Meeting with the Advisory Scientific Board of Statistics Sweden, 2-3 May 2012

Board members
Stefan Lundgren, Statistics Sweden, chair
Mats Wadman, Statistics Sweden, co-chair
Ingegerd Jansson, Statistics Sweden, secretary
Lilli Japec, Statistics Sweden
Professor Jan Bjørnstad, Statistics Norway
Professor Sune Karlsson, Örebro University
Professor Frauke Kreuter, University of Maryland
Professor Edith de Leeuw, Utrecht University
Professor Thomas Laitila, Statistics Sweden
Professor Xavier de Luna, Umeå University
Professor Lars Lyberg, Stockholm University
Professor Daniel Thorburn, Stockholm University

Other attendees:
Karin Andersson, Statistics Sweden
Lina Andersson, Statistics Sweden
Stina Andersson, Statistics Sweden
Martin Axelson, Statistics Sweden
Linda Björneskog, Statistics Sweden
Michael Carlson, Statistics Sweden
Gösta Forsman, Statisticon
Anders Ljungberg, Statistics Sweden
Peter Lundqvist, Statistics Sweden
Hassan Mirza, Statistics Sweden
Anna Nyman, Statistics Sweden
Fredrik Scheffer, Statistics Sweden
Jörgen Svensson, Statistics Sweden
Cherstin Thideman, Statistics Sweden
Frida Videll, Statistics Sweden

Current issues at Statistics Sweden

Speaker: Stefan Lundgren

The Swedish government is currently reviewing Statistics Sweden in two government committees. The Financial Market Statistics committee will redesign the legal framework for production of statistics on commission for the Swedish Riksbank and Finansinspektionen. A report will be finished this autumn.

The System of Official Statistics (SOS) is under review, including the role of Statistics Sweden, a report will be finished in December. No major changes are expected. An additional report was finalized in May on facilitation of micro data for the research community.

Statistics Sweden is currently replacing 8 out of 14 senior directors, in an open competition with external applicants.

Statistics Sweden regularly reports progress of the quality work to the Ministry of Finance. A final report will be delivered in June 2012, including all improvements made at Statistics Sweden during the last years. The work on quality indicators will continue, Paul Biemer and Dennis Trewin is returning in the autumn of 2012.

Reply to recommendations

Speaker: Lilli Japec

Lilli Japec mentioned that the recommendations from the Board have been well received by Statistics Sweden.

Discussion:
Some points made during the discussion:

- The lack of competence management is problematic and SCB has to enforce co-operation with the universities in order to recruit more students
- The statistics department at Stockholm University plan to start a research centre on survey methodology. Statistics Sweden should actively support and encourage such initiatives. Statistics Sweden (R&D department) could approach the committee reviewing the SOS-system on this issue.
- This spring personnel from Statistics Sweden have been teaching at Stockholm University, at the Department of Statistics.
- Statistics Sweden has received many applicants for the summer internships.
- Statistics Sweden need to encourage students to study statistics and the HR department are working on this. In 2011 the Swedish parliament had a hearing regarding this problem but the interest was minor.

Cognitive aspects of surveys on children

Speaker: Fredrik Scheffer
Discussant: Edith de Leeuw

Summary of topic presentation
Past research as well as interviews at the unit for cognitive methods at Statistics Sweden point in a clear direction - special considerations must be made when collecting data from children younger than twelve years of age. Their cognitive abilities do not live up to the cognitive demands they meet in average surveys facing the same questions as older children/adolescents.

It is clear that children younger than twelve have difficulties with complexity in language and comprehension in general and thereby with answering survey questions. When subject to agree/disagree questions the problem seems to deepen. This could be due to acquiescence, satisficing, binary scale interpretation or other reasons, or even a combination of these things.

There seem to be a need to sort out the problem in more detail. What triggers acquiescence, satisficing, etc. for these children? We need to find the right tools to design good questionnaires for younger children.

One further perspective is that this applies for adapting questionnaires to respondents with less cognitive ability in general, may it be children, elderly, immigrants (due to language difficulties), low educated or other. If we neglect in doing so we turn down useful answers from a substantial share of our respondents. Thus, there is a need to design good questionnaires for respondents with limited cognitive ability in general.

Discussion
Some points made during the discussion:

- Measurement effects are enhanced on children compared to adults.
- Children are easy to manipulate, they tend to agree with the interviewer and sometimes answers only in order to finish the interview.
- Children-surveys always draw a lot of public attention so it is important that the questions are of good quality.
- The recency effect has to be considered, probably magnified with children.
- Statistics Sweden needs to review and update the questions asked to children. Easier, yes or no questions, as children have problems in separating several alternatives. No agree-disagree questions.
- Interviewers at Statistics Sweden receive no special training regarding interviewing children. (Reference on interviewer training, Jackie Scott, Bristol paper).
- More detailed studies regarding the response process for children are needed in order to see if the children understand the questions.
- Latent models preferred for analysis, in order to find the underlying structure. In general, measuring the cognitive ability of both grown-ups and children calls for models of measurement error.
- There are no perfect questions for adults or children but less detail and more adaptation for younger ages gives easier questions and might give better data. Should Statistics Sweden settle for less data, but better?
- There are no modes studies on children, and thus no recommendation on how long a telephone interview should be. Telephone interviewing is not common with children; studies are usually carried out on the web or at schools.
- General question if this should be official statistics and what is official statistics? At SSB: separate statistics and research. This is an important research question, but modelling should not be part of official statistics.

Stefan summarized:

- This is a difficult subject that has to be handled with care.
- The number of questions has to be decreased.
- More experiments are needed.
- Official statistics is the thing we produce and call statistics. If we do modelling can we still call it official statistics?

Recommendations on Cognitive aspects of surveys on children
Statistics Sweden should review the questions that are asked to children. Consider simplifying the questions, preferably yes or no questions, as children have problems in separating several alternatives. No agree-disagree questions. There are no perfect questions for adults or children but less detail and more adaptation for younger ages gives easier questions and might give better data.

More detailed studies regarding the response process for children are needed in order to see if the children understand the questions.

Children are very different at different ages, and so is their understanding and the response process. Statistics Sweden should take this into consideration and possibly tailor interviews to different ages.

Interviewers at Statistics Sweden should receive special training regarding interviewing children.

Web panel surveys - could they be useful at Statistics Sweden

Speaker: Jörgen Svensson
Discussant: Daniel Thorburn, Gösta Forsman

Summary of topic presentation
When using probability samples of sufficient size, there is no need to worry about the 'representativeness' of the sample (however, see the nonresponse problem below). The randomization in the sampling procedure ensures 'representativeness' with respect to all relevant variables of the objects. Bias control is then not primarily based on background variables or comparisons with other data sources, but on the probability sampling itself. The procedure is transparent and built on a scientific basis. For a national statistical institute like Statistics Sweden, it is generally considered essential to use probability sampling as much as possible in sample surveys. Practical circumstances might make it necessary to depart from this methodology in some cases, but there must be strong reasons for this.

However, we are facing a growing nonresponse problem, at least for surveys on individuals and households. One approach for Statistics Sweden would be to say: It is true that the nonresponse (if it is not completely at random) leads to a set of respondents that is not a probability sample from the population, but it is not considered reasonable to build in a risk of bias as early as in the sampling methodology. The risk of systematic nonsampling errors is not a strong argument for giving up the whole idea of probability sampling. Rather, it is essential to build

on a solid foundation of probability sampling and minimize nonresponse etc. and adjust as effectively as possible for the remaining nonresponse. Another approach would be to say: The theory of probability sampling and design-based estimation is invalidated if there is (a high rate of) nonresponse. Therefore, one alternative might be to gather data from a set of objects that may not satisfy the rigorous criteria of a probability sample, but instead some other criteria for controlled selection. Statistics Sweden has an advantage here of having a wealth of auxiliary information (mainly from administrative registers) on which to build. However, it takes considerable effort, over a long period, to build alternative systems that are scientifically acceptable. Abandoning probability sampling, for surveys with high nonresponse rates, and instead basing estimation on otherwise selected respondent sets (like those sampled from an access panel) may appear as an alternative worth considering. It has been expressed at a meeting of the Scientific Advisory Board (Särndal 2010) that it is more important to focus on the future of data collection than on how to reduce nonresponse. We need to find sound principles for high quality data collection in the future.

Surveys using web panels are often much cheaper than surveys based on probability sampling. Market research companies working with web panels often do have effective systems of production. So far, web panel surveys are not commonly used for official or other statistics produced by national statistical institutes. Probably, NSI´s will be much more challenged by competition from web surveys for ad hoc surveys in the coming years. Invitations on cooperation on data collection through web panels may also be expected to increase. National statistical institutes therefore need to examine the use of web panels and maybe conduct some quality studies in order to gain more information on pros and cons with the new approach.

There are many different types of surveys conducted in Sweden, from surveys for official statistics, to ad hoc surveys for governmental investigations, to research surveys, to opinion polls and market research. Quality requirements are of course also different. For the official Labor Force Survey, quality is of utmost importance to the users at ministries etc., as far-reaching political decisions are based on the results. It may be considered that quality requirements are less critical for market research, even if the industry may partly disagree (meaning that quality must be high to guarantee the long-time survival of the research company). A question is whether web panel surveys may be considered suitable only for surveys with relatively less critical lower quality requirements. In that case, the survey objectives and the quality requirements have to be communicated in a clearer way than they often are today. It is a far from evident judgment to make, when web panel surveys are motivated.

Daniel Thorburns discussion
The web is a new mode and its advantages should be used. The borderline between web panel surveys (access panels) and other web surveys is not clear. The list by Mick Couper in the background paper contains eight types of web surveys but only three of them are what I would call a real web panel survey. The web is a new mode and we have just seen the beginning. Statistics Sweden should try to find methods which take the best from web surveys but not their draw-backs.

I think that Statistics Sweden should know enough about the practices in private institutes to argue in a competent way why web panel surveys are not a valid approach in cases where they are not suitable. This knowledge should not only be found at the methodology department. It should also be found at the market department, since those are the persons who have to compete with private institutes and should sell good products to the customers.

According to my opinion, web access panel surveys consist of three parts.

1. The basic and expensive part is constructing and managing a ”panel” of persons willing to respond on the web. For those persons, there should exist a series of good background variables and addresses. If special questions, e.g. life style variables, are used for weighting special surveys must be done to find the values for the whole population. The weights can then be estimated using for instance propensity scores. This is the expensive and time consuming part and should be done continuously and long before the survey is even contemplated.
2. The second part comes when a survey is ordered by a customer or when a survey is decided in another way. It consists of the construction of a questionnaire, inclusion probabilities and the decision how to analyse the data and what the report should contain. This part may take anything between one week and three months.
3. The third part is actually performing the study: to send the questions to a sample, to analyse the answers and to report to the customer. This part is fast and cheap. It may take less than a week. It would be good if one could do only this part. One important problem for SCB is the long period from the start of the data collection to the release of results. Once you have done part 1, the marginal cost for this part is quite small. Anyone having and maintaining a panel is interested to do many studies so that the cost of 1 can be shared by many surveys.

I have often heard people say that they have such a large number of respondents in a study so that it does not matter that the sample is not selected in a scientific way: Many persons believe that if a sample is large you do not have to worry about representativity or probability sampling. Nowadays I meet exactly the same argument with access panels: It the access panel is large enough and recruited from many sources, you do not have to worry about representativity or nonresponse. It is equally silly! (It does not help that the sampling from the access panel is probability sampling, when the access panel itself is e.g. a self selected sample)

It is often much better to build up small panels with probability sampling. Since small access panels may have problems with tiring out the respondent, they should be used only for a few studies. A smaller panel is cheaper and does not have to be financed by so many independent surveys.

As I said web panel surveys may have advantages. They are fast and cheap. The marginal cost for extra respondents is small in terms of money – but may be higher

in terms of respondent burden. When people participate only to get the incentives the risk for biased samples is large. Another advantage is that the sampling may be supervised online. If e.g. nonresponse is large measures may be taken. The variance can often be reduced by such measures but seldom the bias.

Another advantage is that the data goes directly into the computer edited and ready for analysis. On the other hand there are small possibilities to get a feedback on the questionnaire quality. If this is desirable something has to be done, e.g. questions or follow-ups, has to be added. (You may also clock the time which is needed to see whether there are some problems).

When I speak about the advantages I should also add that there are a lot of new possibilities for questionnaire construction. These are not limited to access panels, so this is not today's topic. You may e.g.
- have a button for language choice
- replace diaries by daily interviewing
- give alternatives in random order to avoid order effects
- construct good embedded experiments
- easily add illustrations and films
- tailor the questionnaire e.g. with more jump instructions
-Etc.

The main drawback of access panels is representativity. I like this word due to its intuitive but undefined meaning. Almost all existing access panels have unreasonable high non responses if computed according to normal standards. The best panels seem to have around 90 % nonresponse. If they are calibrated by propensity score and special studies, the precision in the calibration depends much on the size of the extra study and there remains a bias due to confounding other factors.

Access panels are often used for market research. One reason is that one is seldom interested in the mean for the population. The same reason holds for focus groups and other methods. But non-representativity is a huge problem for most of Statistics Sweden's statistics, where totals and means are the most important objective.

For market institutes: SRS may not be a good choice. The goal for SRS: to estimate $\Sigma_U Y_i /N$. But for market institutes the goal is often: $\Sigma_U g_i Y_i / \Sigma_U g_i$, where g_i is an obscure and unknown measure like purchasing potential. If inclusion in the access panel is believed to be related to purchasing potential, access panels may even be better and have a smaller bias than SRS

Statistics Sweden seldom has this type of studies, (perhaps in opinion polls where the goal is to taking voting behaviour into account or in a study of the profitability for "normal" one-family farms (not big farms, not moon shine farmers, not those with specialities, like tourism or horticultures))

A use of doubtful methods like access panels may be extra dangerous for Statistics Sweden who has a good reputation. Bad web surveys may destroy that reputation.

Another dangerous aspect is that private institutes may use the argument that SCB makes web surveys to justify their own bad web surveys. Most web surveys are in the low price market. Statistics Sweden has never been able to compete with private institutes in the low price segment. (E.g. they have never been able to enter the market of omnibus studies). I do not think that SCB should try to compete in that market.

However there are many situations when Statistics Sweden may contemplate using access panels. I have constructed four hypothetical situations when access panels may be a realistic alternative.

Possible variant 1
Recruit panels for a special purpose from the population register

E.g. suppose that the government/parliament wants to have a representative sample of Swedes to test different suggestions on. When they are recruited they are told that "We want you to be part of such a group. You will during the next year be asked to answer a web questionnaire about once a month. After a year you will be replaced by another person on the panel."

I believe that such a study will work with the restriction that people who are never on the Internet will not be covered.

Possible variant 2
Studies concerning the economic cycles may be done by recruiting a panel of persons with high positions and getting the permission to submit one mail each month to their personal addresses. You may even get answers from the respondents during their vacation.

The recruiting can be done with ordinary probability sample using frames of businesses or at least in such a way that one knows what the study says.

The panel can be made rotating to avoid persons getting tired.

Possible variant 3

1 From a given web panel take a sample of size n_p from the panel, interview
2 From another ordinary population frame take an ordinary SRS sample of size n_s, do the same interview. End the interview by asking if they can consider becoming a part of a web-panel. Getting n_{sy} yes answers and n_{sn} no.

Analyse as a stratified sample / survey with two domains

1. those from the web panel and those answering yes as one stratum with $n_{sy}+n_p$ sampled units and population size $N*n_{sy}/n_s$
2. Those saying no in the second domain with sample size n_{sn}

E.g. with $n_p=2000$ and $n_s=1000$ and $n_{sy}=300$ the precision will be proportional to $0.49/700 + 0.09/2300 = 0.74/1000$.

Possible variant 4

- Do the web survey using an access-panel as usual and present the result
- But always do an old-fashioned ordinary (telephone) study of small size (say 1/10 of what would have been used if this was the only study) in parallel

In this way Stat Sweden will
– Be able to report the result of the panel survey almost immediately and the follow-up of this particular study one month later, say
– And more important, fairly soon get a good material to describe the quality of the web survey to the users

Finally I will end by trying to give answers to the specific question in the paper.

Q1. Can web panel surveys be designed and used in a scientifically sound way?
Yes, with my definition of web panels. The difference between mine and Göstas answers is probably mostly due to the fact that I am using the term web panel surveys in a wider sense

Q2. Should web panel surveys be introduced at Statistics Sweden?
That is up to the management of Statistics Sweden to decide but, it is quite possible to imagine sound web panel studies suitable to Statistics Sweden
I also want to stress that Statistics Sweden's use of the web should increase, anyhow. Many ordinary surveys like the LFS should contain more elements from the web. But be careful with the reputation of Statistics Sweden. Don't legitimise bad use of web panels by giving the private institutes a chance to say that these methods are used by SCB

Q3. If yes, under what circumstances could a web panel survey be an advisable option?
E.g. for fast answers to timely issues. My opinion is that Statistics Sweden should create and control the panels. You may outsource the management of it but you must remain in control of the panel. Statistics Sweden should only use probability panels or other high quality panels. Some of the gain in costs should be invested to do follow up quality studies

Q4. Should there be a difference in approach concerning official statistics and ad-hoc surveys conducted on commission, respectively?
No, Statistics Sweden should keep high standards in all types of statistics (if ad hoc means ad hoc studies made by stat Sweden)

Q5. How should the drawbacks of web panel surveys be handled?
In the same way as the drawbacks of other bad surveys are handled. Do not do such surveys. Do good studies which benefit from the good aspects of web surveys while avoiding suffering from the drawbacks. Do not compete in the low price low quality segment

Discussion
Some points made during the discussion:

- Statistics Sweden has competitors who are using web panels and needs to be up to date and ahead of them. Total dismissal is not wise.
- If anyone is able to do high quality web surveys it is Statistics Sweden. Have many advantages and means (e.g. auxiliary variables) and many opportunities for testing.
- Statistics Sweden should take the chance to lead the development, come up with an "SCB package". Follow the advice of the ISO standard for access panels.
- Assess the quality of web panels. Statistics Sweden has the means and can explore how to perform a well done web panel survey. Use additional collection, register data, modelling. Explore structure and measurement error.
- Use cost data if available, for example from Centredata, University of Tilburg
- Keep in mind which products might be improved, web panels not suitable for everything. Web panels might be useful in certain cases, like surveying special populations.
- Traditional surveys will always be necessary, web panel surveys can be a good addition but never a replacement
- Follow-up studies and additional surveys can be used to evaluate web panels
- Polls done on the web do not have the same quality as polls done by phone, but in the long run Statistics Sweden might be forced to use web panels. Party election polls are special as they can be evaluated after election.
- Statistics Sweden will move towards multimode anyway, web panels are one choice of many?
- Web panels can be a way to lessen the burden on the public.
- Statistics Sweden could contact external consultants who can suggest designs.

Stefan summarized:

- The question we have to ask ourselves is why we should do it as we don't earn money from it
- One reason: cheap way to get answers

Recommendations on Web Panel Surveys
The web offers many new possibilities for statistics production. We encourage Statistics Sweden to make a greater use of web-based methods and we support in particular that Statistics Sweden studies the possibilities of the web in many fields of data collection.

Web access panels have received a widespread use in the survey industry for simple and cheap studies. However, at the present stage it is not clear if it can be used also for high quality products. The Scientific Board recommends Statistics Sweden to study web access panels further. One reason is that Statistics Sweden should be aware of what their competitors do and of the advantages and drawbacks of their methods. This knowledge should not only be restricted to the methodology department but also to those actually meeting the customers and the public. The second reason is that Statistics Sweden ought to learn more about the methods and how they can be adapted to meet the quality requirement of an official agency. In this work we suggest that Statistics Sweden forms a research group and we are willing to partake in this work.

If Statistics Sweden tries to use the methods of web access panels, we recommend that at least the first studies are complemented by traditional studies to assess the differences between them and web panel studies and also learn more about the quality of access problems and their special problems. In our opinion Statistics Sweden should at present not use the panels kept by private institutes. Statistics Sweden must be responsible for the quality of their products and should thus be in charge of the panel. But we also believe that it is not necessary to build up those large panels that appear on the market today. Statistics Sweden has access to many good frames and we suggest that they are used to create smaller panels which are specially designed for one or a few specific (ongoing) surveys.

We recommend that Statistics Sweden should be careful with their good reputation. Do not produce any low quality statistics and do not legitimise the use of bad web panels by making it possible for other web panel actors to claim that they use the same methods as Statistics Sweden.

According to the presentation Statistics Sweden has received many inquiries to make web panels studies. We recommend that all inquiries of new surveys are noted down for future use as a regular part of the quality management.

Strategies for Statistical Disclosure Control

Speaker: Michael Carlson, Ingegerd Jansson
Discussant: Jan Bjørnstad

Summary of topic presentation
To protect data properly before it is disseminated is important to all NSI:s, for legislative and ethical reasons, and for the credibility of the agency. Statistics Sweden is no exception. Traditionally, decisions on the practices used in the production have been decentralized to units within the agency, but like many other producers of official statistics, Statistics Sweden is moving towards a more standardized production. This applies to the entire production process, where protection of disseminated data is one activity among many others.

In 2008, Statistics Sweden started to work towards a certification according to the international ISO 20252 standard on market, opinion, and social research. An initial self-assessment was carried out by survey managers, in order to compare

surveys at Statistics Sweden to the requirements set by the ISO standard. SDC was identified as an area where a number of surveys did not fulfil the requirements set by the standard. As a consequence, the work to improve SDC at Statistics Sweden has in recent years been given some priority, together with a number of other identified areas.

In order to reach a common practice for tabular data, we have so far worked on the following:

- A common process for SDC in tables
- A handbook where the process and appropriate methods are described (in Swedish only)
- A first version of a software solution for using τ-Argus from SAS
- Training for methodologists and production managers

Current internal work is concentrated on implementation of the SAS/-τ-Argus software for relevant statistical products and a methodologically and technically feasible solution for disclosure control of the Census 2011 tables. We are also presently concentrating on capacity building and some transfer of competency from senior to newer staff members. In addition, Statistics Sweden has in the past five years participated in international collaborations on SDC methodology.

There are several strategic issues that Statistics Sweden needs to consider before determining which methods to use for risk assessment and protection of data. An important issue is where the greatest risk is considered to be. Are small values, detailed geography, group disclosure, risk of differentiation, or anything else considered to be the biggest threat? Is it at all feasible to classify different attributes as more or less sensitive, i.e. more important than others to protect? Are non-perturbative methods preferred over perturbative methods? These decisions will have to be taken at a level of the organization where the formal responsibility for confidentiality and privacy issues lies, i.e. management. Once these strategic issues are settled, appropriate methods can be chosen.

Another important consideration is what to keep in the published data and what can be sacrificed. SDC inherently entails a conflict between controlling risks and utility maximization; every action taken to reduce the risk of disclosure will entail a loss of information. For instance, consistency between different tables could be weighed against a need for preserved additivity within tables; high level of detail with many suppressions against lesser detail but with the cells intact; strong protection against major loss of information, and so on. If Statistics Sweden aims at a general solution as described in above, ample time should be given for important users of data to be consulted.

In any survey we normally try to identify the principal sources of error such as coverage, sampling error, non-response, measurement, processing and imputation errors, and of course issues pertaining to validity or relevance. We try to mitigate the impacts of these errors or at least try to characterize them. Within this total survey error, or TSE, paradigm, protecting data can be viewed as an additional error component. The main difference compared to other error sources is that we are in a position to decide how much to add and attempt to do so in a controlled

manner in order to balance the trade-off between risk and utility. We see the need for considering statistical disclosure control as one of many ways of adding error to data as part of the TSE.

The main vehicle for disseminating micro data (within Sweden) at Statistics Sweden is the MONA system which provides access to micro data through a secure internet connection. Some limited measures are taken to control the output from MONA. Access from abroad is hardly ever granted, due to Swedish legislation. However, we foresee an increasing demand on allowing data exchange across national boundaries, e.g. within the European research community, and that Eurostat will require that safeguarding national data delivered to the ESS is a matter for the individual NSI's; this is implied in the new version of Commission regulation 831/2002 that is currently being discussed at EU level. This will bring with it a need to explore SDC methodology for micro data.

Official statistics in Sweden are currently produced by about 25 different government agencies including Statistics Sweden and all are faced with basically the same methodological challenges as Statistics Sweden with regard to SDC. There is already some cooperation and sharing of experiences between the organizations, e.g. seminars at other agencies held by staff members of Statistics Sweden and via the Council for Official Statistics. Further, SDC is a specialized area within general survey methodology and it is typically not an area that students at universities come into contact with in their education. Opportunities to cooperate with universities should be explored.

Discussion
Some points made during the discussion:

- All countries have the same situation and no one has the definite answers, but it is important to discuss the issue.
- Synthetic data should not be disregarded. Used in many countries. Useful for preliminary analysis.
- Synthetic data can never cover all that you find in real data. No software available that can deal with information on noise.
- Important to check the out-put in the Mona System. Statistical output checking is not used at Statistics Sweden.
- Researchers should not get information that can be identified. Statistics Sweden could do a study on what the researchers do with the information, what has been published?
- Do not mix the issues of giving researchers access to micro data and other types of publications (i e tables etc). Researchers apply to and are reviewed by ethical boards. The legal issues need to be clear.
- Different levels of damage that Statistics Sweden need to consider. What is the damage if something is disclosed by a student compared to a researcher, high level official statistics i a year book compared to detailed special tables, etc. Different levels of protection for different purposes?

- How does the public perceive harm and risk? It varies over time and cultures. An agency might want to change approach accordingly (reference to Eleanor Singer)
- Difficult to measure the perception by a survey, mixes with nonresponse and other errors. Other ways to measure?

Recommendation on Strategies for Statistical Disclosure Control
This is an important topic with regard to the public's confidence in Statistics Sweden, especially concerning the 2011 Census. The recommendations will concentrate on tabular data. This is the most relevant disclosure problem for statistical production agencies generally. A self-assessment from 2008 showed that a number of surveys did not fulfil the quality requirement of minimizing the risk of disclosure of respondent identifiable information. The main issue is that there is a conflict between controlling risks of disclosure and publishing interesting and relevant information. To make it simple, one has to choose between a high level of detail with many suppressions or lesser detail with cells intact. A general solution requires that important users are consulted.

Synthetic data means adding noise to the data to avoid disclosure problems. This is an issue on micro data for researchers that are currently being discussed internationally. It is the view of the Scientific Board that synthetic data can be useful for preliminary analyses, but should not replace real data for serious research. Regarding tabular data, one should not use synthetic data instead of real data other than in some minimal way like suppressing or do some minimal changes of small values like giving cell values of 1,2 values 0 or 3 at random.

The most relevant issue on disclosure control right now is Census 2011 which gives integrated register-based statistics for persons/households. The main problem for the Census is confidentiality considerations for multidimensional tables (hypercubes). There can be many cells with small values like 1, 2. The most important problem is the disclosure of attributes of known persons/households. This can happen with tables with few persons. The Scientific board considers these problems to be of utmost importance in the Census and methods for treating this problem must be implemented. One option is the method that is proposed to use for the Norwegian Census which is based on the approach used in the Norwegian Census 2001. Briefly it can be described as follows:

1. Randomly assign values 0 or 3 to cell values of 1 or 2
2. Select all persons that contribute to small values in at least on hypercube
3. Draw a 1/3 sample of these, balanced within each municipality with respect to gender, age and other demographic variables; the distributions minimally different from original distributions
4. Triplicate the 1/3 sample to substitute the selected persons

Based on the Norwegian Census 2001, 2.8% contributed to small values (1 or 2) in cubes for local districts.

Some strategic decisions for the Census are needed. One can consider the Census as the starting point of integrated person/household statistics in the future and aim

at a general solution for disclosure control that can also be applied in future statistics or concentrate now on a specific solution for the Census. The Scientific Board recommends that SCB takes one step at a time by first finding a specific solution for the Census and learning from that, a general solution later. One can think of two possible types of methods:

- Pre-tabular: protecting micro data for all possible tables
- Protecting tables once they are constructed

Of these two options, the Scientific Board recommends that one should protect each table specifically, so not to lose too much information. Protecting micro-data pre-tabular would probably mean destroying a lot of data unnecessarily.

Regarding the specific questions, the Scientific Board has limited experience in order to answer them in detail. The first question deals with experiences from other agencies, and SCB probably knows more about this than the Scientific Board. On the other issues raised, we recommend to check the output in the Mona system. Also, as mentioned earlier, including important users of tabular data by user surveys should be done. Since the Board recommends not using synthetic data for researchers, there should be no need to develop methods to help users take disclosure control into account in their analyses of protected data. Regarding new challenges with respect to privacy and confidentiality issues, the main important new type of data are integrated register-based statistics for person/households. So it is important that good strategies and methods for disclosure control are developed for the Census and later the yearly Census-like statistics.

Strategies for Dealing with Measurement Errors

Speaker: Michael Carlson, Peter Lundqvist
Discussant: Frauke Kreuter

Summary of topic presentation
To work with total survey error is important for a statistical organization. To optimize a survey design means to minimize the total survey error subject to different quality dimensions and different restrictions. In the quality frame work the accuracy dimension is usually linked to work done by survey methodologists. Statistical methods adopted to investigate the sampling error are a common rule at Statistics Sweden. However, what can one expect about the work in the area of non-sampling errors? The methodological work in this field is at present not equally frequent or concerted; in some areas methods and routines have been implemented, but this is not the case for measurement errors.

A broad knowledge among survey managers and survey methodologists is necessary, but also competence to use sound methods to evaluate measurement errors. A strategy for when and how to compute indicators for measurement errors in surveys would be of great value for Statistics Sweden. There is a big challenge in how to organize the management of quality work at a National Statistical Agency. However, our interest is focused more on how to build competence on

analyzing and evaluating measurement errors among survey methodologists at Statistics Sweden.

The qualitative and the quantitative perspectives on measurement errors need to be better integrated in order to effectively evaluate measurement errors due to questionnaire designs and data collection modes etc. Merging both camps is an issue that has been brought up as a means to improve evaluations at the Cognitive Methods unit. Both perspectives are important but it is our view that the quantitative aspects are lagging at Statistics Sweden and need to be developed and more broadly applied in our daily work.

One major contributory cause to this presentation is the results found in the report *Development of Quality Indicators at Statistics Sweden* by Paul Biemer and DennisTrewin. They developed a quality evaluation approach that was tested on eight of Statistics Sweden's most important products. The quality evaluation had its main focus on the accuracy (or data quality) and the measurement error stood out as: 'the only error source to be rated as "High risk" by all products but one.'

At the moment we have large problems with increasing nonresponse in our surveys. This means that we have to try different data collection methods, more mixing of data collection modes. We also need to try different interventions and contact strategies in order to improve response rates for different groups in the surveys. Many users demand that we produce quality measures of the effect of different interventions in the data collection. It is known that mode effects consist of different errors such as nonresponse and measurement. Statistics Sweden has some statistical methods that could be used to investigate the potential nonresponse bias in a survey but there is a lack on indicators for the measurement bias. There is today important work going on in this area among our colleagues at other NSI's and universities. It would be beneficial for Statistics Sweden to take part in this development.

The ambitions of Statistics Sweden in this area are at present unclear. Today we lack an organized approach to how we should consider and deal with measurement errors in our products and by referring to Biemer and Trewin it could be argued that there is a pressing need to address the issue. The good news is that there is knowledge in the organization that systematic errors do exist and that individual methodologists possess some experience in this area. What we need are procedures in place to assess the impact of these errors and to deal with them.

On the one hand we could focus attention to the immediate needs in each of the eight products that have been reviewed and identified as problematic by Biemer and Trewin. These surveys and registers are definitely among the most important statistical products at Statistics Sweden and even with a minimal allocation of resources this course of action should be both realistic and affordable. In fact, the LFS already have plans in play; evaluation projects aimed at rectifying the current problems will begin later this year using reconciliation methods and analyzing causes and effects using latent class analysis. A realistic course would be to deal with one or two products at a time when resources (staff and funding) are available. The drawback of this strategy is that it will take time before we have

cleared the slate even of just these eight products; there is a risk that the entire knowledge area will depend on the availability of only a few persons and that general knowledge is not well established in the organization as most will only be involved temporarily in the different projects. In the worst case we will have to depend largely on external consultants. We will also probably miss out on the current international development as well.

A more ambitious course of action would be to establish a group of methodologists comprising both statistical and cognitive competencies, together with experienced staff from the data collection and subject matter departments. A governance model (FMOD) specifying how such teams should work is already established at Statistics Sweden. It would be the responsibility of the team to monitor the area (i.e. the literature and internal needs), to develop relevant procedures needed to cope with the issues and to build a sustainable capacity to work on a much broader front and not just the immediate problems; i.e. a more strategic approach rather than just on the *problem du jour* with temporarily available staff. The realism of getting started quickly with this approach is however hampered from the fact that we are currently not adequately equipped competence-wise and that it will require a concerted effort involving several departments and staff, and most likely a considerable allocation of funds.

Regardless of how we set our ambitions for the short or long run, cooperation with external bodies will be necessary. Official statistics in Sweden are currently produced by about 25 different government agencies including Statistics Sweden and all are faced with basically the same methodological challenges as Statistics Sweden. If we want to expand and sustain our knowledge and keep it up to date, national and international collaborations will have to be initiated and continued. There is also a long tradition of cooperation with the universities in Stockholm and Örebro that we should try to develop further.

Discussion
Some points made during the discussion:

- Few studies on measurement errors have been done, but it is necessary to start doing them. Among statisticians the knowledge on measurement errors is poorly used.
- Which information on measurement errors is important to measure and needed by users? There is a balance between what can be measured adequately and what is needed. The effect of measurement errors varies, is the interest on changes over time, comparison between subgroups, point estimates, etc?
- In practice, studies are used in several ways. Stakeholders need to be involved
- Interviewer effects can be used as an indicator, but it is not necessarily important to streamline interviewers. But interviewers should have ongoing education, not only ad hoc.

- Useful if quantitative and qualitative competences work together on measurement errors. For example use cognitive interviewing to disentangle response styles in different groups.
- Statistics Sweden need to allocate more resources to study measurement errors (even though some work has been done). Make god experiments. Collaborate with universities.
- Training among many, not only methodologists. Everyone working with a survey needs to understand the issues of measurement error. Training and experience should be carried out in parallel.
- Collaborate within the ESS.
- Balance between nonresponse bias and other types of bias. One might affect the other, or the impact they will have.
- Start with the eight products that have been reviewed by Paul Biemer and Dennis Trewin. However, there are priorities; a lot of other work also needs to be done for those products.

Recommendations for Dealing with Measurement Errors
We congratulate SCB for putting the topic of measurement error on the agenda. Measurement error is often overlooked in agencies that are in the business of collecting factual questions. Yet measurement error is present not only in survey questions but also in administrative data. It is important to think about both measurement error and nonresponse at the same time, including their interaction. Measurement error also needs to be considered when data from different sources are combined.

When thinking about measurement error it is important to not only focus on the items themselves but also think of respondents and interviewers. All three contribute to measurement error with their own characteristics. SCB has control over the items and over the interviewer. We therefore recommend measurement error evaluation of already collected data, using interviewer effects as one proxy indicator. Collaborations with students can facilitate such analyses. We also recommend extensive training both on the sources of measurement error (cognitive response process), quantitative methods to evaluate them (e.g. LCA, MTMM), and methods to deal with measurement error in the analysis (e.g. SIMEX).

SCB has a unique possibility to study measurement error, with their joint use of administrative and survey data. The possibility of collecting paradata (e.g. time stamps) in ongoing surveys, as well as the possibility to implement small experiments in ongoing surveys should not be overlooked.

We suggest parallel efforts in examining the eight major products while capacity building takes place.