Development of Quality Indicators for Business Statistics Involving Administrative Data

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1.   Overview

Administrative data are increasingly being used by National Statistical Institutes (NSIs) in the production of their statistics, for example, in the Nordic countries where administrative data are already the main data source for the production of official statistics (UNECE, 2007). Historically, the fields of social and population statistics have been more advanced in using administrative data but their use is becoming more prevalent within business statistics (Orjala, 2008; Statistics New Zealand, 2009). This increase is mainly due to the pressure to reduce costs and the requirement to reduce burden on respondents (Eurostat, 2003; Daas & Fonville, 2007).

However, despite this increasing use of administrative data, there is little in the way of formal best practice and recommendations which differ from those for the production of statistics based on survey data. For example, although the European Statistical System (ESS) dimensions of quality apply to all statistics, not all elements of these dimensions are appropriate for statistics that are fully or partly based on administrative data. It was to address this lack of best practice that the ESS Network (ESSnet) project on the use of administrative and accounts data in business statistics was established.

One of the work packages (WP6) within the ESSnet Admin Data is designed to address the lack of quality indicators within this field with a particular focus on developing quantitative quality indicators specifically relating to administrative data. This paper sets out the work done by this work package since the initiation of the ESSnet project in September 2009, including the development of a list of basic quantitative quality indicators and work to develop composite quality indicators. The paper also outlines the future work that the work package plans to complete before the end of the ESSnet in summer 2013.

2.   Introduction

Some work has already been done in the area of quality of business statistics involving administrative data and some indicators have been produced, namely under the preparation of the Quality Report Framework for Business Statistics under Regulation (CE) no. 295/2008. However, the work conducted thus far refers to qualitative indicators or is based more on a descriptive analysis of administrative data (see Eurostat, 2003). The quality indicators that have been produced have been more to do with the quality of the administrative sources (Daas & Fonville, 2007) or have been to develop a quality framework for the evaluation of administrative data (Daas, Arends-Toth, Schouten & Kuijvenhoven, 2008). These do not address the quality of the statistical output however. In fact, almost no work has been done on quantitative indicators of business statistics involving administrative data, which is the main focus of this work package.

Given the increasing use of administrative data in business statistics, this is obviously an important issue and it was therefore anticipated that NSIs were already doing some work in this field. Consequently, the first step was to take stock of the work already being done and to use this as a basis for developing best

practice. This was done by gathering information from NSIs and using the results of this research to identify those NSIs that were more experienced in this field. These organisations were then the focus of more in-depth research.

3.   Developing Quality Indicators

At this stage, it is important to note that the work being carried out under this project should not be seen as independent of other work already in place. When analysing the list of indicators developed, one can conclude that some other information is useful in regard to the quality of administrative data. However, some of that very useful information cannot be (or has not been) translated into quantitative indicators. The main aim of the current project is not to discuss all the issues related to quality when using administrative data. The aim, initially, is to develop basic quantitative quality indicators and, subsequently, to apply this within more complex situations and to develop composite indicators to provide a more holistic view of the quality of the statistical output involving administrative data.

In addition, these indicators are for the benefit of the members of the ESS, and producers of statistics more widely. Consequently, the end result of the ESSnet Admin Data work in this area should be integrated with the work already in place on the production of quality reports, such as those required by Eurostat. For this reason, quality indicators that can be applied in the same way when using administrative data or survey data are *not* included in this list. Many of these latter indicators are those specifically related to the statistical output or the publication. For example, indicators in relation to accessibility of the statistics are out-of-scope for this project because accessibility of the output is not influenced by whether survey or administrative data are used in its production.

In contrast, this project focuses on the quality of the input and process with the *aim* of producing the statistical output. This is because input and process indicators are critical to the work of NSIs and it is the input and process in particular that differ when using administrative data. Doing this for business statistics involving administrative data sets this list of indicators apart from other work in this field.

3.1   The stock-take research

As outlined above, the starting point for this project was to establish the state of play in terms of the use of quality indicators for business statistics involving administrative data across NSIs. This was done through three phases of research, each stage probing more deeply into the processes adopted by NSIs (see Frost, Green, Pereira, Rodrigues, Chumbau & Mendes, 2010, for more details of this research).

The focus of the research was European NSIs but three non-European NSIs (the Australian Bureau of Statistics, Statistics New Zealand and Statistics Canada) were also included in the research to provide some idea of the work being done outside Europe. The overall results of the stock-take research showed that administrative data are widely used within business statistics, both across Europe and further afield. It was also clear that, although quality in these statistics is seen as important, NSIs do not generally produce quality indicators for them in the same way as they might for statistics based on survey data. That stated, some NSIs had developed initial quality indicators that they produced and, in some cases, published. However, this was unusual. Most NSIs conducted checks during the process of producing the statistics that were not developed or published in terms of quality indicators or within quality reports.

NSIs were generally very positive about the development of such a list of quality indicators. Even those NSIs already using quality checks or indicators to some degree were keen on the production of a list of agreed, harmonised and standardised quality indicators which could allow the assessment of quality in this field.

3.2   Developing the list of indicators

Stage 1

On the basis of the stock-take research, an initial list of basic quality indicators was developed by the ESSnet Admin Data. However, this list consisted mainly of a collation of potential indicators that respondents had identified as relevant or had stated would be important. Thus, further development, refinement and enhancement of the list was required and the best way to do this was to user test the list in the context of statistical production. Thus, the NSIs involved in this work package (Destatis, ISTAT, CBS, INE and ONS) undertook user testing of the list in order to establish the viability and relevance of the indicators within their processes. The feedback from this user testing was very useful for the further development of the list because it highlighted areas of general agreement and differences, even across the five NSIs involved in the project.

Overall, there was consensus on the importance and relevance of the quality indicators and that the indicators would play a key role in quality measurement at a time of increasing use of administrative data in the field of business statistics. However, the testing also identified some areas of diversity across NSIs and even across statistical regulations (e.g. Structural Business Statistics, Short Term Statistics) within NSIs. These differences were mainly due to variations in the availability and use of administrative data in the statistical production process. Similarly, some indicators were more relevant during the transition from using survey data to administrative data but, when the use of administrative data is already established, these indicators are no longer as relevant. The testing resulted in rationalizing the list from 34 indicators to a more manageable 22 and a change to the structure of the list, now grouped into two main areas:

- Background Information – these are 'indicators' in the loosest sense. They provide general information on the use of administrative data in the statistical output in question but do not, directly, relate to the quality of the statistical output. This information is often crucial in understanding better those indicators that measure quality more directly. This list is sub-divided into information relating to the input and information relating to the process.
- Quality Indicators – these provide information directly addressing the quality of the statistical output in terms of the input and process involved.

As outlined above, the areas are further sub-divided into those indicators that relate to input and others that relate to the process, but both are considered with the quality of the output in mind. Thus, the quality of the input and process elements are considered in light of the requirements for the statistical output.

Stage 2

Having revised the list following testing within the NSIs involved in the project, it was important to ensure that the findings of this sample of NSIs could be related more widely to the ESS as a whole. Thus, the revised list of basic quality indicators was circulated to European Member States and European Free Trade Association (EFTA) NSIs for feedback on the basis of the application of the indicators within the different statistical production contexts across the ESS. For each indicator, respondents were asked to comment on its relevance in the context of their work, the understandability of the indicator and how feasible it would be to calculate with the information they had available. They were also asked to comment on whether there was anything missing from indicators or from the list as a whole.

This stage of user testing was launched at a Structural Business Statistics Steering Group meeting in Eurostat in November 2010 and was conducted by circulating the list of indicators with requests for feedback. Over 75% of European NSIs responded and provided feedback. Consistent with the testing during Stage 1, there was general consensus on the importance of the list of indicators and positive reactions to this work. Moreover, a number of NSIs were particularly keen to be able to provide feedback and contribute to the development of this list.

Analysis of the feedback received during this phase of testing is ongoing, however all of the indicators were considered relevant by the majority of NSIs that responded and the feedback provided additional information on the clarity and calculation of the indicators. Again consistent with Stage 1 testing, there was some diversity of views on the relevance and importance of individual indicators. However, this was anticipated given the nature of the indicators and the diversity in the use of administrative data across statistical regulations (e.g. SBS, STS) and across NSIs. The feedback received is being incorporated into the latest version of the list of indicators which will shortly be available (see below).

3.3 The list of indicators

The list of basic quantitative quality indicators includes a short description of each indicator along with a formula on how to calculate the indicator. Members of the project team are continuing to develop this list and the associated information, including developing metadata sheets incorporating information about each indicator and a 'real-life' example of how the indicator can be calculated within the statistical production context. Evidence from the extensive user testing suggested that users would find this type of information relevant and helpful in their implementation of the indicators.

Some examples of the quality indicators that have been developed by the ESSnet Admin Data and their accompanying brief descriptions are included below:

- *Item non-response (% of units with missing values for key variables)*
  Although there are technically no 'responses' when using administrative data, non-response (missing values at item or unit level) is an issue in the same way as with survey data. This indicator provides information on the extent of missing values for the key variables. It should be calculated for each of the key variables and for each administrative source and then aggregated based on the contributions of the variables to the overall output.

- *Undercoverage / Unit non-response*
  This indicator provides information on the undercoverage of the administrative data. That is, units that should be included in the administrative data but are not (for whatever reason). This indicator should be calculated for each administrative source and then aggregated based on the number of relevant units (weighted by turnover) in each source.

- *% of units for which data have been adjusted*
  This indicator provides information about the proportion of units for which the data have been adjusted. These units are those that are considered to be erroneous and are therefore adjusted in some way (missing data should not be included in this indicator). Any changes to the administrative data before arrival with the NSI should not be considered in this indicator. This indicator should be calculated for each of the key variables and aggregated based on the number of relevant units (weighted by turnover) in each source.

- *% of imputed values (items) in the administrative data*
  This indicator provides information on the impact of the values imputed by the NSI. These values are imputed because data are missing (Indicator 10) or data items are unreliable (see Indicator 18). This indicator should be calculated by variable for each admin source and then aggregated based on the contributions of the variables to the overall output.

To see the latest version of the list of basic quality indicators, please see the ESSnet AdminData Information Centre and particularly the work of WP6: Development of Quality Indicators at the following website: http://essnet.admindata.eu/WorkPackage?objectId=4257

3.4 Developing composite quality indicators

In addition to the development of the list of basic quality indicators, it would be useful for producers and users of statistics to have a more holistic indication of the quality of the statistical output. Thus, project

members are investigating composite quality indicators that provide information on different quality themes. For example, one theme could be in relation to accuracy, combining indicators on revisions, coverage, level of imputation, etc. The development of these composite indicators would provide statistical producers with a general indication of quality for a particular 'theme' of the statistical output. The current themes being investigated by project members are: accuracy; timeliness and punctuality; comparability; coherence; and cost and efficiency. This work involves investigating ways of combining the basic quality indicators already developed and (if necessary) developing other indicators to fill any gaps that become apparent.

As set out above, the emphasis of the ESSnet as a whole is to help the producers of statistics (the ESS) and this is also clear in the development of the composite indicators which will be useful, for example, as producers look for ways of improving the overall quality of their statistics or assessing new methodologies. However, these composite indicators will also be helpful to users of statistics (e.g. the public, Eurostat, etc.), for example, the general 'ratings' of quality may be something that NSIs publish.

In terms of the more basic quality indicators, some are appropriate to be provided to users, whilst others should only be considered and used by the producers of the statistics because their results may give the wrong impression. For example, if an indicator showed that the quality of the administrative data (input) was poor in one aspect, users could interpret this as bad statistical output quality as a whole. However, if other elements of the input and the process (methods) used by the NSI address these issues, then the overall (composite) quality could be acceptable or even good. Consequently, both the input and process need to be considered and making all individual indicators available to users could lead to confusion. Composite indicators take more of these issues into consideration and thus provide a more holistic view of the quality of the statistical output.

Work on the development of these composite quality indicators is ongoing but information on this work should shortly be available on the ESSnet Information Centre (see link above).

4.   Future work

Those NSIs that use administrative data in the production of business statistics all do so in different ways, both within the NSI (across statistical outputs) and across NSIs. Many of the basic quantitative indicators already developed apply irrespective of the methods used (e.g. % of imputed units for key variables). However, there are other (more complex) indicators that would be useful but which vary dependent on how the NSI uses the administrative data (e.g. survey data for large businesses, admin data for small businesses and some estimation modelling for medium sized businesses). Developing more complex indicators that capture the important elements of all of these different processes and combinations across statistical regulations and NSIs would be near impossible. Therefore, the ESSnet Admin Data aims to develop guidance that can be applied to these situations and which outlines important areas for consideration when developing indicators in these areas. In addition, the effect of using administrative data on the accuracy of the output will be investigated. These studies will look at data based on administrative sources alone and on a combination of different sources, such as administrative and survey data.

The overall aim of this work package of the ESSnet Admin Data is to develop a toolkit that producers of statistics will find useful and relevant. Further development of this work will be done with the input of, and in detailed consultation with, NSIs across Europe to ensure that this toolkit as applicable and relevant across NSIs and thus will be a useful resource at a time when administrative data are being increasingly used within the domain of business statistics.

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ABSTRACT

With the increasing use of administrative data in the production of business statistics comes the challenge for statistical producers of how to assess quality. Although the European Statistical System (ESS) dimensions of quality apply to all statistics, not all elements of these dimensions are appropriate for statistics that are fully or partly based on administrative data. This is particularly the case for indicators of accuracy but also applies to other quality dimensions.

One of the work packages of the European Statistical System Network (ESSnet) project on the use of administrative data in business statistics aims to address this issue. In particular, the aim is to develop quality indicators for business statistics involving administrative data. To achieve this, work has been done to review existing practices across more than 30 NSIs and, based on this, a list of basic quantitative quality indicators has been drawn up. Work is ongoing to develop composite and more complex quality indicators and qualitative indicators.

This paper will outline the work of the ESSnet Admin Data in this area, the results of the research into quality indicators, and will introduce and review the list of basic quantitative quality indicators developed thus far. Progress on the work to develop more complex and composite indicators will also be provided.