Transitioning to the New Editing Process at Statistics Sweden

Fredric Nyström[1], Karl Sahlberg[2], Pia Hartwig[3]
[1]Statistics Sweden (SCB), Sweden, fredric.nystrom@scb.se
[2]Statistics Sweden (SCB), Sweden, karl.sahlberg@scb.se
[3]Statistics Sweden (SCB), Sweden, pia.hartwig@scb.se

Abstract

In 2021, the management of the Statistics Sweden (SCB) made a central decision to restructure the manual editing process with the aim of shifting focus from editing data at the micro level to the macro level. The new editing process is essentially divided into two parts; respondent editing (editing that occurs before data submission) and macro editing (editing that occurs after data submission). The decision was made due to the need to streamline resource allocation and prioritize development projects in other areas. The main goal was to ensure cost-effective work with data collection and editing. The new approach centered around respondent editing, reducing the need for manual editing after data submission. Instead, respondent editing in online surveys became the primary means to correcting data, using prompts to guide respondents to submit correct data.

To implement this new editing process, SCB provided guidelines and checklists for designing and evaluating prompts. The focus was on identifying errors that could have a significant impact on the quality of the statistics. The target group for the guidelines is primarily the competencies within SCB that collaborate in the survey.

Having a macro perspective with selective elements is already a consideration in the selection and design of prompts. This is to facilitate work in the subsequent steps of macro editing. The subject group working with the Production Value Index is an example of a product that has successfully managed these challenges and maintained quality while transitioning to the new editing process. To facilitate this transition, the group implemented measures such as prompts and an automated correction system. In addition, macro levels selectors were introduced to identify specific industries requiring manual editing, thereby reducing the risk of errors at the industry level.

Finally, the team assessed unedited and edited data, comparing microdata that had not been edited or processed at all with microdata that had undergone assessment by both the collection and subject teams. Drawing from this data, the project team could conclude that nearly all incorrect values impacting their respective industries would be identified during the subject team's macro level editing. With this conclusion, the project team felt confident in moving towards a more macro-based editing approach. Our presentation will describe how the implementation of the new editing process has worked in practice. We will provide examples from surveys where the new editing process has had a significant impact.

Keywords: The New Editing Process, Cost-efficient, Respondent Editing, Prompts, Manual Editing

1. Introduction

In 2021, executives at SCB made the decision to restructure the manual data editing process with the aim to improve resource allocation and prioritise development projects in other areas. The main goal was to ensure cost efficiency in data collection and validation activities. This decision resulted in a new process for data editing, focusing on respondent editing (validation and editing that occurs before data is submitted to SCB) and macro editing (validation and editing that occurs after data has been submitted to SCB). These changes require a high level of concurrence between the two forms of editing and validation to ensure an effective and efficient data editing process and a decrease in manual editing activities.

Already at the outset when designing prompts to be used in surveys, the aim is to have a macro perspective. Functional respondent editing allows for more efficient macro editing because data will contain fewer errors. At the point of macro editing, efforts should be focused on handling cases that are of significance for the statistical output. Ideally no such errors should remain after respondent editing, but macro editing ensures any remaining errors are identified and adjusted. We will provide examples from the surveys Enterprises' ICT Expenditure (FUFI) and Production Value Index (PVI) where the new editing process for data validation has had a significant impact.

2. Method

2.1 Respondent editing method

Respondent editing is an activity that respondents perform while reporting on a survey. Fundamentally, the data collection and editing process should be based on trust in the respondents and, therefore, the assumption that the values they report are correct. Data validation efforts should thus not originate from an assumption that there are errors in the data. At SCB, data collection from enterprises and organisations is almost exclusively conducted using online questionnaires. This allows for the implementation of automatic prompts that alert the respondent to potentially incorrect values based on comparisons with previously reported data. Such prompts can be based on historic data as well as current administrative data from registers such as an enterprise's turnover or number of employees.

Experts in survey design at SCB were tasked with formulating instructions and a checklist regarding respondent editing in the new data editing process, aiming to make it more efficient

and to further decrease respondent burden. The instructions stress the importance of focusing on errors that can affect the quality of statistics and seek to alleviate cooperation between SCB and respondents.

When designing prompts, it is crucial to balance the aim and quality requirements for the statistics with a response burden perspective. Overburdening respondents with an excess of prompts must be avoided. Instead, efforts should be focused on the most important variables and break downs to make the editing process as efficient as possible. The manual process where the respondent was required to comment on potentially incorrect values and these comments had to be interpreted and handled in the data editing process has ceased. The requirement to provide a comment has been replaced by fixed response alternatives based on expert knowledge concerning under which conditions the reported value might be correct despite diverging significantly from which might be expected. The introduction of fixed response alternatives both reduces the respondent burden and makes the continued data validation more efficient.

To design relevant prompts, a thorough evaluation of all potential prompts should be conducted. This includes identifying the most relevant variables and break downs, evaluating the need for prompts, designing of prompts, evaluating their efficacy, and making adjustments based on this evaluation. This should be done continually to ensure that prompts remain relevant over time.

2.2 Macro editing method

Macro editing refers to validation of statistical results, namely the statistics that are to be published or reported. It is important to identify significant measurement errors not amended previously in the data editing process as well as potential processing errors. Where possible, macro editing should be rule-based. That is, criteria for what constitutes a diverging value should be predetermined in order to minimise subjectivity.

3. Practical experience and results from the surveys FUFI and PVI

FUFI is an annual survey measuring enterprise's expenditures on ICT in Sweden, mainly consisting of quantitative variables. The survey is not regulated by the EU but is a part of Sweden's official statistics. The primary user is the national accounts for production gross domestic product (GDP).

PVI is a monthly survey with quantitative variables measuring developments in Swedish commerce, and production of goods and services. The survey is regulated by the EU and is a part of Sweden's official statistics. The statistics are coordinated with other business cycle-based surveys.

3.1 Respondent editing

In accordance with the provided instructions and checklist, the respondent editing process should be evaluated and designed in a specific order, so as not to miss aspects of importance for the quality of respondent editing. The recommended order is as follows:

- Inventory of existing prompts
- Evaluation of existing prompts
- Designing prompts

3.1.1 Inventory of existing prompts

To maximise the utility of the new data editing process, existing prompts should be regularly inventoried. The aim of this exercise is to gain an overview of the prompts and how they operate on the whole. In connection with the inventory, prompts should be evaluated and updated in order to remain relevant over time.

In the FUFI survey the following questions were addressed: What prompts exist and why, what is their respective purpose? Could prompts that are connected with uncertainty be adjusted in their design to make them more effective? Are there prompts that are no longer relevant that can either be removed or replaced with more relevant prompts?

3.1.2 Evaluation of existing prompts

Before designing new prompts, existing ones should be evaluated. This evaluation is centred around an accuracy test which measures the relevance of a prompt. Using paradata, the number of respondents that have triggered a specific prompt can be calculated as well as the number of respondents who have subsequently adjusted the diverging value. The test value is calculated as follows:

$$Accuracy = \frac{Number\ of\ respondent\ that\ adjusted\ their\ value\ after\ triggering\ the\ prompt}{Number\ of\ respondents\ triggering\ the\ prompt}$$

This test should be conducted for all prompts. An accuracy exceeding 80 percent is considered high, and prompts reaching this level of accuracy are approved to be kept according to the instructions. For prompts reaching a lower level of accuracy, adjustment or exclusion should be considered.

In the FUFI survey, a few prompts did not achieve a high level of accuracy of 80 percent, but instead reached between 60-70 percent. In order to increase the efficacy of these prompts they were adjusted to not trigger as easily. Incorrect values that might be missed due to such adjustments can still be identified in the macro editing process, at which point a decision on how to handle the value can be made.

Specific adjustments to prompts for certain size classes, industries, or regions can also be considered. In order to detect prompts that are relevant to specialise in this manner, the accuracy test can be conducted by various break downs. The choice of breakdowns to consider is guided by historical information and expert knowledge of the subject matter.

3.1.3 Designing prompts

The new data editing process allows for the use of three versions of prompts. A specific data point can have several prompts that can trigger depending on the nature in which the value diverges from what can be expected.

Forcing prompts require that the respondent report a value for a certain data point. In both the FUFI and PVI surveys, forcing prompts are used for all data points. This means that the respondent cannot submit the survey unless values have been reported on all data points.

Forcing prompts with fixed response alternatives require that the respondent provides a response out of a fixed set of alternatives. When this version of prompt is triggered, the respondent must either adjust the reported value or provide a response explaining why the value is correct. Using fixed response alternatives makes the process more structured both for the respondents and for the survey personnel which leads to fewer manual activities and makes evaluation easier.

Forcing prompts with fixed response alternatives are used in both the FUFI and PVI surveys. They are typically used to trigger if a value diverges significantly for the corresponding value for the previous period. In such cases, the reported value is not

necessarily incorrect, but for data validation purposes an explanation confirming its validity is required.

As part of the new data editing process, activities requiring manual handling are sought to be minimised, thus the fixed response alternatives. For respondents, having fixed response alternatives simplifies the respondent editing process providing them with predetermined options rather than requiring them to manually type a comment. The response alternatives also make the process of evaluating the data collection easier as no time-consuming coding of text input needs to be done in order to analyse the most common reasons for diverging values in the data.

An example from the PVI survey concerns the business turnover variable. If a respondent correctly reports a value that triggers the prompt for significant decrease compared to the value for the previous reference period, it is important to know the reason behind this change. Fixed response alternatives in the prompt allows for this, saving time it would otherwise have taken to contact the respondent to have them confirm and explain the value. The prompt in this example is designed as follows:

The reported value is at least 30 percent lower than the value reported for the previous month. In order to minimise further communication, please specify the reason for this development:

> *1. Decreased demand*
>
> *2. The business is being liquidated*
>
> *3. Parts of the business have been sold*
>
> *4. Other, please specify:*

Non-forcing prompts signal to the respondent that the reported value might be diverging but does not require any action from the respondent if they consider the value to be correct.

One example of such a prompt from the FUFI survey is connected to a question about software development. This is a qualitative question requiring a "yes" or "no" response. If the enterprise has responded to the survey for the previous reference period and changes their answer from "yes" in the previous reference period to "no" for the current reference period, this triggers the following prompt:

In the previous reference period, the enterprise conducted software development. Is it correct that you did not perform any software development in the current reference period? Please validate your response.

This prompt is meant to help the respondent validate their data. In this case, fixed response alternatives have no function since it would only lead to the respondent having to confirm the same thing twice. Therefore, in this instance the choice was made to implement a non-forcing prompt.

3.2 Macro editing

Before the implementation of the new data editing process, data validation was conducted both from a micro and macro perspective in the FUFI survey. Since the implementation, focus has shifted exclusively to the macro perspective. Macro editing in the FUFI survey is conducted using a tool that analyses population totals for each variable respectively, but which allows for more detailed analysis going into specific break downs or strata. When a value at the macro level is found to diverge from what is expected, it can potentially be traced to one or more values at the micro level that warrant further validation. If micro data that causes a significant effect on macro level data can be identified a first step is to investigate whether any prompts have been triggered for the value, and, if so, the respondent has provided a fixed response alternative that validates the reported value. If the value has been validated by the respondent, no further action is required.

In case a divergence at the macro level can be traced to a value that has not triggered any prompts, a qualified decision must be made regarding how to proceed; either to accept the value as valid or to contact the respondent for further validation in order to ensure quality in the statistics. Normally, it tends to be large enterprises with significant financial resource that require further action of this kind. Even though their reported values do not differ markedly, in relative measures, from what was reported for the previous period it can have significant effect on the statistics. Thus, contact with the respondent can be justified. This procedure is not newly implemented as part of the new data editing process but is established praxis.

As a consequence of the new data editing process, data collection personnel that were previously responsible in large part for the manual data editing at micro level, no longer need to perform this task. The focus on macro level data editing has made the process more efficient

and decreased the workload for the data collection personnel without jeopardising data quality.

3.2.1 Evaluation of the effects of micro level data editing

In order to evaluate the effects of micro level data editing in the PVI survey, an analysis of unvalidated and validated data was performed. Unvalidated data is the raw, unprocessed data reported by respondents that will later be processed to perform imputation and estimation. Validated data have gone through the process of micro editing, macro editing and routine adjustments. Differences between these data compiled by industry aggregates and the types of turnover: net turnover, industry turnover, service turnover and trade turnover for each market (total, domestic, export) respectively.

A number of measures were taken to improve macro level data editing, among which were automated selection methods to flag industries with diverging developments. In addition, automated correction of unit errors (errors where respondents have not provided the answer in SEK thousands) has been introduced, something that was previously a part of the micro level data editing.

The results from the analysis provided in table 1 show a comparison between unvalidated and validated data. Above 7 percent of macro estimates based on validated data in the service sector, and 8 percent in the industry sector contained adjustments of at least 1 percent. In 0.8 percent of macro estimates in the service sector and 3.9 percent in the industry sector contained corresponding adjustments of at least 5 percent. The results presented in the table represent the ceiling effect of the micro level data editing. If macro editing failed to identify a single incorrect value, then the effect on the statistics would correspond to the values in the table.

Table 1. Number of estimates that have been adjusted after the former editing process, 2021M04-2022M03

Sector	Adjustments above 1 %	Adjustments above 5 %
Industry	929 (8.6 %)	430 (3.9 %)
Service	319 (6.7 %)	39 (0.8 %)

The analysis led to the decision to eliminate all micro level data editing efforts for the PVI survey. Changes in the macro editing and respondent editing processes have saved

considerable resources in the data editing process. The introduction of automated selection methods has saved time by directing focus to the industries where further validation efforts are necessary.

Generally, measuring direct effects of methodological or procedural changes on the quality of statistics is challenging, so also in this case. It can reasonably be assumed that the decrease or elimination of micro level data editing has led to decreased accuracy due to measurement errors in certain statical products. Yet, there are no indications that this has caused a notable deterioration in terms of relevance for the main users of the statistics. Neither have users expressed concern about the quality of the statistics as a consequence of the implementation of this new data editing process.

4. Conclusions

The implementation of a new data editing process has resulted in considerable changes by eliminating manual micro level data editing for the FUFI and PVI surveys while simultaneously preserving adequate quality by improving the respondent editing and macro editing processes. These changes have improved efficiency which saves resources without jeopardising statistical quality. Evaluation of the new process indicates positive effects of the implementation on the production of official statistics in these areas. It also shows that careful risk analysis and continual evaluation is crucial to implement and maintain this new process successfully.