different types of specialists and we assume that the number of first visits correspond to the number of complete treatments.

⁶Source: www.socialstyrelsen/epc/CPK

⁷ Att beräkna produktivitet i sjukvården. Beskrivning av metod för produktivitetsberäkningar och redovisning av resultat från en studie 2002. (translator's note: Calculating productivity in medical care. Description of methods for productivity calculations and presentation of results from a study in 2002).

⁸The number of produced DRG points divided by the number of hospital stays.

⁹Source: Statistik om hälso- och sjukvård samt regional utveckling 2001, Landstingsförbundet. (translator's note: Statistics on health and medical care and regional development in 2001, The Swedish Association of Local Authorities and Regions (SALAR))

DRGs for out-patient care at hospitals

Development of DRGs for out-patient care at hospitals is going on. Since 2003, there have been defined groups for day surgery and endoscopic treatment (NordDRG-O). This expansion of NordDRG has resulted in 218 new DRG groups, available from 2003 onwards but of variable quality.

The Centre for Patient Classification has developed a secondary patient classification system¹⁰ for medical out-patient care called "Secondary patient classification in out-patient care" which will be used in 2006. The registration includes out-patient care at hospitals and is based on treatments¹¹. The new out-patient care groups are included as a part of NordDRG and cover 234 new groups. This information will eventually be used for the calculations.

Dental care

Dental care is calculated on the total number of treated patients, divided into four different groups. The groups are

- A. General dental care for grown-ups
- B. Dental care for patients with special needs
- C. General dental care for children and young people
- D. Specialist dental care

The volume indices for each group are weighted together with the costs for each group. As we have found no indicators for quality adjustment this is a B method.

8. Model for culture and leisure activities

Activities within this area should be broken down into those who participate as a group and those who participate individually.

Libraries

Public libraries, school libraries and research libraries are the main types of libraries within this area. Statistics are available on the number of books and audio-video products loaned out. However, libraries are also involved with many other activities such as information services, story-telling for children, lectures, music evenings, drama for children, etc. While the number of book loans has decreased, there is a notion that other activities have increased (not confirmed). So far we have not been able to find information to measure these other types of activities.

Museums, theatres

Information is usually available on the number of performances and visits. However, in order to provide satisfactory methods, the number of visits should actually be broken down into different categories such as the number of tickets sold in various price classes.

Another problem with information on visits to museums is that a number of museums (run by the government) have been free-of-charge since 2005. This has affected figures for visits, but not necessarily the production of presentations or exhibitions.

¹⁰Secondary patient classification refers to a care contact that is assigned a certain category with the help of data from one or more primary classifications (directly observed information). Fyra år med CPK, Socialstyrelsen. (translator's note: Four years with CPC, the National Board of Health and Welfare)

¹¹ Final report for SK-OP-projektet. Ny sekundär patientklassificering av öppenvård, Socialstyrelsen, artikelnummer: 2005-4-1, published in June 2005.

Leisure activities

There are no complete statistics for leisure activities at municipally-run operations on visits or tickets sold, such as single visits or season-tickets. Some types of operations such as swimming pools often have information, but there is no central collection in this area.

For some other municipal activities there is also a lack of relevant information on various services. Examples are parks, public leisure activities and supported study organisations.

Within the area of cultural and leisure activities, we have thus had problems in making calculations that fulfil requirements satisfactorily.

A few very preliminary results

The table below presents some very preliminary results from calculations made so far. As a comparison, volume changes are also presented that occur via the current calculations according to the cost method. The figures of change have been calculated using the previous year = 100. As described earlier, discussions with various authorities and other interested parties are going on, and these calculations can be seen as an initial attempt. Adjustments will be made with consideration to viewpoints and improved information. It should also be noted that all areas of individual public production are not included in the table. Compilations have now been made for almost 65 percent of value added in public authorities.

Table 2 Annual change in volume of the value added according to cost method and production method

<i>Health care and medical services</i>	2001/2000	2002/2001	2003/2002
cost method		97.8	100.6
production method		101.3	98.8
<i>Compulsory school</i>			
cost method	105.3	100.6	98.9
production method	99.7	99.2	100.4
<i>Upper secondary school</i>			
cost method	104.4	105.1	99.0
production method	92.7	94.3	102.5
<i>University, undergraduate education</i>			
cost method	102.5	103.1	101.2
production method	105.3	107.2	107.0
<i>University, postgraduate education</i>			
cost method	97.7	105.9	107.6
production method	98.2	100.3	104.7
<i>Pre-school activities, care of school-age children</i>			
cost method	95.9	96.2	93.7
production method	97.3	98.5	100.0
<i>Care of the elderly and disabled persons</i>			
cost method	103.2	103.1	99.6
production method	100.5	101.0	101.3

In some cases the calculations give a higher volume development and in some cases a lower one with the production method, compared to the cost method. It is difficult to see a clear trend. As the volume change in value added to a very large extent is based on hours worked in the cost method, a comparison between the two methods give some indication on productivity. The results then indicate that only for child care and undergraduate university education there is an increase in productivity for all the years studied. Since to a high degree the calculations are based on the number of individuals, the size of the groupings of years is of course a major determining factor for the volume change.

However, the information that the calculations are based on is not satisfactory in all respects. This is partly because it has been produced for other purposes than to make calculations of volume changes, which is a new way to use the information. It is therefore important to improve presentation and description of information based on activities, in order to improve the quality of the calculations. An increased grade of detail would also be desirable in order to break down production into more uniform sub-stages. As pointed out previously, volume indicators also need to have a clear relation to differentiated information on costs at a detailed level, so that the weighted total made from the various sub-outputs within an area is correct.

Further development of quality adjustments is another necessary prerequisite to increase quality. In order to calculate quality changes, a detailed description is needed of the contents of the services performed, and this is currently not available. We also find it difficult to make an assessment of the relevance of the calculated information, considering that the time period for which the calculations have been made is too short. It is thus way too premature to draw any definite conclusions of the material produced so far.

It is worth pointing out again that changes in the methods used can affect the results to a very large extent. As these results are preliminary they will certainly be revised as we continue our work with the aim of improving the methods.

The calculations presented in this report refer to publicly produced services on the country level. However, the method is also possible to apply to a more disaggregated situation. One prerequisite is of course that there is information on matching costs and activities. It is thus in principle possible to make calculations for various organisations and for individual activities.

References and further material

Eurostat Handbook on price and volume measures in national accounts, 2001

Summary accounts from municipalities and county councils

The Swedish Financial Management Authority Documentation of central government net lending

Further material within this area produced by Statistics Sweden and others is also available. Reports previously published by the National Accounts on methods and calculations include:

NR-PM 2001:25 – Översikt av de individuella tjänster som kan produceras av den offentliga sektorn; klassificering av producenter av sådana tjänster till institutionell sektor och som marknadsproducent/icke marknadsproducent.

NR-PM 2001:20 – Metoder för beräkningar av hälso- och sjukvård i fasta priser.

NR-PM 2001:27 – Metoder för beräkningar av förskola och barnomsorg i fasta priser

NR-PM 2002:08 – Utbildning i fasta priser

NR-PM 2004:11 – Volymberäkningar av individuell offentlig konsumtion; utbildning, barnomsorg, äldreomsorg

Health and medical care

”Statistik om hälso- och sjukvård samt regional utveckling 2001”. Landstingsförbundet)

”Att beräkna produktivitet i sjukvården. Beskrivning av metod för produktivitetsberäkningar och redovisning av resultat från en studie 2002” SKL publikation

”Produktivitet och effektivitet i hälso- och sjukvården”, SALAR 2006

”Fyra år med CPK”. Socialstyrelsen.

”Slutrapport för SK-OP-projektet. Ny sekundär patientklassificering av öppenvård” Socialstyrelsen: artikelnummer: 2005-4-1. Publicerad i juni 2005.

Child care

Skolverkets website (www.skolverket.se)

”Barnomsorg, skola och vuxenutbildning i siffror”, Skolverket

Education

Skolverkets website (www.skolverket.se).

”Barnomsorg, skola och vuxenutbildning”, Del 1; Skolverket

”Utbildningsresultat samt Del 2; Barn, elever och personal”. Skolverket

Högskoleverkets website (www.hsv.se) and databases

Statistics Sweden’s publications of official statistics within the area

Annual reports from Högskoleverket, Centrala Studiestödsnämnden, Nationellt centrum för flexibelt lärande, Myndigheten för kvalificerad yrkesutbildning, Folkbildningsrådet

Culture

Kulturrådets website (www.kulturradet.se)

Sveriges Musik- och kulturskoleråd (SMOK)

Material from the Swedish Association of Local Authorities and Regions (SALAR)

Social protection Socialstyrelsens website (www.sos.se) and databases and publications of official statistics within the area

”Tid för vård och omsorg”, Socialstyrelsen

Investigations and reports from various municipalities and county councils within elderly care

Annual reports from Statens Institutionsstyrelse, Arbetsmarknadsverket, Riksförsäkringsverket och Försäkringskassan, Hjälpmedelsinstitutet

Eurostat's website includes several reports from different countries. The link is:

<http://forum.europa.eu.int/Public/irc/dsis/pnb/library>. Then continue on to National Accounts and Workshop price and volume measurements Government output May 2005.

The UK is also very active within this area. For a look at some reports, please visit: www.statistics.gov.uk/ukcemga