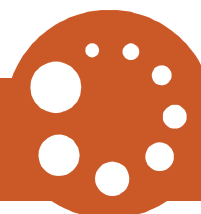




SAE-BESTA - Small area estimation for the Job Statistics

Pilot project within the framework of the FSO's data innovation
strategy: Management Summary

EXPERIMENTAL STATISTICS



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Objectives

For reasons of accuracy, the Job Statistics (JOBSTAT, in German BESTA) have not provided cantonal results since the revision in 2000. An exception are cantons and towns/cities that have funded increases in the size of their sample. To remedy this situation, a pilot project under the umbrella of the FSO's data innovation strategy has tested the possibility of producing cantonal estimates of absolute job numbers using small area estimation (SAE) methods. Additionally, the project aimed to extend these investigations to the level 2 (NOGA2) economic activities of the General Classification of Economic Activities (NOGA)

Method

The SAE method used is based on modelling of the variable collected in the survey, in this case jobs, in accordance with auxiliary variables that must be known for all units in the population. Among the auxiliary variables available are the major region, the economic activity section and the number of jobs according to the FSO's sampling frame based on the Business and Enterprise Register. The number of jobs as reported by the sampling frame may differ to that collected in the survey. This is due in particular to measurement effects as well as time lapses between these data sources.

This project used a linear mixed model with a random effect for the canton and NOGA2. Modelling was carried out for 20 quarterly samples, from 2nd quarter 2015 to 4th quarter 2019.

Assessment

The estimates' accuracy is assessed in terms of bias and variance, i.e. from a design-based perspective. The SAE estimates are based on modelling, which entails a risk of bias due to possible flaws in the model. Compared with conventional direct estimates, however, they generally enable a reduction in variance. The risk of bias in SAE estimates must therefore be validated and assessed. This is done according to the following procedure. For areas with a sufficiently large sample size, SAE estimates are compared with direct estimates, whose accuracy is considered satisfactory in such cases (unbiased and low variance). For smaller areas, where the accuracy of the direct estimate is considered unsatisfactory, SAE estimates are compared with approximations of target values. These are known as CAS2 in this project and are compiled on the basis of the Structural Business Statistics (STATENT) and the JOBSTAT sampling frame. Due to differences in the JOBSTAT and STATENT populations, priority is given to the comparison of SAE estimates with direct estimates. Furthermore, CAS2 values are only available for the 4th quarters of each year, as is the case for JOBSTAT. Variance is estimated using a bootstrap method.

Results

The vast majority of the cantonal results are considered validated. The other cases tend to concern the employment of women in certain (small) cantons in Eastern or Central Switzerland, but the gaps between the SAE estimate and the validation threshold are often relatively low. It is hardest to estimate women's employment in the canton of Ticino, for the samples from the 2nd quarter 2015 to the 4th quarter 2017. The results are nevertheless very encouraging overall, and it may still be possible to make some improvements.

Generally speaking, SAEs enable a significant improvement in variance, except for in very large cantons such as Zurich, where the improvement is less great but the goal of accuracy

is already achieved with direct estimates. Smaller cantons see greater improvement in accuracy. For example, in the canton of Appenzell Innerrhoden, the coefficients of variation of the SAE estimates are generally between 2% and 4% for the total number of jobs men and women combined, while those of the direct estimates can exceed 10% depending on the year.

It should be stressed, however, that these very encouraging results were obtained on the basis of samples for which the cantons or towns had funded an increase in sample size. The scope of the project did not allow an objective assessment to be made as to whether such increases can be dispensed with in future. Moreover, this project only investigated the total number of jobs. Enlarged samples also provide more accurate estimates of the distribution of work-time percentages, full-time equivalents and vacancies, as well as for qualitative variables.

Analyses of SAE estimates at NOGA2 level show results that are more mixed than for the cantons, but that are nevertheless encouraging. However, as the project currently stands, it is not possible to publish series for the economic sections at the levels envisaged.

Conclusion

The results obtained so far allow SAE estimates to be published in the form of experimental statistics for the total number of jobs and jobs broken down by sex at cantonal level but not at NOGA2 level. These SAE estimates are based on the JOBSTAT quarterly samples with an increased size funded by the cantons and towns. It was not feasible within the scope of the project to assess the possibility of foregoing these increases. To do so would require two sets of data; one with and one without an increased sample. This test could be carried out as soon as sufficient data are available for both types of sample.