

Evaluation of a Questionnaire Design for Dependent Interviewing in a Web Survey
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Abstract

Dependent interviewing is one of the new design features that came with the introduction of computer assisted interviewing (CAI). This article discusses an example of a questionnaire design for a self-administered questionnaire on the Web that uses the data collected in a prior survey in order to reduce measurement error and respondent burden. We found a large shift in the data, but no reduction of interviewing time.

1. Introduction

This study is conducted within the setting of a panel survey where respondents report facts about their financial situation on a yearly basis. We found that a substantial part of the information does not change much from year to year. In such a situation it seems efficient to use the information that was gathered in an earlier wave. The use of information of prior interviews or other sources is referred to as ‘dependent interviewing’, and has become more widespread since the introduction of computer assisted interviewing (CAI) (see Mathiowetz and McGonagle, 2000). We applied dependent interviewing in a Web survey where we collect data on assets and liabilities.

The motivation to use dependent interviewing is two-fold. First, it is hoped that dependent interviewing will make the task of respondents easier, because in many cases the respondent merely indicates if something has changed with respect to last year, rather than to reconstruct complete answers. Second, dependent interviewing may make the response more reliable, since last year’s answers form a framework for this year’s response. We will evaluate the effect of dependent interviewing by studying the time that respondents spend on the survey and the patterns in re-reporting of assets.

2. Dependent Interviewing in the CentER Savings Survey

The CentER Savings Survey (CSS) is a panel survey on economic and psychological aspects of financial behavior that started in 1993. Since 2000 the CSS uses ‘web surveys’ as a data collection method. The data are collected from two thousand households in the Netherlands that participate in the telepanel of CentERdata. The members of the telepanel answer a questionnaire at a personal computer every week. This computer may be either their own, or may be provided by CentERdata. The households of the telepanel are recruited by a telephone survey that uses the random digit dialing technique, which makes the panel representative for the Dutch population (see Saris, 1997, Hoogendoorn, Sikkel and Weerman, 2000). The CSS

consists of five questionnaires, each covering a different aspect of financial behavior. The questionnaire ‘assets and liabilities’ is a very detailed questionnaire to measure ‘total personal assets’ accurately, and is notorious for a high respondent burden.

2.1 The original questionnaire (independent interviewing)

In the questionnaire ‘assets and liabilities’ we can distinguish two stages (levels) of questions. At the first stage, the level of *assets components*, the respondent is asked to indicate the assets components that he or she possesses: checking accounts, saving certificates, real estate, cars, etc. The respondent receives detailed information on each assets component to make clear what we exactly understand by a ‘savings account’ or a ‘savings certificate’ before he or she indicates ‘yes’ or ‘no’. After indicating the assets components the respondent receives a review that summarizes answers given, and allows for corrections. The review finalizes the first stage. In the second stage, the level of *assets items*, we focus on each indicated assets component. At this stage we ask the respondent how many items (checking accounts, saving certificates, objects of real estate, cars, etcetera) he or she owns. Then we ask the respondent to describe each item (‘with which bank’, ‘which type’, ‘which year’, etc.) and – what the questionnaire is all about – its current balance or value.

The design described above makes sense for a new respondent. However, for a repeat-respondent the design is not efficient. For example, the elaborate discussion of the different assets components in the first stage may be unnecessary. Another element of inefficiency can be found in the fact that most (financial) products are in possession more than one year. If we do not use the information gathered in the previous year, we ask the respondents to reconstruct the same information several times. We hope that dependent interviewing reduces both respondent burden and measurement error.

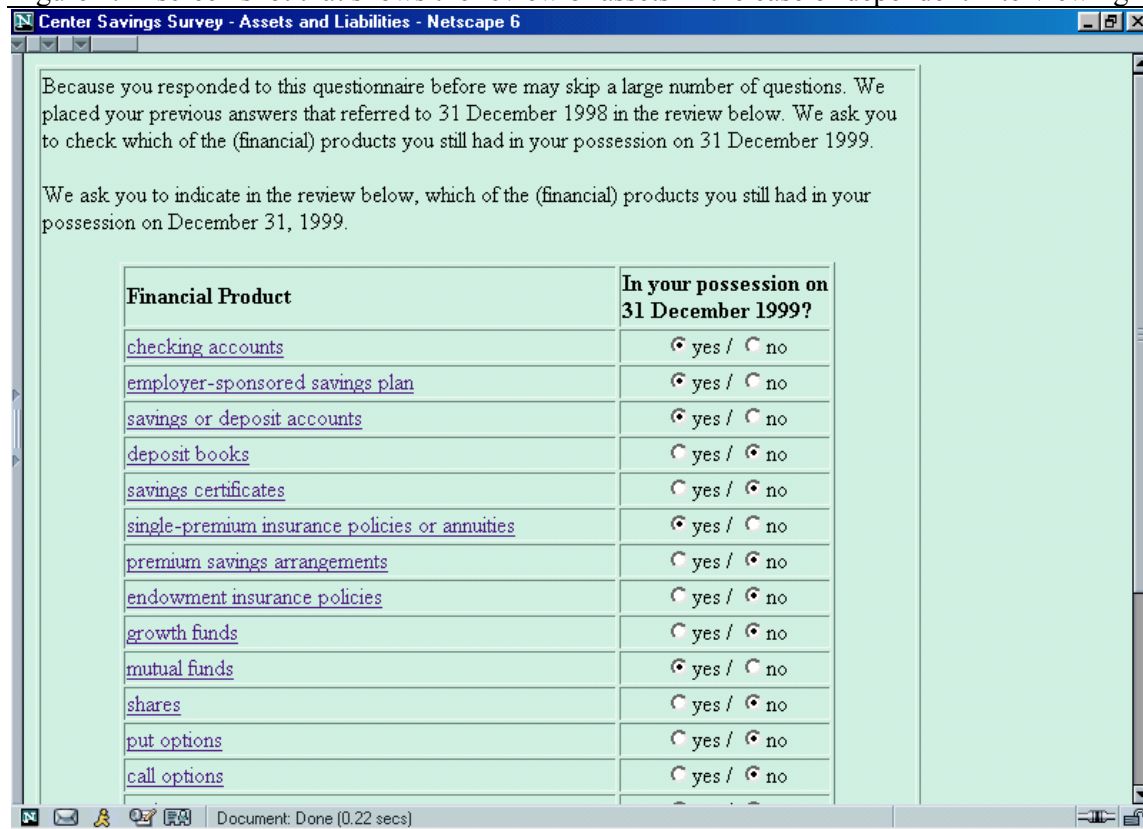
2.2 An alternative design with ‘dependent interviewing’

In 2000 (wave 7 of the CSS) we constructed an alternative design for the questionnaire ‘assets and liabilities’ that incorporated dependent interviewing for repeat-respondents. In doing so, we had to make several choices with respect of the design of the questionnaire. We had to choose between a proactive and a reactive form of dependent interviewing. In the proactive form the respondent is first reminded of the previously acquired information, whereas in the reactive form this information is used to detect discrepancies between current and previous answers that may trigger a question for confirmation (see Brown, Hale and Michaud, 1998). Although both forms are supposed to enhance data quality, we favored the proactive form, since we expect this form to reduce respondent burden in addition. Having decided to use a proactive form, there are further choices to be made. We have the option to merely show the previous answers (e.g. in the question text), or we can go as far as presetting the previous answer in the answer field, and ask the respondent to change the previous answer if necessary. The latter offers a higher reduction of the respondent burden, but may be more likely to suppress the reporting of change, because respondents attempt to minimize the cognitive

efforts (see Mathiowetz and McGonagle, 2000)). The designer has to find a balance between a reduction of response burden and ‘the threat of cognitive satisficing’.

Now we will describe the design of the questionnaire. The new respondents received the questions as in the original design that we discussed in the previous section. For the repeat-respondents we changed both the first stage of the interview (the level of assets components) and at the second stage (the level of assets items). For repeat-respondents we reduced the number of questions in the first stage drastically by deleting the entire set of questions that introduced the different assets component where the respondent is supposed to answer ‘yes’ or ‘no’. In fact, for repeat-respondents, the first stage boils down to checking the review of assets components. But, whereas for a new respondent the review contains the answers that he or she just gave, for a repeat-respondent the answers were preloaded with last years’ information (see figure 1). The rationale behind this reduction is that the repeat-respondents are familiar with the terminology and that today’s situation will not differ much from the earlier situation.

Figure 1. A screen shot that shows the review of assets in the case of dependent interviewing



The implementation of dependent interviewing in the second stage required a thorough redesign. We chose the following design. For each assets component we start by presenting the list of items that was reported the previous year. We ask the respondent to indicate which items are still in his or her possession. Figure 2 shows a screen shot in the case of two checking accounts. Next, for each item that is still in possession, we ask the respondent which

characteristics of the item changed. Figure 3 shows a screen shot of this question in the case of a certain checking account. By default we expect that only the value (for checking accounts ‘balance’) changed, and that the other characteristics (for checking accounts ‘holder’ and ‘bank’) remained constant. Nevertheless we allow the respondent to change the other characteristics as well, since it may occur that these characteristics change, or the respondent might want to correct a mistake that he or she made in the previous wave. Next, we ask the respondent what the new values are for those characteristics that changed. Finally, we ask the respondent if there are any *new* items (checking accounts) that came into his or her possession. If there are any new items then the characteristics are asked the same we as in the original design.

Figure 2. A screen shot showing a question related to preloaded information

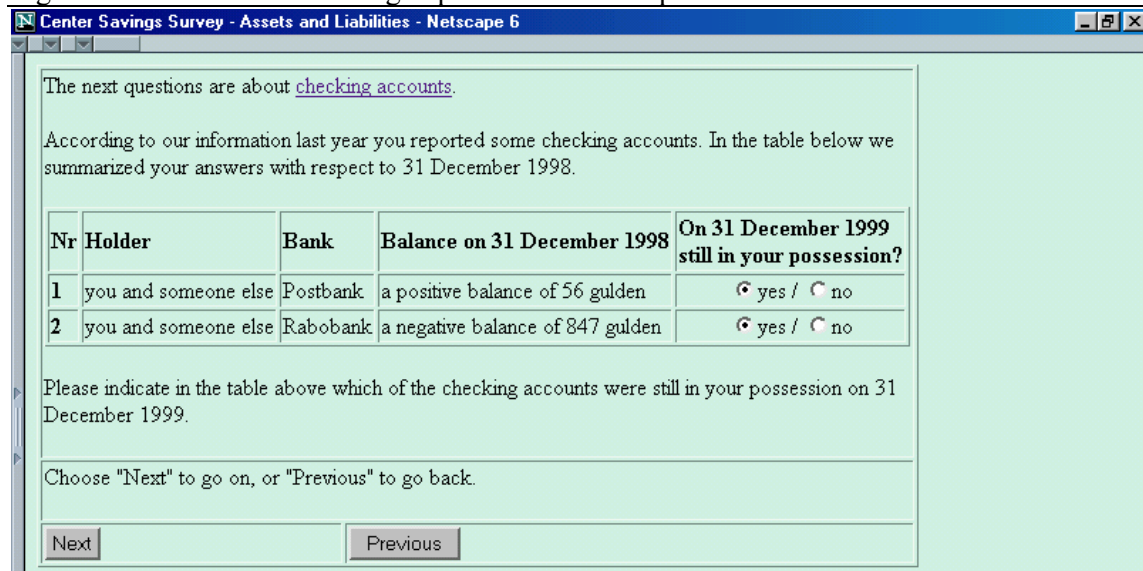
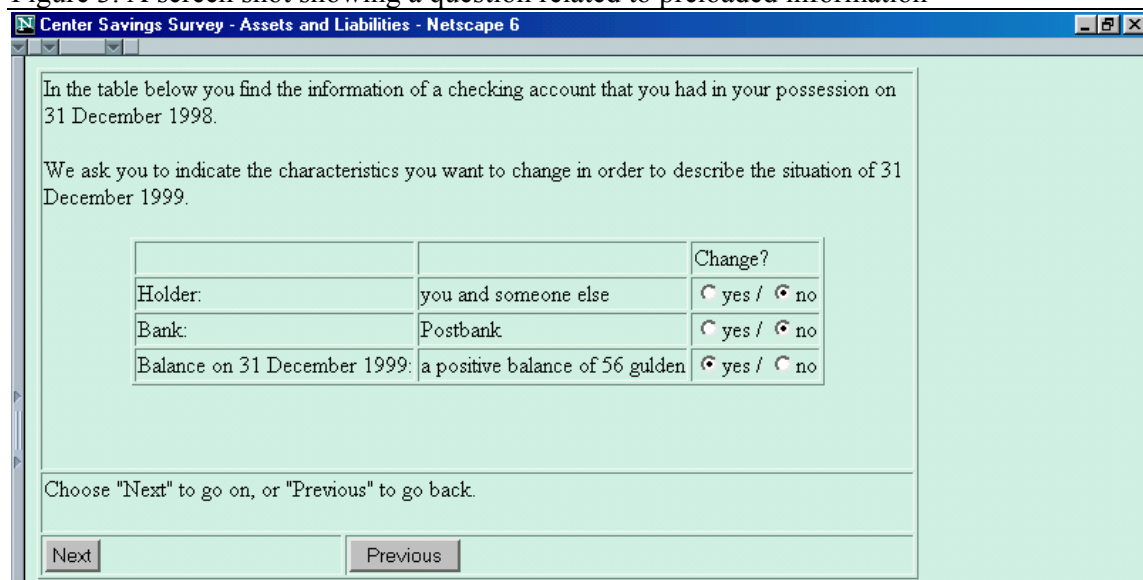


Figure 3. A screen shot showing a question related to preloaded information



In order to implement dependent interviewing we used the Blaise system (Statistics Netherlands, 1999) in combination with CentERdata's C2B software (Weerman, 2001). This environment provided a powerful scripting language for 'online interviewing' with more than one question per screen. We used these software tools to construct (or program) one questionnaire with a different routing for repeat-respondents and new respondents, but leading to one dataset with one set of variables for both the new and the repeat-respondents.

3. Effects of dependent interviewing

3.1. Effect of dependent interviewing on respondent burden

We use proactive dependent interviewing, because we hope that it makes the life of the respondents easier. Proactive dependent interviewing shifts a part of the respondents' task from active memorizing to passive recognizing. We expect that this reduction in cognitive efforts will also result in a reduction of interviewing time. Therefore, in order to study the effect of dependent interviewing on the respondent burden, we will look at the time spent at (parts of) the questionnaire.

We will compare the time spent by *new respondents* with the time spent by *repeat-respondents* in the wave of 2000. Note that the comparison between new respondents and repeat-respondents is not completely fair, since the repeat-respondents are familiar with the questionnaire and its terminology and the new respondents are not. Although the two groups are not obtained from balanced sampling, we hope to get some indications from this comparison. The time information is obtained from the log files that are stored automatically on the file server that hosts the web survey (see Hoogendoorn, 2001).

Table 1. Median time used to answer different parts of the questionnaire 'assets and liabilities'

	new respondents		repeat-respondents	
	seconds	<i>n</i>	seconds	<i>n</i>
total questionnaire	982	932	896	651
<i>first stage:</i>				
total first stage: indicating assets components (including the review of assets components)	218	932	55	651
the review of assets components	24	932	55	651
<i>second stage:</i>				
checking accounts	103	854	167	587
deposit books	57	104	102	147
single premium annuity insurance policies	173	196	149	103
cars	101	584	114	442

Table 1 shows the median time spent on different parts of the questionnaire. There were 932 new respondents and 651 repeat-respondents. We see that the time spent on the total questionnaire is somewhat less for the repeat-respondents than for the new respondents. The difference, however, is modest: about ten percent. If we study the time spent on the different part of the questionnaire, we find that in the first stage on average the new respondents take 218 seconds, including 24 seconds for the review. Repeat-respondents spend more time for the review (55 seconds), but that is all there is to the indication of assets components.

With respect to the second stage of the questionnaire we see that for most assets components new respondents use less time than repeat respondents to report the items. Although this came as a surprise, it can be made clear by the following example. Let us suppose a respondent owns two checking accounts. In that case the number of questions for a new respondent would be seven: the first question is: ‘How many checking accounts do you have?’; then for both the accounts there are three questions: ‘Who is the holder of the first (second) checking account?’, ‘With which bank is the first (second) checking account?’ and ‘What is the balance of the first (second) checking account?’. In the case of a repeat-respondent the number of questions is in fact higher. The repeat-respondent is first confronted with a screen that contains two questions to determine what checking accounts are still in possession (see figure 2); then for both checking accounts the respondents gets a screen with three questions to determine what characteristics changed (see figure 3) and a question to determine the new balance. Finally there is a question to determine if the respondent owns any new checking accounts. In table 1 we also find one assets component (single premium annuity insurance policies) for which the new respondents use more time than repeat-respondents. The explanation for this exception is that a single premium annuity insurance policy has many identifying characteristics. However, we must conclude that we found no substantial reduction in time due to the use of dependent interviewing. Yet, there may be a reduction on the respondents’ effort operation of constructing the answers, but this we do not know. Next to a reduction of cognitive efforts the respondent may be less annoyed, since we do not ask him or her to do report the same assets two (or more) years in a row.

3.2 Effects of dependent interviewing on data

In order to study the effect of dependent interviewing to the quality of the data we will compare the changes in reported assets between 2000 and 1999 (when dependent interviewing was used) with the changes in reported assets between 1999 and 1998 (when no dependent interviewing was used). Note that, again, this comparison is not completely fair, since we are comparing changes in assets over two different years. Again we hope that we may learn from this comparison.

Table 2 shows re-reporting probabilities for a list of four assets components, both for the case that independent and dependent interviewing is used. We see that if we use independent interviewing the probability that a respondent reports to possess checking accounts given the

fact that he or she reported to possess checking accounts the year before is equal to 0.91. In the case that we used dependent interviewing the probability is higher: equal to 0.98. We see that for all four assets components we end up with higher re-reporting probabilities if we use dependent interviewing. Unfortunately we do not have an independent data source that we can use in order to validate the two methods.

Table 2. Probability of re-reporting assets components

	independent	dependent
Checking accounts	0.91	0.98
Deposit books	0.61	0.77
Single premium annuity insurance policies	0.64	0.86
Cars	0.88	0.96

Table 3 shows re-reporting probabilities for the *items* of the assets components for both the case that independent and the case that dependent interviewing is used. We see that if we use independent interviewing the probability that a respondent reports to possess a certain checking account given the fact that he or she reported the same checking account (characterized by the ‘holder’ and the ‘bank’) the year before is equal to 0.64. In the case that we used dependent interviewing the probability is higher: equal to 0.92. Again we see that for all four assets components we end up with higher re-reporting probabilities for the items if we use dependent interviewing. Again we do not have an independent data source that we can use in order to validate the two methods. However the re-reporting probabilities obtained by dependent interviewing seem much more plausible.

Table 3. Probability of re-reporting items of assets components

	independent	dependent
Checking accounts	0.64	0.92
Deposit books	0.29	0.62
Single premium annuity insurance policies	0.25	0.53
Cars	0.57	0.75

At the item level the quantity of interest is the value of the item. Aggregated over all items of all assets components these quantities deliver the ‘total personal assets’. Table 4 shows the probabilities (fractions) of items where the value remained unchanged. We see that, as expected, these probabilities are higher if we use dependent interviewing. However, it should be noted that these probabilities are far below one.

Table 4. Probability of ‘unchanged value’ of items of assets components

	independent	dependent
Checking accounts	0.03	0.15
Deposit books	0.10	0.32
Single premium annuity insurance policies	0.69	0.66
Cars	0.16	0.20

4. Conclusion

We applied proactive dependent interviewing in the setting of a questionnaire on ‘assets and liabilities’. We expected that this design would reduce response burden, partly from a reduction in interviewing time. On the other hand we expected that this design would have a positive effect on the quality of the data from a reduction of measurement error. We found that the effect of dependent interviewing on interviewing time is not substantial. The cause for this surprising result is that the obtained reduction in interviewing time caused by the disappearance of questions to identify a certain item, is compensated by an increase in interviewing time that comes from the introduction of new questions to point out which items still are in possession and from the extra questions to point out what characteristics of the item changed. The reduction may be a matter of cognitive efforts of the respondent, more than in time use. The effect on the quality of the data, however, is considerable. We found that due to the use of dependent interviewing the re-reporting probabilities of certain items of assets components more than doubled. Although we have no data to validate the results, the data that we obtained using dependent interviewing seemed much more plausible. More research is required to confirm the indications that we found here.

There is a counter side to this story. The effort to program a questionnaire that used the proactive form of dependent interviewing is huge. We believe that the efforts of programming a questionnaire with reactive dependent interviewing are at least as much. The testing of a questionnaire of this type is at the same time very difficult and essential to get the benefits from the method.

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