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SCB PMU

Meeting with the Scientific Advisory Board (SAB) of Statistics

Sweden (SCB) November 21st-22nd 2019

Attendees

Board members

Joakim Stymne, SCB, chair
Lilli Japec, SCB, co-chair
Ingegerd Jansson, SCB, secretary
David Sundström, SCB, secretary
Lars Lyberg, emeritus
Jan Björnstad, Statistics Norway and University of Oslo
Sune Karlsson, Örebro University
Xavier de Luna, Umeå University
Daniel Thorburn, emeritus
Thomas Laitila, SCB and Örebro University
Natalie Shlomo, University of Manchester
Barteld Braaksma, Statistics Netherlands
Annette Jäckle, University of Essex
Frauke Kreuter, University of Maryland and Universität Mannheim

Other attendees

Steve Heeringa, University of Michigan
Folke Carlsson, SCB
Mats Bergdahl, SCB
Gustaf Strandell, SCB
Joakim Malmdin, SCB
Cecilia Wass, SCB
Jesper Hansson, The Swedish Riksbank
Yeasmin Sayeed, Swedish Energy Agency
Jens Malmros, SCB
Annika Lindblom, SCB
Suad Elezovic, SCB
Martin Axelson, SCB

Current Issues at Statistics Sweden

Director-general Joakim Stymne gave an overview of the recent quality issues regarding unemployment data delivered by a subcontractor. This has put focus on SCB in media and generated public awareness of statistics and methodology. SCB will in the coming years put a focus on labor market statistics in general.

Stymne discussed SCB's new strategy. The board expressed eagerness to see the new strategy.

Stymne discussed the Swedish statistical system (Statistikansvariga myndigheter, SAM-system) with 28 different public agencies responsible for official statistics. Historically the system-awareness among some of the agencies has been somewhat variable. However, the awareness is now increasing, as is partnership based cooperation between these authorities. The director-generals of the SAM-agencies have agreed on a common strategy for the system.

The board discussed statistical systems in other countries, e.g., the UK and Korea.

Reply to Recommendations

Senior Advisor Lilli Japec, SCB, gave SCB's response to the SAB's recommendations from the last meeting held in April 2019 on the topics raised then:

1. Hard-to-Survey Populations
2. State-Space Models and the Sampling Errors in the Swedish Labor Force Survey
3. Quantitative Quality Evaluation of Base Registers
4. Quality in Official Statistics

Joakim Malmdin (head of quality at SCB) added some comments in the response to Topic 4. Many of the things SCB is doing is being done similarly at other National statistics institutes (NSI). Some of them report positively on their communications and dialogues with their users.

Some discussion in the board. Especially on the notions *errors* and *uncertainty*. This is an important discussion for SCB regarding the potential design-to-modeling transition.

The following five topics were discussed

Topic 1: Models and modelling for official statistics – the past, the present & the future
Speaker: Gustaf Strandell
Discussant: Steve Heeringa

In the past and in the present the words models and modeling have primarily been used at SCB when statistics have been produced using something else or something more than what is covered by a strict reading of the theory of designed based survey sampling. Also, the words models and modeling have been closely associated with the production of statistics using administrative data, or any other form of data which have not been collected by SCB using a questionnaire (of course administrative data also plays an important role in designed based survey sampling).

Questions to the board:
What are the benefits of adopting a model-based approach to official statistics?

Comments from discussant:

- Unified, explicit (transparent) approach to statistical analyses of data from multiple sources (surveys, admin data, found data).
- Efficiency gained through using models for inference.
- Computational resources and software tools needed to apply models (including Bayesian methods) are now available.
- Probability samples (subject to nonresponse) improve ignorability of inclusion mechanism
    - Selectivity or non-ignorable inclusion probabilities of nonprobability samples or "found data" are explicitly incorporated into the inferential model.

What are the drawbacks to adopting a model-based approach to official statistics?

Comments from discussant:

- Explicit dependence on model choice for Y. Includes an element of subjectivity (but assumptions are explicit and testable).
- Model misspecification leads to bias.

- (Team): Subject matter expertise is needed for deep understanding of the data, model specification and model evaluation.
- (Team): Enhanced training in modeling.

Which is the role of subject matter expertise in official statistics that employs models and modeling?

Comments from discussant:

- (Team): Subject matter expertise is needed for deep understanding of the data, model specification and model evaluation.
- Programs of official statistics involve teams, not all members require same level of subject matter or statistical expertise.
- Personal view: The subject matter is essential to effective practice of applied statistics. It serves to make our work more relevant and interesting.

Further discussion in the SAB:

- Model-based thinking is important. We will always have non-ignorable non response, even if we model.
- Nowadays very many owns a computer and can use SCB's products as inputs. A relevant thing to think about is how to take this into consideration, i.e., that SCB's products are used as numerical inputs Similar issues at Statistics Netherlands.
- It is healthy to rotate a NSI's employees from time to time. Everyone should have interesting tasks. How should organizations change to fulfill this?
- Automated data collection is the future, through smartphones etc. How fast can SCB change its way of working?
- Predictive likelihood as an alternative to calibrated bayes. The risk of over-identification can partly be solved with likelihood.
- The first phase of modelling is conceptualization. Involve subject matter specialists in this phase.

Topic 2: Redesign of the Swedish labor-market statistics and its implications for an increased use of models and modelling
Speaker: Martin Axelson
Discussant: Jesper Hansson

SCB has recently initiated a large-scale overview of the Swedish labour market statistics, which comprises more than 20 statistical products produced by three statistical agencies. The activity is of strategic importance, targeting the goal of a "design for completely up-to-date and future-proof labour-market statistics" which is one of the prioritised goals in SCB's recently revised strategy. In the work, the five main components in the quality concept for official statistics will play a leading role: Relevance, Accuracy, Timeliness and punctuality, Accessibility and clarity, and Comparability and coherence. However, quality is but part of the equation, as also cost and response burden need to be taken into account. Given the current situation, with continuously decreasing response rates in combination with increasing costs for direct data collection from units (individuals, enterprises, etc.) included in a sample survey, the two latter aspects are becoming increasingly more important for SCB. Consequently, an important part of the work will be to identify to what extent it is possible to establish a future design that relies much less heavily than today on data collected from sample surveys. In order to achieve this, it is likely that the future labour-market statistics will rely more heavily on administrative data and an increased use of models and modelling. The paper will discuss different scenarios and their potential consequences and implications for both SCB and the Swedish system of official statistics as a whole. The questions to the Scientific Board will primarily be quite general, seeking advice on questions on strategic rather than technical aspects of the work.

Comments from discussant:

- Good to have a comprehensive review of labour market statistics
- Coordination of firm surveys and/or replacement with administrative register data should be done
- Need data collection directly from respondents, at least at a low frequency (annual) to validate models
- Could use model-based estimation procedures for higher frequency data
- Use administrative data more to check quality
- Overall resources and ambitions for labour market statistics must be discussed

Comments from the SAB:

- Sample size does not need to be the same all the time.
- Variation in the unemployment rate will induce variability in how easily recruited interviewers are, implying correlation in the measurement to the thing measured, which in turn implicates biased estimators.
- New form of responsive design, use administrative data to vary sub-sampling schemes.
- Sample sizes can be decreased by looking at volatilities in different sub-groups.
- A good idea is to change the periodicity, why not decrease it to make things cheaper.
- What is not recorded in registers? The labor market is very dynamic, e.g., the gig-economy, migration and so forth. Which are the unmet user needs and what do we have?
- Heavily regulated by EU, is it necessary to follow everything?
- Use the registers and do validating surveys
- Involve topic specialists for the choice of scenario. What are the information needs?
- Use administrative data and subsample fewer of the stable individuals and more of the unstable, Predict the probability of change to sort out people that don´t need to be sampled frequently.

Topic 3: A call scheduling strategy for telephone surveys
Speaker*:* Jens Malmros
Discussant*:* Frauke Kreuter

We present a model for call scheduling with respect to the time of the call, which make use of background variables and paradata. The model combines a mixed effects logistic regression model with a Markov model. The logistic model predicts contact probabilities from register variables and is trained on paradata from the Labour Force Survey. The latter Markov model is primarily mechanistic and aims at adjusting the initial prediction from the logistic model by utilizing the results of previous calls and by introducing increasingly random call times during the course of the survey.

Answers to SCB's question from discussant:

Question from SCB: What are the most important improvements we could make to the model?

Answer from discussant: Time slots and time intervals: would first empirically examine distributions of interviews by important categories (i.e. labor force status); Multiple surveys. Previous answers and response patterns certainly useful. Consider also examining sequence of slots. I.e. someone never at home in slot 1 and 2 over several days might be working. Does the sequence of patterns predict status?

Question from SCB: Which of the suggestions given in Section 4 should we consider first?

Answer from discussant: Find relevant covariates.

Question from SCB: Which of the suggestions given in Section 4 should we consider first?

Answer from discussant: Time between calls less relevant as predictor (imho).

Question from SCB: Would you recommend us to pursue any of the more general directions for model development?

Answer from discussant: Nonparametric (tree) models.

Question from SCB: Is it of interest to integrate the two parts of the model further?

Answer from discussant: I don't see the advantage to the different stages.

Question from SCB: How would you recommend us to proceed with model evaluation?

Answer from discussant: Precision/recall by subgroups, experiments within the given round / hold out sample.

Question from SCB: In particular, what are the options for model evaluation aside from experiments?

Answer from discussant: Respondent composition, time and cost as part of the equation.

Question from SCB: Should we aim to construct a model for all surveys or should we construct different models for different surveys?

Answer from discussant: Yes. To the extend that the survey topic is affected by at-home patterns.(you could learn that from historic data).

Question from SCB: Is it feasible to combine paradata from different surveys for model training?

Answer from discussant: Can't speak to the technical aspects of this (how easily can the data be compiled for one general analysis). Having more training data is good. Survey topic could go in as one predictor and you can learn the importance of that predictor.

Comments from the SAB:

- What at about stability of being-at-home patterns? Across the week.
- Hard-to-obtain phone numbers as an explanatory variable
- Lynn Stokes U of Texas had a similar paper but using hazard models.
- It is really a queuing problem, as there is a fixed capacity of making calls in given time slots.
- Strong seasonal effect in these matters as well.
- For prioritizing, find other criteria than when you reached people last time.

Closed session for the Board members

- Discussion and advice to SCB.

Topic 4: On the use of VAT data in creating estimates of monthly turnover in Short Term Business Statistics
Speaker: Suad Elezovic
Discussant: Daniel Thorburn

Development of official statistics in modern days is largely influenced by the needs of producing timely and cost-effective estimates, especially in the domains where some alternative data sources are available. The use of administrative (-and similar) data for improving, complementing, validating or even replacing the survey data has a long history in official statistics but the real flourishing has been experienced during the recent years, mostly due to the technological progress and increased availability of up-to-date data.
This study is concerned with the potential uses of administrative data from the *Value Added Tax* (VAT) database in estimating monthly turnover in Short Term Business Statistics (STS) in Sweden. The VAT database, available to SCB (SCB) from the Swedish Tax Agency, is updated on an almost daily basis. Motivation for this work is to investigate the possibility of reducing response burden by utilizing this kind of administrative data as well as producing more accurate and timely statistics.

Comments from discussant:

- To replace survey estimates with VAT-estimates is a good idea.
- I recommend to use all the data and not just a subset
- If this is a low budget statistics a macro approach is probably best, otherwise an adequate micro approach is recommended either based on a regression estimator or on a multilevel model.
- There are other alternatives but most of them probably requires learning new methods like neural networks or multiple imputation. The gains of such methods are probably small compared to the efforts.
- It is important to use adequate models. SCB should consider available auxiliaries. Models that assume that the response set is random are probably not adequate.
- There is nothing in the handout on quality of the answers, misreporting for VAT, wrong periodization, quality of data with 0 % VAT both in- and outgoing. It is difficult to say anything about other branches, than B01-C33
- The problems of growth estimation are probably the same as for the level, but periodization is a more serious problem.
- I believe that it is as motivated to fill the gaps with good imputation techniques, as it is to handle non-response in the present survey with standard techniques? Some techniques may even be better, but it depends to a large extent on the model and on what auxiliaries that are used. I.e. multiple imputation gives better estimates of the error than calibration.

- Much of the answers have been incorporated in the previous answers.
- The so-called macro-approach may be good enough.
- Do not try a time series model – neither a dynamic one, a traditional multivariate ARIMA model, nor a spectral method. The series are far too short.
- Methods from the artificial intelligence (machine learning) toolbox, like a two-layer neural network, may be alternatives. But this application alone does not motivate that SCB learns how to use it.

Discussion in the SAB:

- Are the VAT estimate accurate? It seems like it.
- In the Netherlands they have implemented a similar approach in production, so make a study visit to them. Good relations to Skatteverket are necessary. Tax data are used for international trade statistics as well. This lead to a redesign of the business register, units were adapted to align with the VAT data. Replicate the old situation, but somewhat hard. Had to accept the break in the time series, but an effort was made to involve users. Numbers are dominated by large companies, still surveys for these.
- Check out Statistics Canada as well.
- Is the behavior of the late reporting companies stable over time? If so, ratio estimators can work well. If not, more stochastic, then modeling might be required, nowcasting etc.

Topic 5: Estimation of price elasticity for electricity demand in residential and service sectors with new data
Speaker*:* Yeasmin Sayeed
Discussant*:* Sune Karlsson

The objective of this study is to analyze the role of energy taxes for energy efficiency in the residential and service (ReS) sectors. For that purpose, we estimate the price elasticity for electricity demand for the Swedish consumers in the ReS sector, in order to analyze the ReS sector's contribution to the overall Swedish target for energy efficiency set by the EU directive for energy efficiency. This might also help decision makers by providing insight about the implication of further increase in electricity taxes. The estimated equations are inspired by the electricity demand model applied by Brännlund (2013) for the residential and service sector in Sweden. In this paper, we further modify the model by including a proxy variable that explains structural changes over time in Sweden. Moreover, we apply the model for on data for the period 1975-2017. The estimated price elasticities are -0,11 percent (short-term) and -0,52 percent (long-term).

Comments from discussant:

- It is difficult to view the relation in Table 1 as a long run equilibrium
- Similar for Table 3
- The models in Tables 5-9 address the "secular trend"
- Allowing for a change in slope and time to adjust may be beneficial
    - Estimated price elasticities quite small
- Could more disaggregated (micro) data be used?

Comments from the SAB:

- Geographic variation in the electricity price. Elasticities are probably not constant over time.
- Other things that change over time, insulation of housing etc.
- Include other variables in the model, more than one series.
- This is a modelling problem; prediction. Do not use non-significant variable, do not over fit.
- Look at what is being done internationally. Similar behavior in other countries?
- Use microdata. Collaborate with researchers if it is difficult to get access.

Closed session for the Board members

- Discussion and advice to SCB.