Evaluating the Quality of Administrative Data as Input for Official Statistics

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Abstract
Several projects have provided substantial contributions on how to evaluate the quality of input data. However, less effort has been devoted to the question of how to integrate the results of such a quality assessment in a statistical production system.
The use of administrative sources for the production of official statistics varies a lot between statistical domains, e.g. direct tabulation, use in combination with a survey, use for building a statistical register etc. We will present the main challenges in terms of quality measurement for each type of use of the data.
Substantial efforts have been made previously, e.g. the BLUE-ETS project (https://www.blue-ets.istat.it/) and especially work package 4 (Improve the use of administrative sources)
Within this project we have first collected and reviewed existing methods for assessment of input quality. The most promising methods have been tested on actual data in several statistical areas and with different types of administrative sources. Based on the testing we have recommended which approaches are more suitable for the different uses of administrative sources. The results will be made accessible for a wider audience through a commented repository on a CROS portal.
Finally, a consolidated checklist for input quality regarding both dimensions and indicators is constructed. It might be the case that we cannot create a single method fit for all purposes, in which case variations will have to be created for specific purposes.

Keywords: Administrative data, multisource statistics, quality..

1. Introduction

Register based statistics have become a backbone of statistical production in all Eurostat country in recent years. While in the earlier years focus primarily was on getting access to administrative registers focus seems to have shifted towards assessing the statistical quality of the same registers. By 2015, a third of the UNECE countries base their census at least partially

on administrative registers (Asamer et. al. 2016). For countries already having a population register the main focus has shifted to the quality, while for the others creating or getting access to administrative data is still the focus.

On the ESSnet workshop on quality of multisource statistics in Budapest in April 2016 participants were asked about usage, need and preferences regarding methods for assessing quality of register based data. Many countries had implemented existing methods in their regular routine of quality assurance. The method described in Daas et al. (2011) seemed to have a certain usage in several countries, while other countries used different methods. It is not always easy to complete methods. Quality indicators used, need to be precisely defined in order to make the method operational. In addition it can be challenging to approach such methods, so a step by step guide on how to implement methods was asked for.

The length of the gross list presented in section 2 reveals that it is difficult to develop a method that easily can be used across different areas of statistical production. Most statistics have characteristics and quality issues that are difficult to cover within a standard frame. Step by step guides will need to give space for exceptions that are present in most statistics.

The main result of work package 1 from the ESSnet quality on of multisource statistic procjet (KOSUMO) will be a consolidated version of checklist for assessing the quality of input data. The setup for this work will look as follows:

1. Create a gross list of existing method for evaluating the quality of register based statistics.
2. Create a list of promising indicators from existing methods.
3. Test the promising indicators.
4. Evaluate test.
5. Make adjustments to the list to create a consolidated checklist.
6. Select additional indicators that can be used for partial testing of statistics and that does not fit in the frame of the consolidated checklist.

Within this workpackage, point 1 and 2 are finished and 3 is well underway. Point 4, 5 and 6 remain to be finished within 2016.

1.2 About the ESSnet

The paper presents the preliminary results from the first work package within the ESSnet Quality of multisource statistics. The ESSnet is organised within ESS.VIP.ADMIN and sees participation from Denmark, Norway, Netherlands, Hungary, Austria, Ireland, Lithuania, and Italy. This first work package started in January 2016 and ends in June 2016. Hence, the content of this paper is of preliminary nature.

2. List of existing methods

In the KOSUMO project a gross list of methods for assessing quality of register based statistics has been produced. The list created consisted of a total of 15 different methods for evaluating the quality of input data for register based statistics. The list of methods can be seen in Table 1

It is seen that all methods are quite new. All lists of indicators can be found on the internet, except the Swedish list from 2007 which is part of a book on quality of register based statistical production in general. There is a remarkable amount of work done in this area in recent years. The number of methods reveals a need for a standardized method of assessing quality of register based statistics, that can be used across statistical production within NSI's and across countries.

Many of the methods on the gross list have a considerable overlap, which is to be expected from methods describing the same kind of quality. But most lists also have indicators of their own, which probably is due to the fact that they are all developed with particular statistics in mind. Instead of using existing methods for assessing quality many NSI's have developed own methods in order to fulfill certain needs. There is however a need for standardization, so that it is possible to benchmark countries against each other.

In order to cover all aspects of data quality all methods group indicators into dimensions, hyperdimensions or some other kind of grouping. Many methods have some of the same dimensions, but most methods have dimensions of their own. All methods have a mix of qualitative and quantitative indicators. The participating countries of the KOSUMO project expressed a need for quantitative indicators that could make it possible to compare different registers and to compare the same register over time. Qualitative indicators that are defined as

appraisal of the quality are sensitive to persons performing the assessment and the result can vary depending on which person is asked to assess.

At the startup meeting for the KOSUMO project the participating countries were asked about preferences regarding a list of quality indicators. There was a clear preference towards quantitative indicators and many countries mentioned the importance of exact definitions of the indicators. Another preference was shorter checklists that take a reasonable amount of time to fill out.

Most methods tend to be rather long and some of them have more than 100 different quality performance indicators. The burden on responsible persons at the NSI's should be taken into account, when assessing the methods. It can be quite a cumbersome task to calculate quality indicators and the value added to the statistics should at least commensurate with effort needed to complete the assessment.

Comments on existing methods are made within the KOSUMO project. The comments are collected into a commented repository that will be published on the project website. There are comments regarding usage within NSI's and experience form this use.

Table 1. Methods for evaluating quality of input data for register based statistics.

Country	Year	Title
ESSnet	2013	Use of Administrative and Accounts Data in Business Statistics: - WP2 Usefulness of administrative data for business statistics and initial quality checking - WP6 Quality Indicators when using Administrative Data in Statistical Outputs
Netherlands	2009	Checklist for the Quality evaluation of Administrative Data Sources
Sweden	2007	Register-based Statistics: Administrative Data for Statistical Purposes
Sweden	2011	Quality Assessment of Administrative Data
Istat	2010	Quality assessment and reporting in a short-term business survey based on administrative data
Istat	2014a	Evaluating administrative data quality as input of the statistical production process
Istat	2014b	Towards a more efficient system of administrative data management and quality evaluation to support statistics production in Istat
UK	2013	Guidelines for Measuring Statistical Output Quality
USA	2013	Data Quality Assessment Tool for Administrative Data
NZ	2011	Evaluation of administrative data sources for subnational population estimates
NZ	2011	Evaluation of alternative data sources for population estimates
Austria	2010	A Quality Framework for Statistics based on Administrative Data Sources using the Example of the Austrian Census 2011
BLUE-ETS	2011	Report on methods preferred for the quality indicators of administrative data sources
Eurostat	2014	Memobust Handbook on Methodology of Modern Business Statistics
Eurostat	2014	ESS Handbook for Quality Reports

3. Proposal for a revised method

All participating countries in the project selected a number of promising indicators from the list of indicators found in the methods on the gross list. The first mentioned method and the backbone of the gross list was the method from the ESSnet Admin project. Most countries selected indicators from this list and added additional indicators from other list. The indicators finally selected for testing are indicators that where selected by more than two different countries. It was decided to have all six dimensions from the ESSnet Admin project represented by at least two indicators, hence the list of indicators chosen by at least three countries was supplemented with indicators with fewer selections but belonging to other dimensions.

Though the evaluation of the testing is not finished yet, there seems to be consensus on that most of the promising indicators tested are easy to calculate, most of the indicators are useful for checking quality on input data and in most cases they can be used frequently. There is still some work left to do in order to finish the test and evaluate on the testing results, but indicators from the ESSnet Admin project will be the backbone of the consolidated list.

The list of selected indicators will be uploaded on the cros portal for the ESSnet project on quality of multisource statistics (https://ec.europa.eu/eurostat/cros/content/essnet-quality-multisource-statistics_en).

4. Test of revised method

A test of the revised checklist was conducted in Austria and Denmark. Partial tests will be performed in Lithuania and Hungary. The testing done in this project has been focused on how easy indicators are to calculate, how clearly they are defined and an appraisal of how useful they were. The results are shown in Table 2 (Austra) and Table 3 (Denmark).

Generally, the results from Austria and Denmark are pretty well aligned. By far the most of the same indicators are considered valuable for describing the quality of the statistics.

One of the reasons for preferring quantitative indicators is that it is possible to compare the quality across various statistics, between countries and over time on the same statistics.

There are several usages of quality indicators and choice of which indicators are constructed in each method is without doubt influenced by certain statistics.

Table 2: Results from Austria

Indicator	Easy to calculate?	Indicator useful?	How often used?
Accuracy			
ESSnet 9: Item non-response (% of units with missing values for key variables)	Yes	Yes	Frequently
ESSnet 10: Missclassification rate	Yes	Yes	Frequently
ESSnet 11: Undercoverage	Yes (unclear how to handle missing Ids in admin sources)	No	Frequently
ESSnet 12: Overcoverage	Yes (unclear how to handle missing Ids in admin sources)	No	Frequently
ESSnet 14: Size of revisions from the different versions of the admin data RAR – Relative Absolute Revisions	Only for specific data sources, often administrative data is delivered only once		
ESSnet 15: % of units in admin data which fail checks	Yes, but fail checks in output files are dubiously	Yes	Frequently
ESSnet 16: % of units for which data have been adjusted	No, for one source possible, for more than one source difficult (unclear)	Yes	Frequently
ESSnet 17: % of imputed values (items) in the admin data	No, the example is unclear	Yes	Frequently
Timeliness and punctuality			
ESSnet 4: Periodicity (frequency of arrival of the admin data)	Yes	Yes	
ESSnet 18: Delay to accessing / receiving data from Admin Source	Yes	No	
Coherence			
ESSnet 5: % of common units across two or more admin sources	Yes (unclear how to handle missing Ids in admin sources)	Yes	Frequently
ESSnet 21: % of relevant units in admin data which have to be adjusted to create statistical units	very restrictive, high requirement to the data structure	Yes	Rarely
Comparability			
ESSnet 19: Discontinuity in estimate when moving from a survey-based output to an output involving admin data	no example in our department		
Cost and efficiency			
ESSnet 7: % of items obtained from admin source and also collected by survey	no example in our department		
CBS 2009, Source 4.1: Cost of using data source	Yes	No	
Use of administrative data			
ESSnet 2: % of items obtained exclusively from admin data	no example		
ESSnet 3: % of required variables which are derived using admin data as a proxy	Yes		

Table 2: Results from Denmark

Indicator	Easy to calculate?	Indicator useful?
Accuracy		
ESSnet 9: Item non-response (% of units with missing values for key variables)	Input data are needed. For some registers in Denmark only edited data are available. Marking of which data are imputed does not reveal which data were missing on the input stage.	Yes
ESSnet 10: Missclassification rate	The definition of this indicators point directly to misclassification according to the Business Register. In Denmark populations are often defined by their NACE code in the Business Register, hence by definition there is no misclassification.	Yes
ESSnet 11: Undercoverage	Not always easy to know which units should have been in the register. In the handicap register undercoverage is primarily due to municipalities not reporting in at al - in that case it is easy to estimate undercoverage.	Yes!
ESSnet 12: Overcoverage	Yes	Yes!
ESSnet 14: Size of revisions from the different versions of the admin data RAR – Relative Absolute Revisions	Some registers are well time stamped and it is easy to calculate difference due to revisions	Yes!
ESSnet 15: % of units in admin data which fail checks	Checks need to be known	Yes!
ESSnet 16: % of units for which data have been adjusted	No, it is not always possible to distinguish between values imputed from missing and values imputed from outliers. Adjustments due to other reasons are not always noted. Imputation % might have been used instead	Yes
ESSnet 17: % of imputed values (items) in the admin data	On most registers yes, it is easy. All our register make marks when imputing data.	Yes
Timeliness and punctuality		
ESSnet 4: Periodicity (frequency of arrival of the admin data)	Yes	No
ESSnet 18: Delay to accessing / receiving data from Admin Source		No
Coherence		
ESSnet 5: % of common units across two or more admin sources	Yes	Yes
ESSnet 21: % of relevant units in admin data which have to be adjusted to create statistical units	A precise unit definition is needed in order to calculate indicator	Yes/No
Comparability		
ESSnet 19: Discontinuity in estimate when moving from a survey-based output to an output involving admin data	NA	
Cost and efficiency		
ESSnet 7: % of items obtained from admin source and also collected by survey	0	No
CBS 2009, Source 4.1: Cost of using data source	None - except from registerers maintained by Statistics Denmark	No
Use of administrative data		
ESSnet 2: % of items obtained exclusively from admin data	In most cases all items are obtained from admin data	No
ESSnet 3: % of required variables which are derived using admin data as a proxy	Yes	

5. Conclusion

There is consensus about the need for standardized methods for measuring quality of input data. A standardized method must consist mainly of quantitative indicators and should not be too long. Definition of indicators has to be clear and useful examples are needed in order to make the method operational. A shortlist of indicators from the ESSnet Admin project is useful for this purpose and will make the backbone of a standardized method.

Testing from Austria and Denmark showed that most indicators selected were usable, but still there are differences in the conclusions for the testing. Regarding what register is used for testing the results will vary and this also reflects the challenges in generating a standardized model that can be used for most registers.

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