7 th WORKSHOP ON LABOUR FORCE SURVEY METHODOLOGY

DATA PROCESSING AND DATA QUALITY

Madrid, Spain, 10 – 11 May 2012

F. Data quality: Quality assurance measures

F1 – Using process indicators to assess and improve the quality of LFS data collection procedures

Dag F. Gravem – Norway

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Dag F. Gravem, Statistics Norway
+47 21 09 48 20
dfg@ssb.no

Introduction

Output quality is achieved through process quality (Eurostat 2009). The process of producing LFS statistics is complex, and changes made at one point in the process can influence operations in later stages as well as the data quality. In the 4th quarter of 2011, a significant change of systems and routines was introduced for the LFS interviewing, the first phase of the production process after sampling. This had some expected, and some unexpected consequences. Access to process data was instrumental in order to understand the effects that the changes had, and to be able to assess and improve the quality of the new procedures.

The background: a new case management system for interviewing

In 1996, computer-assisted interviewing was introduced at Statistics Norway, using Blaise software and an in-house developed case administration system called CAI. In the 4th quarter of 2011, the CAI system was replaced a new case management system called SIV. This had several practical and technical implications for interviewer routines and the data collection procedures in general. To put it very short, with CAI the data collection was primarily based on electronic lists of sampled families administered to offline CATI interviewers working from home. With SIV,the data collection being primarily based on automatic case administration of sampled individuals from a central Blaise database to CATI interviewers at call centres. In addition, a list-based approach is used in the follow-up phase.[1]

With the SIV system, we have easier access to process data from call records. The main analysis unit for this kind of process data is not the sampled unit, but the call attempt, something which may complicate and hinder the use of such data. (Kreuter et al., 2010) In the SIV system however, data for up to 50 call attempts are gathered for each individual in the sample. These data are accessible on a file that also contains key demographic and administrative data for each individual in the gross sample, as well as interview data from the net sample.

In general, it was hoped that with more automation and centralization of the data collection, along with easier access to process data, we would better be able to monitor and improve the quality of the data collection process. In this paper, I shall describe how the system change affected the data collection and the net sample on some key aspect related to process quality. These aspects are:

- The timeliness of call attempts and interviews
- The response rates and representativity of the net sample
- The costs of the data collection

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[1] See Gravem 2011 for a fuller descripion of these systems and the data collection procedures. The SIV system is built on top of the Blaise case administration system, but Statistics Norway has also developed new solutions in Blaise in connection with the introduction of SIV. See Båshus 2012 for a technical descriptions of these soultions.

I will describe how process data and other data were used to understand these phenomena and, when necessary and possible, make adjustments. What we perhaps did not expect was that the change of case management system in itself would influence the data collection as much as it did, requiring us to make several adjustments. In conclusion, I shall discuss how the case management system may be further improved, and how LFS data collection process data may be better exploited in the future.

The timeliness of call attempts and interviews

EC council regulation No 577/98 states that LFS interviews normally should take place during the week immediately following the reference week. This is already achieved for the Norwegian LFS data collection. However, in the Norwegian LFS, interviews as late 15 weeks after the reference week may occur. The data quality of the variables on absence and actual working hours may of course suffer in such cases.

With the SIV system, the responsibility of ensuring that all units are attempted as soon as possible is shifted from the individual interviewers to the field staff at Statistics Norway. In theory, this would make it possible to complete more interviews within the first week after the reference week, and shorten the average number of data collection days required per completed interview. However, the call centre seats need to be filled with the optimal number of interviewers depending on the needs of the LFS and other surveys, and this has at times proved difficult. Table 1 shows the development of the median and mean values, plus the standard deviation of days after the reference week that an interview was completed.

Table 1. Number of days after the end of the reference week that LFS interviews are completed. 2011.

| | Quarter | | | |
	Q1 2011	Q2 2011	Q3 2011	Q4 2011
No. of interviews	19 702	19 334	19 026	18 619
Median value	3	4	4	4
Mean value	7.32	8.78	9.05	10.04
Standard deviation	9.79	10.95	11.82	12.31

The table reveals that there was no improvement of interview timeliness in the 4th quarter, but neither was there any marked decline that may be attributed to the introduction of the SIV case management system. Rather, a negative trend continued throughout 2011. When we examined more closely the process data on the accumulation of completed interviews over time, we discovered that there was a certain time in the field period where the SIV data collection started lagging behind without ever recovering: in the middle of the 2nd week of data collection. Figure 1 compares the 3rd quarter of 2011 with the 4th quarter.

Figure 1. Number of interviews by day after the end of the reference week, accumulated. Q3 2011-Q4 2011.
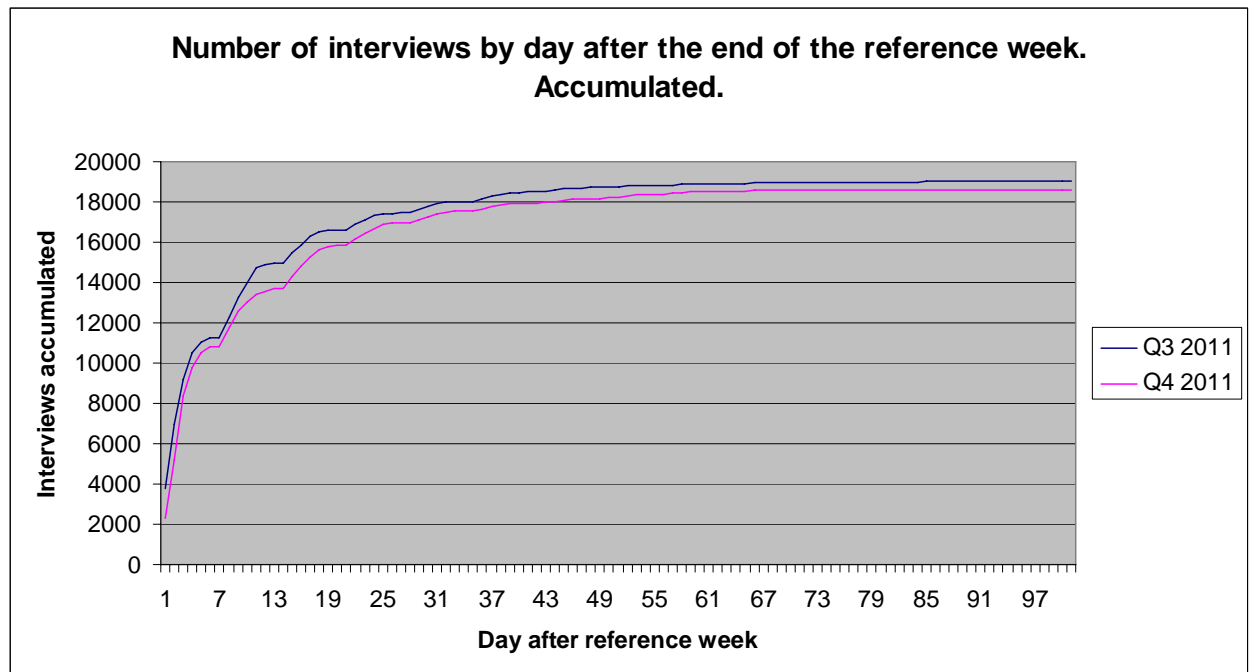
Two factors may account for this: 1) At this point in the data collection, non-response cases (including non-contact) were starting to be transferred from the Blaise CATI database to local interviewers for list-based follow-up. This was part of the field strategy, and meant that for better or worse these cases were no longer directly monitored by the field staff. In addition to this, local interviewers now only receive such previously tried follow-up cases, something which may have affected their motivation negatively. Process data show that the probability of a call attempt resulting in an interview in the 4th quarter decreased from 27 % at the first attempt to 17 % at the fourth call attempt.

2) For some reference weeks, non-response cases were kept in the Blaise database instead of being transferred to local interviewers. In these cases, case distribution algorithms may have been inefficient, as untried cases from new reference weeks were put in the database weekly. As these cases had not been tried before, they had a higher priority in the Blaise system. At times, there were too few interviewers available at the call centres, and as cases from earlier reference weeks were always the last in the Blaise queue, they were never administered.

In an effort to cope with this, we tried to better exploit the possibilities of the Blaise system by creating groups of follow-up interviewers and changing priorities, as well as streamlining the transferring of cases to local interviewers. Experiences from the data collection for the 1st quarter of 2012 indicate that further adjustments need to be made.

The response rates and representativity of the net sample
Response rates

Although the response rate of the Norwegian LFS has declined during the past decade, it has remained high compared to other of Statistics Norway's household and social surveys. The LFS was the last survey to be ported from the CAI to the SIV system, and surveys had previously experienced a negative development more or less directly as a consequence the transfer to SIV. This did not happen for the LFS, although (as indicated in table 1 above), in the 4th quarter of 2011 there was a continuation of a negative development. Looking closer at the administrative and data, it did however seem that one important group was affected negatively by the SIV system and the associated new routines: Wave 1 respondents. Figure 2 shows how the distance between the response rates of 1st wave respondents and the response rate for all 8 waves increased markedly after the introduction of SIV in the 4th quarter of 2011.

Figure 2. Quarterly response rates for the Norwegian LFS. 2009-2011
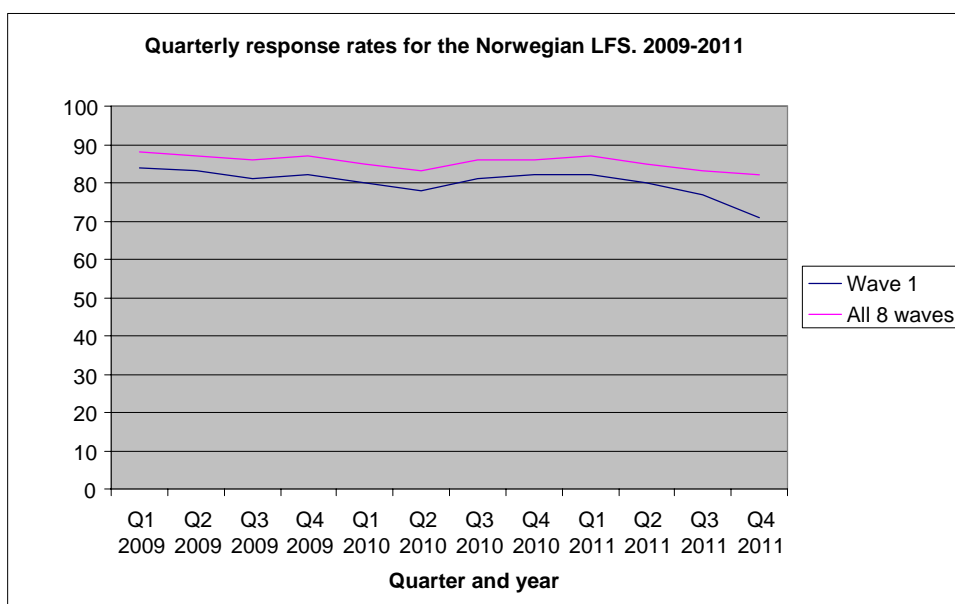
This seems to indicate that recruiting first-time respondents did not work too well in the SIV system. Our hypothesis was that this could be connected to a weakened relationship between interviewer and respondent. In the old CAI system, most of the first wave interviews were done by local interviewers, and this interviewer had a special obligation to recruit all wave one respondents on his/her list. It is likely that these interviewers put more effort into tracing wave 1 respondents, and tailoring the timing of call attempts.

This was even more evident when we looked at the response rates for single person families versus multiple person families. For a number of reasons, single person family respondents are harder to get in touch with than multiple person family respondents, and have a response rate that normally is between 7 and 10 percentage points lower than the sample at large. With a difference of 10 percentage points, this did not change in the 4th quarter of 2011. For the sub-group of 1st wave single person family respondents, however, the response rate went down from 67 % in the 3rd quarter, to only 58 % in the 4th quarter. This has made it evident that in the SIV system, 1st wave respondents and in particular

single person family wave 1 respondents need to be monitored closely and be prioritized in different ways. The special attention given by local interviewers to these groups should perhaps be emulated in some way.

Proxy interviews

In the SIV case administration system, respondents are treated more as individuals than as members of a family. Previously, local interviewers receiving lists of sampled families and their associated members, and could pick which family member to call. Often, an interviewer would pick one of the parents and do proxy interviews with this parent for the household's children. In the SIV system, a random member of a family is administered to the computer screen, and this may just as well be a child in the sampled household. Only proxy interviews with parents and spouses are permitted, interviewing children about their parents is not permitted. We therefore expected the percentage of proxy interviews to go down as a result of the introduction of the SIV system, and possibly increase data quality for some groups of the sample in terms of reliability.

As expected, the percentage of proxy interviews went down, from 12-15 %in the CAI system, to 9 % in the 4th quarter of 2011. The figures show that the percentage of proxy interviews has gone down in all age groups, but most significantly in the age group 15-24, where it went from 36 % in the 3rd quarter of 2011 to 23 % in the 4th quarter. There were worries that the declining overall response rate in the 4th quarter was linked to this phenomenon: that certain groups of respondents who in previous quarters were proxy interviewed were not interviewed at all in the 4th quarter. We found no evidence of this. Of the respondents that were proxy interviewed in the 3rd quarter, 8 % were nonrespondents in the 4th quarter of 2011. In comparison, of the respondents that were proxy interviewed in the 2nd quarter of 2011, 7 % were nonrespondents in the 3rd quarter. Nonetheless, the interviewers have been instructed to change their behaviour towards offering to do a proxy interview more actively. This may have had some effect, as the percentage of proxy interviews is currently 10 % for the 1st quarter of 2012 (preliminary figure).

Representativity

Nonresponse may lead to biased estimates and reduced survey quality, but a low response rate does not necessarily lead to biased estimates. To measure this, the R-indicator is a useful tool to assess the representativity of a net sample. In a longitudinal survey such as the LFS, it may also be used to look at changes in representativity over time. In the data collection phase, it may also be used to better allocate data collection resources. (Schouten et al. 2009) R-indicators may be calculated using different background variables available from administrative sources, and which variables are used may be dependent on what is available. For the Norwegian LFS, we have used gender, age group (11 categories), degree of urbanity (39 categories), and level of education (3 categories).

Figure 3. R-indicator and response rates for the LFS data collection. Q4
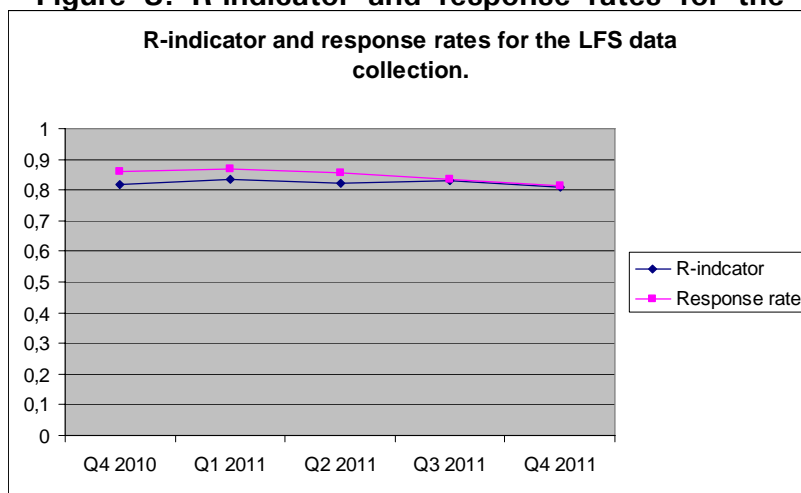
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lence that the introduction

of the SIV case management system has had any effect on the representativity of the samples when using gender, age group, urbanity and education as R-indicator variables. It should be noted that a variable for household size was not included, as it was not available. As mentioned, nonresponse is high among single person families, but this is not necessarily equivalent with a single-person household. (A "single-person family" in the Norwegian LFS may in fact be a person living with a partner. Unless partners are married, they will not constitute a family in the register)

In the future, we wish to start using partial R-indicators actively in managing the data collection, identifying underrepresented groups of respondents. This could be of particular importance in the trade-off between data quality and survey costs.

The costs of the data collection

Striking a balance between survey costs and data quality is a challenge for any survey organisation (Laflamme et al. 2008), and optimizing the use of interviewer resources is crucial for the LFS. If a data collection becomes too expensive, one may have to settle for lower representativity, adjust sample size samples and/or use cheaper methods of data collection.

We had hopes that the SIV system would enable us to organize the interviewing more efficiently, and if not reducing interviewer costs, then at least keep costs or cost increases at the same level as before. Figure 4 shows that the monthly wage payouts to interviewers for the LFS have increased slightly exponentially over the past 27 months. The first payout where a SIV effect would be traceable is December 2011. A clear trend or break with the introduction of SIV is perhaps difficult to discern, but it should be noted that starting with the month that SIV was introduced; there were three payout increases in a row. Some of this is attributable to interviewer training and trying and failing in general, and it seems too early to conclude whether the introduction of the SIV case management system has had an effect on the cost of the data collection.

Figure 4. Monthly interviewer wage payours for LFS interviewing. 2010-2012.
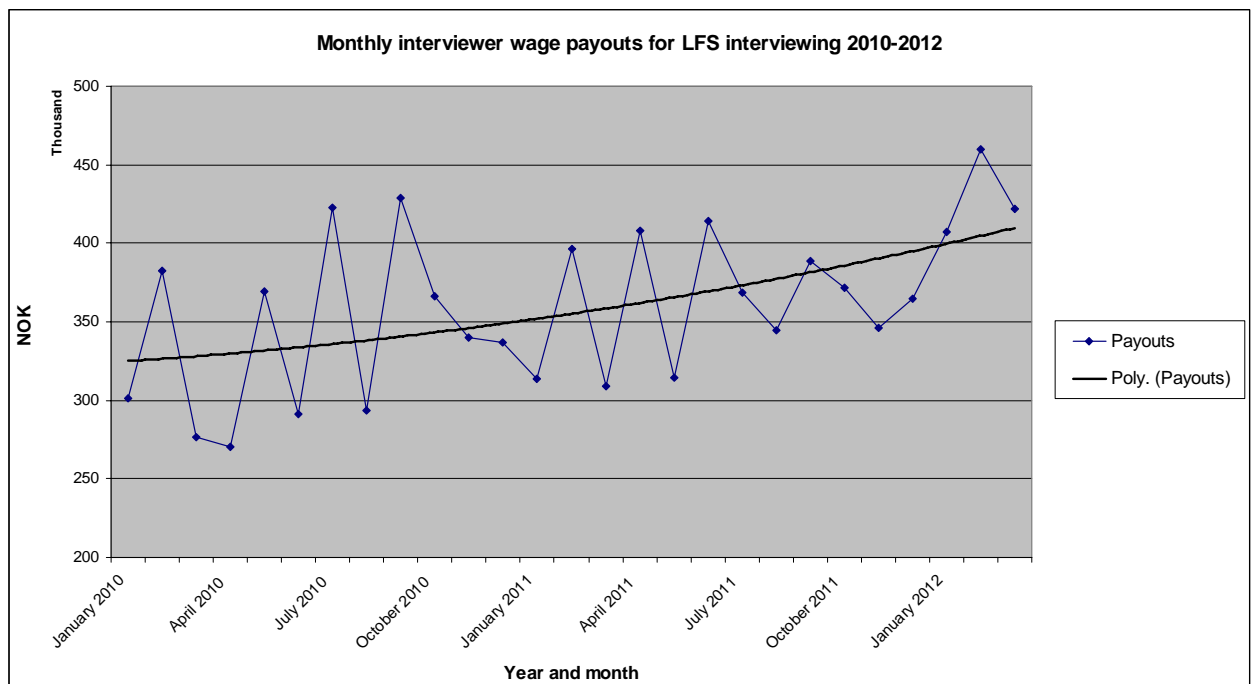
Conclusion

When data collection routines or systems are introduced, different aspects of survey quality and data quality may be affected – directly or indirectly – in ways that are not always easy to predict. So far, the introduction of the SIV system cannot be said to have had a positive effect on any of the process quality aspects investigated in this paper. However, easier access to process data than earlier has been instrumental in enabling us to make adjustments and corrections along the way. There is room and need for numerous further improvements of the various data collection tools and interviewer and field staff routines.

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