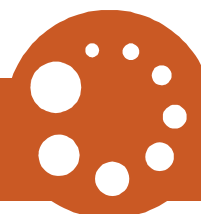




Model-based estimation of the gross value added in the enterprise groups statistics (VAB-STAGRE)

Management Summary

EXPERIMENTAL STATISTICS



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Overview

The enterprise groups statistics (STAGRE) provide information on the activities and importance of Swiss companies that are part of an enterprise group. Since its creation, these statistics have been continuously enriched with new information in order to broaden the possibilities of analysis. For example, the variable "turnover" was introduced in 2020. This was the result of data linking, at the legal unit level, combining the value added statistics survey (WS) on the one hand and administrative data (VAT turnover, OASI labour income, etc.) on the other hand, as well as on statistical modelling relying on this data.

Project approach and objective

The methodology already used for the target variable "turnover" will be refined and expanded in order to provide further variables within STAGRE. This methodology is based on the basic notion of small area estimates (SAE). A statistical model is first estimated on the basis of the WS net sample units (for which collected values of the target variables are available). Predictions of the target variables from this model are then used to estimate values for the companies not represented in the net sample. These estimated values (or, where available, the surveyed values) can then be aggregated in the relevant areas of investigation (e.g. by STAGRE industries) in order to obtain estimates of the totals. As the modelling is based on the WS data, the results obtained refer to the intersection of the STAGRE and the WS sampling frame. Enterprises with fewer than three employees or belonging to certain combinations of industries and legal forms are therefore excluded.

The new variables to be made available are gross output (GO), intermediate consumption (IC) and gross value added (GVA). These are the three basic variables of the production account of the national accounts (NA), from which the gross domestic product (GDP), the best-known macroeconomic indicator, is obtained. Adding these variables to STAGRE will therefore make it possible to carry out more relevant analyses of the importance of enterprise groups in the Swiss economy than what has been possible with the variables available until now.

Outputs

Different variants of models were estimated and evaluated for each of the three target variables, all of them belonging to the family of linear mixed models (LMM). The different model variants were compared among each other using quality measures, which can be considered as variants of the coefficient of determination R^2 . Based on the comparisons, the preferred variant was identified for each variable.

Particular challenges that had to be met in this project were:

- a weaker explanatory power of the auxiliary variables VAT turnover and OASI labour income for the target variables;¹
- taking into account the possibility of negative values for GVA in the modelling;
- ensuring the accounting equation between the three variables (GVA is defined as the balance of GO and IC).

Summary and prospects

The model-based estimation of the GO, IC and GVA variables is a promising approach. Nonetheless there is still a need for further analyses and potential for improvement with regard to several aspects of this approach, for example:

- Quality measures according to different areas of investigation (such as sectors, membership of the STAGRE population or not, etc.)
- In the context of model estimates and predictions: incorporation of WS extrapolation weights, analysis of extreme values, verification of the distribution assumptions used
- Quantification of possible biases
- Development of variance estimators

¹ This is reflected in the lower R^2 values for the predictions of the three variables (between 0.56 and 0.75) in the preferred model variants as compared to the corresponding value for the prediction of turnover (0.87).