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SOME EFFECTS OF COMPUTER-ASSISTED INTERVIEWING ON THE DATA QUALITY OF THE SURVEY OF LABOUR AND INCOME DYNAMICS

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EXECUTIVE SUMMARY

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The Survey of Labour and Income Dynamics is a new longitudinal survey developed by Statistics Canada to support research on changes in the labour market experience and economic well-being of Canadians. All data collection is by decentralized computer-assisted interviewing (CAI). No previous paper questionnaire existed and in the development of the application, a specific effort was made to use the capabilities of this new technology to minimize response error. This paper describes the impact of CAI on the quality of data in three content areas: labour force activity, respondent-sensitive sources of income, and household relationships.

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1.   INTRODUCTION

The Survey of Labour and Income Dynamics (SLID) is a new longitudinal survey launched by Statistics Canada in January 1993. The purpose of SLID is to support research on changes in the labour market experience and economic well-being of Canadians. For six years, from 1994-1999, information will be collected from the same respondents on a wide range of variables. They include labour market and educational activity, demographic and family changes, and detailed sources of income. Beginning in 1994, SLID annual data are collected in two phases, labour information in January and income information in May. All data collection is by decentralized computer-assisted interviewing (CAI), mainly on notebook computers by telephone interviews from interviewers' homes. No previous paper questionnaire existed and unlike surveys that convert to CAI, there was no requirement for historical consistency. In the development of the SLID application, a specific effort was made to use the capabilities of this new technology to minimize response errors. We of course benefited from the well-known features of being able to ensure correct flows and having range edits where appropriate. But for a longitudinal survey there was a special advantage from computer- assisted interviewing. It makes it feasible to carry large amounts of information from previous contacts to feed back to respondents to minimize reporting errors, in other words to use dependent interviewing. This paper discusses some results of this technique on 1994 labour and income data. As well, the paper describes quality improvements from the use of programming techniques to give more control to the way interviewers enter responses in a non-standard question on household relationships.

2. SLID COLLECTION METHODOLOGY

SLID's first panel of 15,000 households was selected in January 1993 as a subsample of Canada's monthly Labour Force Survey. A supplement, using a paper questionnaire, collected background and benchmark data from all persons aged 15 and over, about 31 000 persons in all. This included information on jobs and schooling that we planned to feed back to respondents the following year. Beginning in 1994, SLID annual data are collected in two phases—information on labour market activity, education and family changes at the beginning of the year, and income in May. At that time, most respondents have summary income information available after filing their tax returns. In both cases the reference period is the previous calendar year.

In 1994, two forms of dependent interviewing were used by SLID. For labour data we fed back information about jobs and employers that we had collected in the 1993 preliminary interview before we asked about changes during the reference year—proactive dependent interviewing. In the May income interview, we used a reactive approach. If respondents did not report certain sources of income we expected, based on their responses in January, we probed about the item.

3. PROACTIVE DEPENDENT INTERVIEWING: LABOUR INTERVIEW

Because a major objective of a longitudinal survey is to measure change, it is important to minimize reporting errors in any of the waves. The information from SLID is heavily oriented toward spells, such as spells of employment or unemployment, absences from work, and schooling. When retrospective questions are asked about these topics, respondents tend to forget or misplace events which occurred at the beginning of the reference period. These response errors create a

well-known problem in a longitudinal survey—the seam effect, when there are too many spells starting and ending at the interface of the two reference years (Lemaître, 1992). The technique of feeding back information to respondents from the previous year, before we ask them about their current situation, has been used at Statistics Canada to reduce inconsistencies at the seam (Murray et al., 1990). This proactive feedback provides a form of bounded recall for retrospective reporting.

In our labour interview we use dependent interviewing to remind respondents of whether they were working or attending school a year earlier and to lead into other questions asking about changes over the year. The respondent is always given the opportunity to disagree with the information being fed back. Nevertheless, there is concern that this technique may minimize reports of real change—that it is too easy to agree with everything.

Early results of dependent interviewing in the 1994 labour interview are reported in SLID Research paper 95-06 (Hale and Michaud, 1995) and they will not be elaborated here. In brief, the confirmation rate was over 95% for most variables fed back and the reaction by respondents was favourable. In fact, they expect that with computers the interviewers should have all the information collected a year ago at their fingertips. Misreporting and under-reporting of activity early in the reference period appear to be reduced but it is too early in the survey to assess whether true change has been repressed.

4. REACTIVE DEPENDENT INTERVIEWING: INCOME INTERVIEW

In January, at the end of the demographic and labour questions, respondents were asked whether they had received unemployment insurance, social assistance (welfare), or workers' compensation during the previous year. (We did not ask for amounts.) These government transfer payments are often under-reported in income surveys. Four flags that reflected January responses were carried to the May application. They were the fact that paid employment was reported therefore an amount in wages or salaries was expected, plus the three more sensitive items. In May, if an income source we expected wasn't reported, the computer displayed a probe for the interviewer to ask the respondent about the omission.

In May we did not use a proactive approach because it is generally accepted you shouldn't feed back negative information (Webber, 1994). The income interview is short and we didn't want unnecessary interruptions, especially on items that might be considered sensitive. Of course reactive dependent interviewing has to be used with discretion because it means questioning the responses of the respondent. This approach was tested in 1993 with an improvement in data quality and no major negative reaction from respondents (Hale, Grondin and Michaud, 1994). In the May 1994 interview, we used what we hoped was a tactful, non-threatening error message. When an edit was triggered the interviewer said **"Based on our January interview, we thought we would get an amount for [type of income]. Did we miss it?"** Respondents could give an dollar amount, say they didn't know the amount or deny that they had income from that source.

The income application is basically one long question with parts referring to different sources of income. Interviewers have complete freedom to scroll downward through each source. The edits from January were triggered if the

interviewer tried to bypass a source without an entry. CAI gives us a keystroke record that shows the number of times the edit was triggered and the actions that were taken. The wages and salaries flag had the least impact in improving the percentage of amounts reported (about 5%)—perhaps because it is the first item in the list and the most frequent source of income so interviewers would not be likely to skip by it. In contrast, the reactive feedback increased the reporting of amounts for the more sensitive and less common government transfer payments by at least 20%. The next section gives details on the results of the edit for unemployment insurance.

5.   UNEMPLOYMENT INSURANCE: A CASE STUDY

The unemployment insurance program covers almost all Canadian full-time paid workers and about 75% of part-time workers, but not the self-employed. It was initially intended to provide short-term support during temporary unemployment. In recent years, because of structural changes in the Canadian economy, there are more people who are frequent claimants, drawing benefits for longer periods. There is perhaps a reluctance among recipients to report this income. It is estimated there is at least 20% under-reporting of this source in household surveys, which is why we implemented our edit.

We have May 1994 results for about 3600 people who had reported in January that they received unemployment insurance the previous year (Table 1).The "Volunteered" column means the interviewer keyed some kind of entry, either a valid amount, a don't know or a refusal. The other column refers to cases when the interviewer tried to by-pass the source without an entry. Note that the amount of proxy reporting (answers given for another household member) was similar for both situations. This suggests that lack of knowledge by the proxy was not the main reason for under-reporting of the amount.

Table 1   Unemployment insurance: Reports volunteered or triggered by an edit

Unemployment insurance		
Volunteered responses compared to those triggered by edit		
	Volunteered (%) n ≈ 2300	Triggered by edit (%) n ≈ 1300
Amount reported (≈ 2900)	94 (n 2200)	54 (n 700)
Don't know	5	21
No amount or refusal	1	25
	(100)	(100)
Reported by proxy	43	40

Over half the persons who were reminded by the edit did give a valid amount (54%). This represented about one quarter of the non-zero amounts reported for this income source. Thus it is clear that the technique was effective in increasing the frequency of reporting. On the other hand, about one-quarter of the cases triggered by the edit had no amount entered or were refusals. These are effectively denials, and with the 21% who said they didn't know the amount, it shows that the reactive feedback does not completely solve the problem of under-reporting.

As a result of a data quality study of a micro match of survey responses to records for the same persons on the Revenue Canada tax file, we have 1993 survey and tax data for most of the people who reported or should have reported unemployment insurance. (Some cases could not be matched). With this information we can evaluate the quality of the survey data, both the amounts volunteered and those triggered by the edit. We consider the amount on the tax file to be the true value because people must include records with their returns and there are penalties for false and incomplete returns.

Table 2.   **Survey amounts compared to tax file**

Survey amount compared to true value on tax file			
	Amount Volunteered n≈2250	Triggered by edit n≈625	Differ- ence
Average reported on survey ($)	5500	4600	900
'True' average from tax file ($)	5750	5000	750
Survey as proportion of tax	96%	92%	4%

Table 2 shows the averages of the amounts reported, whether volunteered or triggered by the edit, in both the survey and on the tax file. (Zero amounts have been removed). There is a close agreement between the amounts on the tax file with those reported in the survey, either spontaneously or because of the edit. The average survey amounts reported via the edit were lower than the amounts volunteered, $4,600 versus $5,500. This reflects a true difference, according to the tax file, of $750. Under-reporting of the true amount was slightly higher for cases resulting from the edit. This is summarized by the row showing the reported value as a proportion of the true value. The average from the edit, at 92% was slightly lower than the 96% from the volunteered cases (but still very good). The maximum amount reported, both on the survey and tax return, and whether triggered by the edit or otherwise, was around $22,000 which is the maximum benefit from the program.

As shown by these average and maximum figures, the values we collected through our edit were substantial amounts which would certainly have an impact on personal and family income. Without the dependent interviewing based on January

responses, all of these cases would have been missing and required imputing. This points to the benefit of asking about unemployment insurance in a less sensitive interview to ensure that receipt of the benefit is identified.

From the tax match, we also know what should have been reported for the flagged cases where we got denials and "Don't knows". In fact, most of these people did receive unemployment insurance. Their true average was around $5,000, similar to the amounts for persons who did respond to the edit. In other words, we are getting false denials and in spite of reactive dependent interviewing, we are still missing valid amounts. We also know from the match that even in January there was some under-reporting of the receipt of unemployment insurance.

6.   CAI AND THE SLID RELATIONSHIP QUESTION

The results from the use of dependent interviewing illustrate a benefit from computer-assisted interviewing in being able to carry relevant content information from other interviews. This section describes a more operational use of CAI to reduce interviewer data entry errors. Because the experience of our earlier tests suggested that interviewers often do not have time to react to edit error messages and make the appropriate corrections, the SLID application has been developed under the principle of 'doing it right' the first time rather than relying entirely on edits to identify errors and interviewers to make corrections.

A number of small but effective items have been programmed to help the interviewers but I will describe more major changes that improved the quality of our household relationships question.   We collect the relationships of each household member to all other household members instead using the usual method of relating everyone to a reference person. One objective is to better identify stepchildren in blended families and to clarify the relationship in three-generation

families. Also in a longitudinal survey, this approach avoids the need to re-ask all relationships if the reference person leaves the household.

The fact that SLID was developed using computer-assisted interviewing greatly facilitated this approach. The question is asked after everyone's date of birth has been collected, permitting interactive edits based on age. Also, the question is basically a matrix and to reduce the number of questions that must be asked, after a response the reciprocal relationship is automatically entered, e.g. if John is Mary's father, her relationship to him is prefilled to "child".

A field test in 1993 indicated problems with the new approach. Interviewers and respondents found it confusing and repetitive and the data required considerable editing, mainly because of errors introduced by the complexity of the application. One major problem was that the screen was too busy. Interviewers had too much latitude in what they could do in the screen because it allowed both the collection and review of the information. Observation of interviews and debriefing reports showed that interviewers had difficulty keeping track of who they were talking about. Sometimes they were not sure when they had completed an individual's relationships, and inadvertently changed them. In addition, edit failures showing a conflict between age and relationship were too difficult to correct. The record of keystrokes showed that 47 % of the interviewers accepted the conflict, 24 % said they tried to change age (but none actually did), and only 29 % corrected the erroneous relationship (LePetit, 1993).

The problems encountered in the test demonstrated the need to reassess the data needs and to simplify the CAI operations. To minimize errors and permit easy review and correction there was a complete redesign of the display. The question was split in two—one part for collection and one part for review. The main

priority of the collection screen was to clarify the person the interviewer was working with, and when relationships were complete for that person.

The collection part of the question was more controlled than before but had a friendlier interviewer interface and edits and corrections were simpler. In fact, the relationships that were deemed impossible were dimmed and made unavailable for selection, namely persons aged less than 15 cannot be a husband/wife, common-law partner, same-sex partner or grandparent. If either one of the selected persons has an age constraint, the restricted relationship cannot be entered. Soft edits warned if a child was older than a parent.

Figure 1   Relationship collection screen

The redesigned collection screen is shown in Figure 1. The interviewer could see all the members of the household, the one selected and the permitted relationships.

It was hoped that the layout of the question, **"What is the relationship of** (*highlighted name in box*) **to** (*highlighted name in box)***?** , would clarify the direction of the relationship. Reversals of parent/child relationships can be a problem even in a self-completed questionnaire. (Figure 1 gives an example of the choices that could be entered for Kelly Roe, aged 10).

When a relationship is chosen the name (Mary) disappears from the second list. When all relationships are completed for a person (Kelly), a check mark is displayed beside the name on the first list, and you cannot make changes for that person until the review screen.

Figure 2   Relationship review screen

First Name	Last name	Is the . . . of	First Name	Last name
George	Roe	Husband/Wife	Mary	Roe
		Birth Father/mother	Kelly	Roe
		In-law	Martha	Winter
Mary	Roe	Husband/Wife	George	Roe
		Step Father/mother	Kelly	Roe
		Birth child	Martha	Winter
Kelly	Roe	Birth child	George	Roe
		Stepchild	Mary	Roe
		Grandchild	Martha	Winter
Martha	Winter	In-law	George	Roe
		Birth Father/mother	Mary	Roe
		Grandparent	Kelly	Roe

A second improvement was to simplify the edit message (again based on relative ages) by prompting either a 'Continue' or 'Cancel'. As mentioned above, the number of edits was reduced because certain relationships were simply not allowed to be entered. Thirdly, corrections could be made in the review screen (Figure 2) which displays the whole household. It was essential to give this option because there is so much control in the collection screen.

How did this simpler and more controlled approach work? The question is of course still longer than the traditional one that collects relationships only to the reference person but the reaction from interviewers is much more positive than in the test. The quality of the data also appears much better. For example, preliminary analysis of the 1994 results show a marked drop in age reversals where a child is older than a parent. In the test, 5.3% of the parent/child pairs were inconsistent. In 1994, about 200 out of 27,000 of these relationships, or less than one percent, require fixing.

Complete household relationships are collected at the start of the panel. In subsequent contacts, if there are any new household members, their relationships are added. If there are no membership changes, the review screen is displayed and interviewers have a chance to make corrections or changes. What remains to evaluate as SLID continues, is the ease of updating relationships and whether they are updated when household changes suggest they should be.

7. CONCLUSIONS AND NEXT STEPS

SLID's experiences with dependent interviewing and revising the relationship question can be more generally applied to the issue of how much control should be imposed in a CAI interview. In earlier testing, we found that if you had too many edits, they stop the flow of the interview and are ignored. Also, as our 1993 test

of the relationship question showed, if it is difficult to make a correction, interviewers will continue as best they can. We feel for a non-standard question that interviewers may never become really familiar with, it seems preferable to reduce the options available to them, to prevent errors from occurring rather than expect them to react to edits. Initial results from the improved relationship question support this approach.

It is too early in the life of the panel to evaluate conclusively whether dependent interviewing, as used in our labour interview will lead to false agreement with what we are feeding back and thus repress the reporting of changes. Based on the results so far, that risk seems less than having spurious transitions. Therefore, in 1995, we added the feedback of job search and receipt of the three previously mentioned transfer payments, if reported at the end of the reference year.

Now that we are into the second year of the survey we are carrying information from previous contacts to help interviewers. Over the life of the panel, members move in and out of their original household. This has caused linking problems in some longitudinal surveys. Computer-assisted interviewing allows us to carry a list of everyone who ever lived in a household. This year when interviewers update the household composition they can see if the "new" member ever lived there before and is really a "returner". We use a similar function to list the names of all employers collected in previous contacts. Interviewers can indicate whether these are new to the survey, or are what we call 'ghost' returners and employers. This feature should improve our longitudinal data.

The reactive feedback we use in our income application has increased the reporting of good quality dollar amounts that would otherwise have to be imputed. Thus we have added an edit asking about receipt of old age security payments, if not

reported, for persons 65 and over. This government payment is received by almost everyone that age.

Of course we now know that even when the edits are triggered, some respondents still don't report all their sources of income. As a separate initiative, this May (1995) we are asking respondents for permission use to use their tax data, instead of contacting them for an income interview. If this new approach is successful, it should improve the data quality of all income sources, not just the sensitive ones.

After these changes, we will probably not increase our use of dependent interviewing. Any more feeding back of information from previous contacts would just hinder the flow of the interview and make it longer. We think we have also got the right amount of reactive edits. Any more might antagonize respondents and make interviewers uncomfortable. But our conclusion, based on our first year's experience, is that the functions and features of computer-assisted interviewing have already improved the quality of SLID data.

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