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The Effects of Dependent Interviewing on Responses to Questions on Income Sources

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Using an experimental design, we compare two alternative approaches to dependent interviewing (proactive and reactive) with traditional independent interviewing on a module of questions about sources of income. We believe this to be the first large-scale quantitative comparison of proactive and reactive dependent interviewing. The three approaches to questioning are compared in terms of their effect on under-reporting of income sources and related bivariate statistics. The study design also enables identification of the characteristics of respondents whose responses are sensitive to the mode of interviewing. We conclude that under-reporting can be significantly greater with independent interviewing than with either form of dependent interviewing, especially for income sources that are relatively common or relatively easy to forget. We find that dependent interviewing is particularly helpful as a recall aid for respondents below retirement age and registered disabled persons.

Key words: Acquiescence bias; computer-assisted personal interviewing; experiment; longitudinal surveys; measurement error; questionnaire design; under-reporting.

1. Introduction

In this article, we describe a large-scale experimental study of dependent interviewing techniques. These techniques are becoming widely used on longitudinal surveys, mainly because of their potential to reduce burden, increase efficiency and reduce measurement error (Mathiowetz and McGonagle 2000). However, their introduction has been largely guided by assumption and instinct. Our study aims to provide an empirical evidence base to inform design decisions regarding the use of dependent interviewing.

In Section 2, we describe the nature of dependent interviewing and the history of its introduction on major social surveys, and in the subsequent section we review the possible effects of dependent interviewing on survey implementation and survey data. This provides the motivation for our study, which aims to assess these effects. Our experimental design is described in Section 4 and the survey items on income sources are described in Section 5. In Section 6, we examine the extent to which each form of dependent interviewing affects the propensity of survey respondents to report income from particular

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sources, both singularly and in combination. We identify some sources that are particularly sensitive to the interviewing method. We also analyse the effects on estimates of propensity conditional upon reported receipt of income from other sources. In Section 7, we describe the characteristics of survey respondents whose responses seem particularly sensitive to the interviewing method and in Section 8 we investigate effects on estimated propensities for demographic subgroups and on differences in propensities between subgroups. Finally, in Section 9, we draw some conclusions regarding the effects of the different interviewing methods and how survey researchers should choose between them. We conclude that the choice between independent and dependent interviewing can make a significant difference to the resultant data. We find differences in both bivariate and multivariate statistics. Dependent interviewing appears to reduce under-reporting, though the extent of the effect differs across income sources. We find few differences between the two forms of dependent interviewing that were tested.

2. Dependent Interviewing

The term "dependent interviewing" is generally used to refer to structured interviews where the *choice of questions* and/or the *wording of questions* vary across sample members, depending on prior information held by the survey organisation about the sample member. Typically, this prior information comes from a previous survey data collection exercise (interview or questionnaire), though it may alternatively come from an external source such as administrative data used as the survey-sampling frame. Many longitudinal surveys collect particular data at regular intervals, to build up a "history" of particular attributes of the sample units. In the case of surveys of individual persons, examples include data on marriage and fertility, income sources and amounts, occupation and employment, education and qualifications, household structure and membership, housing circumstances and location, voting behaviour, crime victimisation, and many others. Such surveys may attempt to update information collected previously by presenting the sample member with that information and asking them to confirm whether or not their circumstances have changed (dependent interviewing), rather than simply asking them to state their current circumstances (independent interviewing). Specific examples of dependent interviewing questions are described in Section 4 below.

In some respects, this approach to survey questioning is similar to techniques used commonly in single-instrument surveys. First, with "routing" or "skipping" (Oppenheim, 1992, Chapter 6), the *choice of question* to ask next depends upon the answer(s) given to one or more previous questions. Second, the precise *wording of a question* may be adapted depending on the answers to previous questions (e.g., "...your current job..." for a respondent who has just answered that they are currently in employment, and "...your most recent job..." for a respondent who answered that they are not currently in employment but have been employed previously). The difference is simply that the information used to determine which question to ask, or the wording of the question, comes from within the same survey interview, whereas in the case of dependent interviewing, the information is known to the survey organisation prior to the commencement of the interview. This brings about extra challenges for importing the information in appropriate form into the current interview, but it also brings about extra

opportunities, as the researcher can interrogate the information prior to designing the survey instrument. For example, it is possible to ascertain the sample frequency of certain combinations of answers, enabling the researcher to make informed judgments about the value of asking situation-specific questions of certain sample sub-groups. Also, there is an opportunity to "clean" any textual data that are to be used in question wording, to fit the proposed structure of the question better. The process of extracting the data that will be needed during the dependent interview, cleaning or amending them, and providing them to interviewers in an appropriate form, is often referred to as "feeding forward" survey data (Corti and Campanelli 1992; Jabine 1990).

When using pencil-and-paper interviewing, feeding forward survey data from one interview to the next is a laborious and error-prone business. For this reason, few surveys used dependent interviewing prior to the advent of computer-assisted interviewing (CAI) methods. Dependent interviewing tended only to be used when there was very strong evidence that the quality of the resultant data would be significantly improved (Neter and Waksberg 1964) or the nature of the data to be fed-forward, and the way that it should be used by interviewers, was simple (Holt 1979). The advent of CAI (both computer-assisted personal interviewing (CAPI) and computer-assisted telephone interviewing (CATI)) greatly facilitated the use of dependent interviewing, as the need for manual transcription was removed, as was the burden on the interviewer to look up the relevant information and take responsibility for amending the question wording appropriately. In consequence, many longitudinal surveys adopted dependent interviewing techniques. However, the choice of which questions to ask in a dependent way and how to word the questions was often based on judgement rather than empirical evidence of the likely effects.

There are many possible ways to word and to structure dependent questions, but a key distinction is between *proactive* and *reactive* questioning methods. *Proactive* dependent interviewing (PDI) is so called because the information from the previous interview is offered proactively as part of the questioning process (Brown et al. 1998). An example is the U.S. Current Population Survey (CPS) questions on occupation and industry (U.S. Bureau of Labor Statistics and U.S. Census Bureau 1997, 2002). Respondents are reminded of the company for which they reported working in the previous quarterly interview and asked whether they still work for the same company. If yes, industry of employment is assumed to be unchanged and the respondent is asked if his or her activities or duties have changed since the previous interview. If the respondent reports no change in activities or duties, then the description of activities and duties given at the previous interview is read out and the respondent is asked to confirm whether this still applies. If yes, occupation is assumed unchanged. It was found that the introduction of these dependent questions greatly reduced apparent change (which the authors assumed to have been largely spurious) and also addressed respondent complaints about repetitiveness (Cantor 1991; Norwood and Tanur 1994; Polivka and Rothgeb 1993). Experimentation on the Survey of Income and Program Participation (SIPP) drew similar conclusions to the CPS studies (Hill 1994), and PDI for questions about occupation and industry was introduced in 1996. Aside from occupation and industry questions, household composition details are amongst the question types for which PDI is most commonly used (Mathiowetz and McGonagle 2000). PDI is also used extensively on the U.S. National Longitudinal Survey of Youth (NLSY, Center for Human Resource Research 2001) and the English Longitudinal Study of Ageing (ELSA 2002).

With *reactive* dependent interviewing (RDI), the information from the previous interview is offered only in reaction to certain responses. For example, RDI is used on the Canadian Survey of Labour and Income Dynamics (SLID) for wage data (Sauvé et al. 2000). If the respondent reports an amount that is either less than the amount reported in the previous interview one year ago, or more than 10% higher, then a box appears on the CAPI screen showing both amounts and instructing the interviewer to query and enter the reason for the difference. This information is used in subsequent data editing (Hale and Michaud 1995). Other examples of RDI occur on U.S. Government Agricultural Surveys, where farmers are queried about reported changes in crop acreage (Pafford 1988) and ranchers are queried similarly about changes in number of cattle (Stanley and Safer 1997).

The main reason for preferring dependent to independent interviewing appears to be a concern with measurement error – particularly in situations where spurious change is believed to be rife. There is some empirical evidence (Hill 1994; Rips 2000; Webber 1994) to support the commonly expressed view that independent questioning will tend to result in over-estimation of change, particularly where response categories involve long lists of similar items or where open-ended answers require subsequent coding to complex frames. On the other hand, as Bates and Okon (2003) suggest, PDI could invite acquiescence bias, causing spurious change merely to be replaced by spurious stability. RDI should avoid the possible acquiescence bias, though whether it is as successful as PDI in reducing spurious change has not been tested (Mathiowetz and McGonagle 2000). Other reasons for preferring dependent interviewing include concerns with respondent and interviewer burden (and perhaps associated cost). In so far as there is considerable genuine stability, PDI has the potential to reduce – significantly in some cases – the number of questions that need to be asked and the number of open-ended answers that need to be recorded by interviewers and subsequently coded. Weinberg (2002, p. 18), referring to the SIPP, states that "the switch to CAPI has allowed the increased use of information from prior interviews (dependent interviewing), reducing the length of the interview."

3. Survey Measurement of Income Sources

Many large-scale general population panel surveys regularly ask questions about sources of income. In most cases, the same questions are asked at every wave of the survey in order to build up a complete history. The resultant data are used to address many important social and policy issues, including issues of poverty and poverty dynamics (e.g., Jenkins 2000; Jenkins and Rigg 2004; Cappellari and Jenkins 2002), the process of benefit take-up (e.g., Pudney et al. 2002) and modelling the effects of changes in welfare entitlement (e.g., Francesconi and van der Klaauw 2004). However, there are at least three areas in which survey researchers have concerns regarding such income histories: measurement error, burden, and efficiency.

3.1. Measurement Error

Measurement error is present in all survey data and it takes various forms (Biemer et al. 1991). With categorical data, measurement error can lead to misclassification, which can be either random or systematic. The measures of central interest to us here are a special case of categorical data, namely dichotomous indicators of whether or not some income

was received from a particular source during a particular period. With dichotomous variables, only two forms of misclassification are possible, omission (failure to report a source from which some income was in fact received) and incorrect inclusion (reporting income from a source from which no income was in fact received). Both forms of misclassification can arise due to confusion about the name of an income source. For example, if a recipient of "disability working allowance" incorrectly reports it as "severe disablement allowance," this will result in omission with respect to the former and incorrect inclusion with respect to the latter. Such mistakes are not uncommon with a welfare regime such as that in the UK, where there are many state benefits, the names and criteria of which change quite frequently. It is also possible that some survey respondents will simply omit an income source altogether, either because they forget it or through deliberate suppression, perhaps related to social desirability or stigma (Sudman and Bradburn 1973; Burton and Blair 1991). Indeed, most of the concern in the literature on income source questions has been with under-reporting (omission) of income sources (Dibbs et al. 1995; Doyle et al. 2000).

Both misclassification and omission of income sources can occur in cross-sectional survey data, but in repeated measures data such errors become both more apparent and more troublesome. They are more apparent as they tend to cause "seam effects" or "seam bias" (Doyle et al. 2000; Hill 1994; Lemaître 1992; Rips 2000). This occurs on surveys where the measurement period is shorter than the interval between survey waves. For example, SIPP interviews are carried out at 4-month intervals but with a 1-month reporting period. For each income source, the respondent is asked whether he or she has received any income from that source during the past four months and then, if yes, in which months the income was received. This structure of questioning is used on all the major panel surveys. In consequence, any omissions or misclassifications tend to result in a source being omitted for *all* the reporting periods covered by an interview. In consequence, many transitions in status (new receipt or cessation of receipt) occur at the "seam" between two interviews. In the case of SIPP, this leads to peaks in observed transitions every four months (Martini 1989; Ryscavage 1993). In surveys with interview intervals of 1 year and reporting periods of 1 month (e.g., British Household Panel Survey (BHPS), German Socio-Economic Panel (GSOEP)), the peaks occur every 12 months (e.g., Ashworth and Walker 1994); in the Panel Survey of Income Dynamics (PSID), which has an interview interval of two years, the peaks occur every 24 months (Hill 1987). Seam bias is particularly troublesome in repeated measures surveys as a central aim is typically to model dynamics, for example of income receipt or income levels. Thus, transitions are of substantive importance but are systematically over-represented in the data. Not only do survey data provide biased estimates of rates of transition in the presence of seam bias, but the bias may differ between population subgroups. This would occur if levels of measurement error vary across groups – i.e., if some groups have a greater tendency than others to omit or misclassify.

Typically, when a respondent reports income from a particular source, they are subsequently asked the amount received (see, e.g., Section 5.1 below). The amount question is important both in its own right and because it contributes to measures of household income. Omission of a source will result in an incorrect estimate of zero for the amount received from that source and will by definition contribute negative bias to any estimate of total income.

Dependent interviewing offers the potential to reduce measurement errors of the sort that lead to seam bias, by explicitly asking about change or stability rather than inferring it from independent questions subject to measurement error. However, Mathiowetz and McGonagle (2000) have noted that few systematic attempts have been made to isolate the contribution of dependent interviewing to measurement error reduction, and none have compared alternative versions of dependent interviewing. Mathiowetz and McGonagle specifically argue that an empirical comparison of proactive and reactive methods would be of great value. (The 1990–91 CPS "CATI/RDD test" compared two versions of dependent questions for occupation and industry, but both were varieties of proactive questions (Copeland and Rothgeb 1990).)

The questions typically used to identify the sources from which income is received (see, e.g., Section 5.1) are cognitively demanding on several of the dimensions identified by Tourangeau et al. (2003) as being associated with increased risk of measurement error. They involve recall (over periods of months or even years), they involve complex terms (also, in the UK many state benefits have names that are similar to one another, and that have changed over time), and they involve a complex question structure (where the permissible answers are revealed only a few at a time, so the respondent is not aware of the full range of possible income sources until the end of the questions). Increased cognitive demands are associated with a tendency to satisfice (Krosnick et al. 1996), so omissions could occur directly as a result of the demanding nature of the question or as a result of satisficing. It is to be expected that omissions would be more prevalent amongst respondents who are less cognitively able and/or less motivated to respond accurately (Alwin and Krosnick 1991).

PDI should reduce omissions, by reminding respondents of income sources that they reported in the previous interview. However, there is a risk that reducing omissions amongst previous recipients but not amongst previous nonrecipients could actually increase bias in some measures of stability or change in receipt. To reduce this risk, it would be necessary also proactively to remind nonreceivers of their previous nonreceipt. This would at least give every respondent equal cause to think explicitly about each income source. However, in surveys where a large number of income sources are of interest, this could be impractical. In the BHPS case (see Section 5.1), 34 show card items (four questions) would become 34 separate questions, lengthening the interview and introducing undesirable repetitiveness to the questioning.

With proactive questions of respondents who previously reported receipt, there is also a risk of acquiescence bias (Cannell et al. 1981). Some respondents may interpret that the interviewer is expecting a "yes" and may consequently supply one without giving the question much thought. The use of RDI may reduce this risk, as the initial (independent) question introduces no preconceptions about the expected response, while the follow-up question, where applicable, is more likely to encourage explicit consideration as it is asking the respondent to consider both information just provided and information provided in a previous interview.

The Canadian Survey of Labour and Income Dynamics (SLID) tested a reactive question regarding receipt of unemployment insurance and concluded that it reduced the extent of under-reporting compared with independent questioning without provoking negative reactions from respondents (Hale et al. 1994). Furthermore, the test survey

responses were matched to the Statistics Canada tax file, enabling validation of the responses. This showed that net under-reporting remained even after the RDI question, but also that there were hardly any cases of over-reporting (Hale et al. 1994). This suggests that acquiescence bias is not a problem with RDI for income sources. From May 1994, SLID introduced a reactive dependent question for income from each of four sources: employment, unemployment insurance, social assistance (welfare) and workers' compensation. The question is, "Based on our January interview, we thought we would get an amount for ⟨source⟩. Did we miss it?" Dibbs et al. (1995) report that the proportion of respondents reporting income in response to the reactive question varied from 5% for employment income to 25% for unemployment insurance.

3.2. Respondent Burden

To ask about sources of income, surveys typically remind respondents of each of a wide range of possible income sources and separately record a dichotomous indicator of receipt for each. When the indicator is positive, a number of follow-up questions regarding that source are asked. In most countries, there are a large number of potential sources to ask about. Whether the questions are asked in series, hierarchically, or using show cards, this involves a lot of repetitive questioning about a topic that is unlikely to be interesting for the respondent. Respondents can easily get bored or irritated by such questioning, especially when they remember that they were asked the same questions in a previous interview as part of the same survey (Hill 1994; Pascale and Mayer 2004). Lack of motivation can lead to a reduction in the quality of the answers given (Krosnick 1990). Worse, for a panel survey, it could lead to respondents being unwilling to take part again and cause panel attrition.

Dependent interviewing offers an opportunity both to reduce respondent frustration at seeming to have to answer the same questions in every wave, and also to reduce the repetitiveness of the questions by splitting them into two or more types of questions. This could be done by first asking explicit questions regarding income sources that had been reported previously, to confirm whether or not the respondent is still receiving income from those sources, and then asking about other sources. The first set of questions acknowledge the information provided by the respondent previously and so are less likely to be viewed as unnecessarily repetitive. They also save the respondent from having to locate (again) their own income sources within some much larger list, reducing the cognitive burden on them. And the two sets of questions have different structures, thus providing more variety within each interview. Hale and Michaud (1995) and Pascale and Mayer (2004) both concluded that respondents expect interviewers to be able to utilise their responses from previous interviews and consider dependent interviewing to be efficient and appropriate.

3.3. Efficiency

As already mentioned, questions about income sources take considerable time to administer. This time could potentially be reduced by dependent interviewing, by saving the time needed to identify and code each income source, at least in cases where an income source continues to be received. This potential benefit is likely to be greater for surveys with shorter between-interview intervals, due to the greater stability in income sources over short

periods. Efficiency arguments are even stronger for survey questions that require answers to be recorded verbatim and coded subsequently, particularly when the code frame is long and complicated. Dependent interviewing can bring very significant savings in both interview and coding time. Questions about occupation and industry are a classic example of this and these formed part of our field experiment, though they are not discussed further here.

The effects of RDI and PDI on burden and efficiency are discussed in Jäckle (2005).

4. The ISMIE Study

4.1. The Sample

The sample for our study consisted of the GB "low income supplemental sample" of the European Community Household Panel Survey (ECHP). This sample is a subset of the original ECHP sample selected in 1994, consisting of those who in the first three years of the survey exhibited characteristics associated with an increased likelihood of low household income (e.g., elderly, single parents, in receipt of income support). A description of the sample design appears in Lynn (2006). Though the sample is not designed to be representative of the general population, it covers a broad range of characteristics and is in some respects not dissimilar to the total population (Jäckle et al. 2004). For the purpose of experimenting with questions about income sources, it is an advantage that this sample contains disproportionate numbers of recipients of state benefits.

Attempts had been made to interview all adult members of sample households eight times at annual intervals, the last round of interviewing having taken place between September 2001 and February 2002. Since 1997, the field work had been administered as part of the British Household Panel Survey (BHPS) using the standard BHPS survey instruments (Taylor et al. 2003). Funding for this supplement to the ECHP was then discontinued after Wave 8, so we took the opportunity to return to the sample one more time, for purely methodological purposes. This methodological project was known as "Improving Survey Measurement of Income and Employment" (ISMIE). The 1,163 sample members (in 700 households) who had provided full interviews at the 8th wave (2001–02) of the ECHP were included in the experiment. They were randomly assigned to one of three treatment groups, which we shall refer to as the "independent interviewing," "reactive dependent interviewing" and "proactive dependent interviewing" groups. The assignment to groups was implemented alternately after hierarchical ordering of the sample list by three variables: a dichotomous indicator of whether or not a valid measure of income from employment had been obtained at Wave t-1, sex and age. Consequently, sample members within the same household were not necessarily allocated to the same group.

4.2. Survey Instruments and Fieldwork

At each household containing at least one sample member, a household interview was carried out (median interview length five minutes), plus an individual interview with each sample member (median interview length 24 minutes). Three versions of the CAPI script for the individual interview were prepared. The first, the independent interviewing version, was a slightly reduced version of the standard BHPS instrument. A module of questions on values and opinions and a few questions on health and caring and household

finances were dropped from the standard instrument in order to reduce the interview length. Nevertheless, the remaining questions constituted the bulk of the standard interview and provided a realistic context for the experiment. The other two versions of the script differed from the first only in the way that five sets of questions were asked. All other questions were asked in identical form. The five sets of questions manipulated experimentally concerned educational qualifications, current occupation and industry, income from current employment, employment history since last interview, and sources of income. It is the last of these five sets of questions that are the focus of this article. A total of 1,034 interviews were achieved, representing a response rate of around 89%. We shall refer to these 1,034 persons as the "ISMIE respondents." Field work was carried out between February and April 2003 by NOP Research, constituting an interval of between 13 and 18 months since the previous interview.

The two dependent interviewing versions of the instrument called upon data from the previous interview ("Wave *t*-1"). To enable this, a file of feed-forward data was prepared for respondents in either of these two treatment groups. For most of the experimental questions this simply meant copying one or more codes from appropriate Wave 8 items, but in some cases text was needed for insertion into the question wording. Considerable effort was needed to prepare the textual feed-forward data so that it would fit seamlessly into the question wording. Researchers had to individually edit each response to the items on occupation and industry for grammar, punctuation, case and sense. A small number of responses were not deemed useable and a special code was provided in the feed-forward data so that these respondents would not be asked the dependent versions of the questions.

5. Questions on Income Sources

5.1. The Standard Questions

The questions asked of the independent interviewing group were the standard BHPS questions. Respondents were asked to look in turn at four show cards, each of which contained a list of possible sources of income. The first card listed six types of pension, the second listed ten state benefits related to disability or injury, the third listed nine other state benefits and the fourth listed eight other miscellaneous income sources, plus a catch-all category, "any other regular payment." The respondent was asked to say whether they had received any of the types of income or payments shown. The interviewer clicked a radio button for each source reported. Subsequently, for each reported source, a series of questions was asked regarding in which months (since the previous interview) income was received from that source, whether income was still being received from that source currently, the amount of the most recent payment, the period covered by that payment, and whether the income was received solely or jointly. The questions are reproduced in Annex A.

5.2. The Dependent Interviewing Questions

PDI respondents were first asked, for each source that had been reported in the previous interview as being received currently, "According to our records, when we last interviewed you, on < date >, you were receiving < source >, either yourself or jointly. For which months since then have you received < source > ?" Then, they were

shown the four cards in turn and asked whether they had received any of the other types of income listed. This procedure is therefore similar in structure to the standard independent interviewing procedure, the difference being simply that any sources about which an explicit question has already been asked need not be indicated here. Subsequently, the follow-up questions were asked for sources reported at the previous interview if the respondent had indicated receipt in any month(s) since then and, for sources not reported previously, if receipt was indicated in response to the show card question.

RDI respondents were first asked the standard independent question using the four cards. Then – drawing particularly upon the SLID experiences described earlier in Section 3.1 – the CAPI script ran a check to identify any sources that had been reported at the previous interview but not in the current one. For each such source, the respondent was asked, "Can I just check, according to our records you have in the past received < source > . Have you received < source > at any time since < date > ?" The follow-up questions were then asked for any source indicated in response to either of the questions.

6. Propensity to Report an Income Source

In this section, we examine differences between the three interviewing methods in estimated propensities of survey respondents to report income from particular sources. We use a dichotomous indicator of income receipt for each source, where "receipt" means that the respondent indicated having received income from that source in at least one month between September 2001 and the month of the ISMIE interview (February to April 2003). We would however note that for most income sources between 80% and 95% of respondents who report receipt in at least one month in fact report receipt in *all* months, so the results presented below are not greatly sensitive to the definition of receipt. We focus here on the most prevalent income sources, namely those from which at least 60 ISMIE respondents had reported income at the previous (Wave t-1) interview. Eight income sources met this criterion. To provide necessary context for interpretation of the results, we briefly describe these eight income sources.

State (contributory) retirement pension is paid to persons who have reached State pension age (presently 65 for men, 60 for women) and have also met the contribution conditions (specified levels of National Insurance contributions paid by either the claimant or his or her spouse). Thus, once someone becomes eligible he or she almost invariably receive it continuously until death. Ex-employer pensions vary in nature, but also tend to be paid continuously until death. Child Benefit is a fixed-amount entitlement paid for children up to the age of 16 and those aged 17 or 18 in full-time nonadvanced education at a recognised educational establishment. Again, receipt is typically continuous until the child has both reached the age of 16 and left education. Income support (IS) is intended to help people on low incomes who do not have to be available for employment. The main types of people who receive it are pensioners, lone parents, the long- and short-term sick, people with disabilities and other special groups. Incapacity Benefit is paid to people who are assessed as being incapable of work and who meet certain contribution conditions. Working Families Tax Credit (WFTC) was designed to supplement the income of low income families with at least one person undertaking at least 16 hours of paid employment per week, thereby increasing the incentive to accept low-paid jobs. (It was replaced in April 2003 – around the end of the

ISMIE field work period – by Working Tax Credit.) Housing Benefit (HB) and Council Tax Benefit (CTB) are designed to help people on low-income pay their rent and their council tax (local taxation) respectively. Four of these eight income sources (IS, WFTC, HB, CTB) are means tested, based on income received by the family unit. As income can vary over time, duration of receipt tends to be shorter for these benefits than for the other income sources.

The dependent interviewing questions are designed primarily to reduce omissions amongst respondents who previously reported income from a particular source. Table 1 presents, for each source, the percentage of respondents who reported the source at Wave *t*-1 who also reported the source at Wave *t*, by treatment group. Two sets of percentages are presented for the RDI group. The first (RDI1) are the percentages who report the income source in response to the initial question. This, recall, is identical to the standard independent question. However, we should not assume that the propensity to report an income source with this mode of questioning is identical to that of the independent interviewing (INDI) group, as respondents may have experienced the reactive follow-up questions to other items and this could well prompt them to study the show cards more carefully, knowing that their answers might get queried. The second set of percentages for the reactive interviewing group (RDI2) is those that result after adding in respondents who reported a source only in response to the follow-up question. The percentages for the PDI group relate to the response to the proactive question and the catch-all follow-up. Percentages for each of the three dependent interviewing treatments are compared independently with the equivalent percentage under INDI using a Pearson χ^2 test with the second order correction of Rao and Scott (1984) to account for intra-household correlation. This was implemented using the `svytab` command in *Stata* 8.0 with households specified as PSUs. Significance is indicated in Table 1 by asterisks, the absence of an asterisk indicating $P > 0.05$.

The percentages with RDI1 are similar to those with INDI (the percentage is higher for six out of the eight sources, but in no case is the difference significant). This suggests that respondent behaviour in reaction to these questions is not greatly affected by possible prior experience in the interview with reactive questions. But with both forms of dependent

Table 1. Percentage reporting each income source at Wave t conditional upon having reported the source at Wave t-*1*

Income source	INDI	RDI1	RDI2	PDI	*Base (INDI)*	*Base (RDI)*	*Base (PDI)*
NI retirement pension	99	100	100	100	*96*	*104*	*99*
Ex-employer pension	91	94	100*	100*	*55*	*50*	*49*
Incapacity benefit	71	83	96*	85	*17*	*23*	*20*
Income support	82	77	83	98**	*55*	*48*	*49*
Child benefit	68	71	86**	93***	*77*	*80*	*76*
Working families tax credit	57	51	68	87*	*28*	*37*	*23*
Housing benefit	78	83	94**	94**	*64*	*86*	*80*
Council tax benefit	79	81	94**	95**	*80*	*84*	*81*

Notes: the base for each percentage is the number of respondents in the relevant treatment group who reported having received income from the relevant source at Wave *t*-1; percentages for RDI2 and PDI are compared separately with the corresponding percentage for INDI using a Pearson χ^2 test on the relevant 2×2 table, with a correction for intra-household correlation, implemented in *Stata* 8.0 using `svytab` with households specified as PSUs; * indicates $0.01 < P \leq 0.05$, ** $0.001 < P \leq 0.01$, *** $P < 0.001$.

interviewing, there is a clear tendency for the final percentages to be higher than with INDI. Compared with INDI, RDI2 results in significantly higher estimates ($P < 0.05$) of continued receipt rates for five out of the eight income sources and PDI results in significantly higher estimates for six out of eight. The continued receipt rate for one other source, National Insurance retirement pension, is already so high (99%) as to make it impossible to detect a significant increase with RDI2 or PDI, while the sample sizes for one other, WFTC, are so small as to make it unlikely that differences would be detected. It is striking that, for five out of the seven sources for which it is asked, the reactive question receives a positive response from more than half of the respondents of whom it is asked. For example, 15 respondents who had reported receipt of housing benefit at Wave *t*-1 did not report it in response to the initial (independent) question at Wave *t*, but in response to the follow-up question ("Can I just check, according to our records you have in the past received housing benefit. Have you received housing benefit at any time since ⟨date⟩?"), ten of them confirmed that they had, thus raising the continued receipt percentage from 83% to 94%. Overall, the RDI question was asked on 131 occasions, and in 66 of these instances (50%) the respondent replied that he or she had indeed received income from this source.

Table 2 presents percentages equivalent to those in Table 1, but based upon respondents who had *not* reported income from the source at Wave *t*-1. In this situation, there are no dependent questions asked, so any effect of treatment group could only be caused by the general context of having been asked dependent questions about other income sources or other subjects earlier in the interview. The concern here is that PDI might, if anything, tend to reduce the propensity to report an income source not previously reported as the respondent may perceive that they have already answered the (dependent) questions about the relevant income sources and may therefore pay less attention to the "catch-all" show cards. There is only slight support for this, as the percentage for child benefit is lower with PDI than with INDI ($P < 0.01$).

When respondents who had and who had not previously reported receipt of an income source are considered together, to predict unconditional propensity to report receipt at

Table 2. Percentage reporting each income source at Wave t *conditional upon not having reported the source at Wave* t*-1*

Income source	INDI	RDI1	PDI	*Base (INDI)*	*Base (RDI)*	*Base (PDI)*
NI retirement pension	3	2	3	*252*	*240*	*241*
Ex-employer pension	1	2	1	*293*	*294*	*291*
Incapacity benefit	3	3	2	*331*	*321*	*320*
Income support	6	6	3	*293*	*296*	*291*
Child benefit	4	1	0**	*271*	*264*	*264*
Working families tax credit	3	1	6	*320*	*307*	*317*
Housing benefit	7	9	9	*284*	*258*	*260*
Council tax benefit	11	16	12	*268*	*260*	*259*

Notes: the base for each percentage is the number of respondents in the relevant treatment group who did not report income from the relevant source at Wave *t*-1; differences are assessed using the method described in Table 1;

** $0.001 < P \leq 0.01$ here and in later tables, "0" indicates zero responses and "-" indicates a nonzero percentage < 0.5.

Wave *t*, only three of the conditional effects remain significant ($P < 0.05$), though the magnitude of the differences in the estimated proportions is substantial (Table 3). Both RDI and PDI increase the proportion reporting housing benefit, while RDI also increases the proportion reporting council tax benefit.

As the survey design involves multiple interviews in many households, it is plausible that some omission may have stemmed from a belief that another sample member in the household (typically a spouse or partner) might have already reported a particular income source and consequently that it did not need to be mentioned again (even though the question wording asked for any income received jointly to be reported). If this was the case, then the apparent significant effects of dependent interviewing may be unimportant as the questioning may only be picking up receipt of income sources already mentioned by another household member (and therefore already known to the data analyst). To check this, the analyses of Tables 1 to 3 were rerun using an indicator of whether *any* respondent in the household had reported the source at Wave *t* (Check 1). Additionally, the analyses of Tables 1 and 2 were rerun conditional upon *any* member (or no member) of the ISMIE respondent's Wave *t*-1 household having reported the source (Check 2). Though some of the percentages changed slightly in these analyses, only two significance levels changed, namely those for the difference between PDI and INDI in the proportions reporting housing benefit and council tax benefit at Wave *t* conditional upon have reported receipt at *t*-1. These *p*-values increased to larger than 0.01 (but not above 0.05) with Check 1; that for council tax benefit further increased to 0.15 with Check 2. Given this relative insensitivity of the results to the contribution of other responses within the household, we conclude that the "extra" reports of income sources apparent with dependent interviewing represent information that would have been missing had independent interviewing been used.

There is considerable interest amongst researchers in the distribution of receipt of combinations of benefits. For example, research into nontake-up by pensioners (Hancock et al. 2004; Pudney et al. 2004) has identified receipt of certain combinations as being problematic, i.e., people who claim benefit *A* may not necessarily claim benefit *B*, to which they are entitled. Also, it is the combination of benefits received that determines income

Table 3. Percentage reporting each income source at Wave t*: unconditional*

Income source	INDI	RDI2	PDI
NI retirement pension	30	31	31
Ex-employer pension	15	16	15
Incapacity benefit	6	10	7
Income support	18	17	17
Child benefit	18	21	21
Working families tax credit	8	8	11
Housing benefit	20	30**	29**
Council tax benefit	26	35**	32
Base	348	344	340

Notes: the base for each percentage/model is all respondents in the relevant treatment group; each DI method is compared separately with independent interviewing using a logit model with a single 2-category predictor and a 1-tailed test; ** $0.001 < P \leq 0.01$.

and hence poverty. Researchers using survey data to study poverty are therefore interested in measurement error in the combinations of benefits reported by survey respondents.

Table 4 and Table 5 present bivariate descriptive estimates. Table 4 presents percentages reporting each of two sources, for all combinations of the eight common sources. These can be viewed as estimates of unconditional joint probabilities. Some of these combinations are not substantively interesting (for example child benefit with either form of pension, as extremely few pensioners have a child under 16) but all are presented here for completeness. There are eight combinations for which RDI produces a higher proportion than INDI. All of these combinations involve either housing benefit or council tax benefit, the two income sources for which RDI was seen to have a significant effect on the univariate distribution (Table 3). For three of these eight, PDI also produces a higher proportion. Additionally, PDI results in a higher estimate of the proportion in joint receipt of child benefit and working family tax credit.

Table 5 presents percentages reporting source y conditional upon reporting source x. Here, several differences are larger in magnitude but are not consistent in direction. This is to be expected, as the "extra" reports obtained under DI could serve either to reduce these percentages (if the increase in x dominates – given that most recipients of x do not also receive y) or to increase them (if the increase in y amongst recipients of x outweighs any increase in x amongst nonrecipients of y).

There are two percentages for which both forms of dependent interviewing produce a significant difference ($P < 0.05$): an increased percentage reporting housing benefit amongst those who report a National Insurance retirement pension, and a reduced percentage reporting income support amongst those who report housing benefit. Additionally, there are five percentages for which one of the two dependent interviewing methods produced a significant difference. Of these, four involve either housing benefit or council tax benefit, and the direction of these differences is consistent with that observed for the two percentages that are significant for both dependent interviewing methods: percentages reporting receipt of either of these two benefits conditional upon receipt of another source increase and percentages reporting receipt of another source conditional upon receipt of either housing benefit or council tax benefit decrease. Indeed, there are several other differences of this sort that are large in magnitude but of borderline significance, due to the relatively small sample sizes. For example, with RDI, $P = 0.076$ for the increase in housing benefit conditional upon ex-employer pension and $P = 0.086$ for the increase in incapacity benefit conditional upon retirement pension. With so many comparisons (112 in Table 5), we must of course be cautious in interpreting nominal significance levels when it comes to individual tests, but the number of "significant" differences exceeds the number that would be expected by chance and the pattern of differences is consistent. These considerations together lend strength to the suggestion that genuine differences exist.

Overall, the pattern is clear. Dependent interviewing appears to increase the propensity to report the receipt of housing benefit and of council tax benefit, but this is not accompanied by proportionate increases in the propensity to report other income sources on the part of the same respondents. The consequence is an increase in the unconditional proportions reporting both of these benefits (Table 1 and Table 3), increases in the proportions reporting joint receipt of two income sources including

Table 4. Percentage reporting both of two sources at Wave t

	2. EP			3. IB			4. IS			5. CB			6. WFTC			7. HB			8. CTB		
	INDI	RDI	PDI	INDI	RDI	PDI	INDI	RDI	PDI	INDI	RDI	PDI	INDI	RDI	PDI	INDI	RDI	PDI	INDI	RDI	PDI
1. NIP	12	13	11	0	1	1	8	6	6	–	0	0	0	–	0	10	16*	15*	14	18	17
2. EP				1	1	2	2	1	1	0	0	0	0	0	0	3	6*	4	5	8*	6
3. IB							3	3	4	1	–	1	0	–	0	3	5	4	3	5	5
4. IS										3	6	4	1	1	–	13	15	14	14	15	15
5. CB													6	5	9	3	7*	6*	4	8*	7
6. WFTC																1	3*	2	1	3*	2
7. HB																			19	28**	25*

Key: NIP, National Insurance Retirement Pension; EP, Ex-employer pension; IB, Incapacity Benefit; IS Income Support; CB, Child Benefit; WFTC, Working Families Tax Credit; HB, Housing Benefit; CTB, Council Tax Benefit. Bases are 348 for independent interviewing (INDI), 344 for reactive dependent interviewing (RDI) and 340 for proactive dependent interviewing (PDI). Each DI method is compared separately with independent interviewing using a logit model with a single 2-category predictor and a 1-tailed test: * indicates $0.01 < P \leq 0.05$, ** $0.001 < P \leq 0.01$.

Table 5. Percentage reporting source y *conditional upon reporting source* x

	1. NIP			2. EP			3. IB			4. IS			5. CB			6. WFTC			7. HB			8. CTB		
	INDI	RDI	PDI	INDI	RDI	PDI	INDI	RDI	PDI	INDI	RDI	PDI	INDI	RDI	PDI	INDI	RDI	PDI	INDI	RDI	PDI	INDI	RDI	PDI
1. NIP				77	78	71	0	9	13	44	38	39	2	0	1	0	3	0	51	52	52	53	52	53
2. EP	40	40	34				24	15	30	10	5	9	0	0	0	0	0	0	16	19	14	18	24	19
3. IB	0	3	3	9	9	14				19	17	21	5	1	3	0	3	0	14	17	14	12	15	15
4. IS	26	20	21	11	5	10	57	30*	52				19	16	18	7	14	3	67	49*	49*	53	42	46
5. CB	1	0	–	0	0	0	14	3	9	19	33*	23				74	62	82	16	22	21	16	21	20
6. WFTC	0	1	0	0	0	0	0	3	0	3	7	2	32	25	43				6	11	6	4	10	7
7. HB	34	50*	48*	21	36	27	48	55	61	74	86	86	18	32	29	15	38*	16				72	79	79
8. CTB	48	58	54	32	53*	39	52	55	70	79	88	88	24	36	31	15	41*	21	96	92	86*			
Base	103	108	106	53	55	51	21	33	23	62	58	57	62	72	72	27	29	38	69	103	99	92	121	108

a Key: See note to Table 4. The conditioning source forms the column: hence, for example, under independent interviewing 40% of respondents who reported income from NIP also reported income from EP, while 77% of respondents who reported EP also reported NIP. Each DI method is compared separately with independent interviewing using a logit model with a single 2-category predictor and a 2-tailed test. * indicates $0.01 < P \leq 0.05$.

either – or especially both – of these benefits (Table 4), increases in the proportions reporting receipt of either of these benefits conditional upon receipt of particular other income sources (bottom two rows of Table 5), and decreases in the proportion reporting receipt of particular other income sources conditional upon receipt of either of these benefits (last two columns of Table 5). We also observe some sensitivity to dependent interviewing for other benefit combinations with relatively high joint receipt propensities, e.g., working family tax credit and child benefit, incapacity benefit and income support (Table 4 and Table 5).

7. Characteristics Associated with Sensitivity to Dependent Interviewing

In this section, we investigate the extent to which respondents who report receipt of income sources only in response to dependent questions differ in their characteristics from those who report receipt in response to independent questions. If these two sets of respondents differ, then the implication is that dependent interviewing could affect the conclusions that would be drawn from analyses of the characteristics of income recipients. In other words, in addition to the *proportion* of recipients being underestimated in the absence of dependent interviewing, the sample of respondents identified as recipients could be *biased*.

To make this assessment, we cannot use the PDI sample, as it is impossible to identify which of the respondents who report receipt in response to the proactive question would have in any case reported receipt in response to an independent question. Instead, we use the RDI sample. We classify the sample into three groups: those who did not report receipt of income from any of the specified sources ("nonrecipients"), those who reported receipt but (for all reported sources) in response to the initial independent questions ("independent reporters"), and those who reported receipt but (for at least one income source) only in response to the reactive question ("reactive reporters"). We compare the latter two groups, interpreting the reactive reporters as representing recipients whose receipt would have been missed if only independent questioning were used.

The analysis is presented both for the eight common income sources discussed in Section 5 above, for consistency with the earlier analysis, and for all 32 sources (for which there are slightly larger numbers of both independent and reactive reporters). We observe (Table 6) that the reactive reporters are less likely than the independent reporters to be retired (or born before 1943, or NI pension recipients) or to be living with a spouse or partner, but more likely to be registered disabled. We would also note that these differences between groups in sensitivity to interviewing method do not seem to be explained by differences in the types of benefit received. Retired/ elderly respondents were more likely than others to receive housing benefit and council tax benefit. These were amongst the benefits for which DI had the biggest effect on reports (Section 6), so other things being equal the retired/elderly could have been expected to be more likely to be reactive reporters rather than independent reporters. The opposite was found. Similarly, those living with a spouse or partner were more likely than others to receive child benefit, another benefit for which DI increased reporting levels. The findings for all 32 income sources are very similar to those for the eight most common sources.

Table 6. Characteristics of independent and reactive reporters of income sources

	Top 8 sources		All 32 sources	
	Independent reporters	Reactive reporters	Independent reporters	Reactive reporters
	%	%	%	%
Male	32	33	34	31
Born before 1943	55	25**	49	29*
In paid work	26	33	29	29
Retired	47	22**	42	24*
NI pension recipient (at Wave *t*-1)	48	22**	43	26*
Children under 12 in household	21	14	20	12
Living with a spouse or partner	58	31**	55	31**
University-level qualification	4	6	4	5
General health "excellent" or "good"	52	50	53	50
Registered disabled	23	39*	21	40**
Has lived in h'hold more than 1 year	94	92	93	93
Has regular use of a car	43	44	46	40
Has mobile phone	52	61	54	60
Likes current neighbourhood	90	83	89	86
Base	198	36	215	42

Note: The analysis for "top 8 sources" is based on the 234 RDI respondents who reported receipt of at least one of the 8 income sources addressed in Section 5. Independent reporters are those who always reported those source(s) in response to the independent question; reactive reporters are those who reported at least one of those sources only in response to the reactive follow-up question, having initially failed to identify the source at the independent question. The analysis for "all 32 sources" is based on the 257 RDI respondents who reported receipt of at least one of the 32 income sources for which the RDI question was asked. * indicates $0.01 < P \leq 0.05$, ** $0.001 < P \leq 0.01$.

8. Effects on Multivariate Statistics

In Section 6 we showed that the proportions receiving income from particular sources, or combinations of sources, appear sometimes to be under-estimated in the absence of dependent interviewing. In this section, we explore the extent to which this apparent under-estimation may differ between subgroups and the consequent effects on estimates of differences between subgroups in the propensity to report particular income sources. To define subgroups, we choose two of the variables investigated in Section 7: gender and age. Gender did not exhibit a tendency to be associated with the propensity to be sensitive to dependent interviewing. We are not therefore expecting differences between the sexes in the *proportionate* difference (between independent and dependent interviewing) in the percentage reporting a particular source, but we could nevertheless find differences in the *absolute* difference, due to differences between the sexes in propensity to receive income from particular sources. On the other hand, age *was* shown to be associated with the propensity to be sensitive to dependent interviewing, so it is of interest to see, if this manifests itself in an effect on estimates of between-subgroup differences. We have limited the analysis to two definitions of subgroups for reasons of space and have chosen these two due to the different results obtained for them in Section 7 and the wide interest in sex and age as covariates. Obviously, different results could be obtained for different subgroups.

In Table 7, we observe that the significant effect of both forms of dependent interviewing on the reporting of receipt of housing benefit, seen earlier in Table 3, applies to both men and women in roughly equal measure, resulting in no significant effect on the estimated difference in proportions between the sexes. The effect of RDI on report of council tax benefit is significant only for women, but still does not result in a significant effect on the between-sexes difference in proportions. Additionally, for both income support and child benefit the effects of dependent interviewing, which were not significant overall (Table 3), are significant for women for one version of the questions for each income source. This results in a significantly altered between-sexes difference in proportions reporting receipt.

There are three treatment group and income source combinations for which the effect of dependent interviewing is significant for only one of the two age groups (Table 8). For incapacity benefit (RDI) and WFTC (PDI), the proportion reporting receipt is greater with DI only amongst the under-60 s (consistent with the finding of Section 7 that respondents aged under 60 are more sensitive to interviewing method), whereas for council tax benefit (RDI) the proportion is greater with DI only amongst respondents aged 60 or over. In all three cases, this can be explained by the much greater propensity of the affected age group to receive the benefit. However, in none of these cases is there evidence ($P < 0.05$) that this affects the between-group difference in proportions.

9. Conclusions

Our findings have shown that the choice between independent and dependent interviewing for questions on income sources can make a significant difference to the resultant data and to estimates based upon those data. It seems reasonable to conclude that this difference is mainly due to greater under-reporting with independent interviewing. It is therefore likely that dependent interviewing results in less measurement error, though we have not presented any direct evidence of the magnitude of measurement error and it is possible that

Table 7. Subgroup percentages and differences between subgroups: sex

	INDI			RDI			PDI		
	Men	Women	Diff	Men	Women	Diff	Men	Women	Diff
NI pension	27	31	−4	28	34	−5	30	32	−3
Employer pension	25	8	16	24	11	13	21	10	11
Income support	16	19	−2	9	22	−13*	12	21	−9
Child benefit	8	25	−18	6	31	−25	5	34*	−29*
WFTC	3	11	−7	5	11	−5	5	16	−11
Housing benefit	15	23	−8	23*	34**	−11	24*	33*	−8
Council tax benefit	22	30	−8	28	40*	−12	26	36	−10
Incapacity benefit	9	4	5	13	7	6	9	5	4
Base	146	202		135	209		148	192	

The effect of dependent interviewing on *subgroup proportions* was tested using a Pearson χ^2 test on the relevant 2 x 2 table, with a correction for intra-household correlation, implemented in *Stata* 8.0 using `svytab` with households specified as PSUs. This was done separately for each version of dependent interviewing and for each subgroup (men and women). Significance is indicated in the columns headed "Men" and "Women" for both RDI and PDI. The effect of dependent interviewing on the *difference in proportions* between men and women was tested by fitting a logit model, separately for each version of dependent interviewing. Fitted predictors were treatment group and sex (both dichotomous) and the interaction between the two. The significance of the interaction term (2-tailed test) indicates the effect of dependent interviewing on the difference between men and women and is indicated in the columns headed "Diff" for both RDI and PDI. Logit models were fitted using `svylogit` in *Stata* 8.0. * indicates $0.01 < P \leq 0.05$, ** $0.001 < P \leq 0.01$.

Table 8. Subgroup percentages and differences between subgroups: age

	INDI			RDI			PDI		
	U-60	60 +	Diff	U-60	60+	Diff	U-60	60+	Diff
NI pension	0	91	−91	–	90	−89	–	90	−89
Employer pension	3	42	−39	4	39	−36	4	36	−32
Income support	14	27	−13	15	21	−6	14	21	−7
Child benefit	26	1	25	32	0	32	32	0	32
WFTC	11	0	11	12	1	12	17*	0	17
Housing benefit	13	34	−20	20*	48*	−27	20*	46*	−26
Council tax benefit	17	47	−30	22	60*	−37	21	52	−31
Incapacity benefit	6	5	1	13**	3	10	8	5	2
Base	235	113		225	119		223	117	

Note: Effects were tested in the same way as for Table 7. The group "U-60" is defined as all persons born subsequent to 31-12-1942. Consequently, all members of the 60 + subgroup were aged at least 60 years and 2 months at the time of interview and a few members of the U-60 group may have just recently turned 60.
* indicates $0.01 < P \leq 0.05$, **$0.001 < P \leq 0.01$.

some under-reporting remains even with dependent interviewing. (Lynn et al. 2004 attempt to separate out under-reporting and over-reporting using validation data.)

There has been some concern that PDI may lead to an over-statement of "no change" due to respondent satisficing in the form of acquiescence bias (Stanley and Safer 1997; Mathiowetz and McGonagle 2000; Hoogendoorn 2004). We have found no evidence of this, as there are few differences between two fundamentally different forms of dependent interviewing, only one of which could be susceptible to acquiescence bias. This suggests that the effect of dependent interviewing is instead simply caused by getting the respondent to think explicitly about each income source. A corollary of this is that under-reporting may well still remain with the forms of dependent interviewing used in our experiment, as only a subset of respondents were prompted explicitly to consider each income source – namely those who had reported income from that source at Wave t-1. One could reasonably conjecture that out of all recipients of a particular source at Wave t-1, those who actually reported it to the survey interviewer are likely to have had a higher propensity to report it than those who did not. Consequently, if dependent interviewing significantly increases the propensity to report a source amongst respondents who already had relatively high propensities, it is conceivable that the effect could be even greater amongst respondents with lower propensities (where there is likely to be greater under-reporting). The difficulty, of course, is that in a normal survey situation it is not possible to identify the nonreporting recipients at a particular wave, so to gain the desired effect it would be necessary to ask questions that encourage *every* sample member explicitly to consider each income source. This would greatly add to the interview length, compared with the more usual types of questioning described in Section 5.

It was noticeable that the effect of dependent interviewing differed across income sources. In particular, effects appear strongest for housing benefit and council tax benefit, followed by child benefit. Several factors may contribute to this. First, these are three of the four most commonly reported income sources out of those considered here. This provides greater power for detecting differences. Larger overall sample sizes may be needed to detect differences for other income sources. Second, these are benefits which many recipients receive for long periods of time. Child benefit is a relatively small amount (compared with other benefits) and is not means tested. Housing benefit and council tax benefit can both be paid directly to the landlord, so the money may never actually pass through the hands of the "recipient." These considerations perhaps make it relatively easy to forget these sources of income. Note that the fourth of the four most commonly-reported income sources, NI retirement pension, for which no significant effects were observed, contrasts in that it is always paid directly to the recipient (unlike housing benefit and council tax benefit) and is typically the major – or even sole – component of the recipient's disposable income (unlike child benefit). Third, we cannot completely rule out the possibility of effects of question design. The benefits for which the strongest effects were observed appear towards the end of a show card, whereas NI retirement pension is the first item on the first card. Consequently, primacy effects, known to be prevalent with lengthy show cards (Schwarz et al. 1992), could also play a part. Further research is needed in order to better understand why dependent interviewing has different effects on different income sources.

We have also presented evidence of the effect of the choice between independent and dependent interviewing on multivariate statistics. Multivariate statistics involving income sources for which univariate statistics are not affected (e.g., NI retirement pension) can themselves be significantly affected (see Tables 4 and 5). Data analysts should therefore be aware that analysis can be sensitive to the questioning method so long as at least one of the questions from which the data derive is sensitive to the method. This has implications, for example, when comparing estimates or combining data from different surveys that have used different questioning methods.

Respondents who were sensitive to interviewing method were particularly likely to be aged under 60 and not living with a spouse or partner. They were also more likely than others to be registered disabled. As well as shedding light on the likely nature of under-reporting with independent questions, this also suggests possibilities for tailoring questions in future. For example, disabled people are an important group in terms of benefit receipt, but they are also a relatively small group, so it would not be unthinkable to ask slightly more detailed income questions just for that group.

In conclusion, for researchers designing future longitudinal surveys there is evidence that under-reporting is reduced with dependent interviewing. The choice between proactive and reactive dependent interviewing does not seem to greatly affect the data, so can be made based upon practical considerations of instrument design and data management. The possibility of targeting questions to particular subgroups could also be considered. For existing longitudinal surveys currently using independent interviewing, a change to reactive dependent interviewing might be considered. This, as opposed to proactive methods, has the advantage that the analyst can choose to consider only the responses to the initial, independent, questions in order to provide comparability with earlier waves, or to use the full data in order to minimise under-reporting. Analysts of existing data should be aware of the possible effects of interviewing method.

Annex A: Question Wordings

Independent Interviewing

I am going to show you four cards listing different types of income and payments. Please look at this card and tell me if, since September 1st 2001, you have received any of the types of income or payments shown, either just yourself or jointly.

If yes: "*Which ones?*" Probe: "*Any others?*" until final "no."

Code entered for each that applies. Question repeated for each card in turn.

For each code entered: *And for which months since September 1st 2001 have you received. . . ?*

CARD 1	CARD 2
N.I. retirement (old age) pension.....01	Severe disablement allowance.....16
A pension from a previous employer.....02	Industrial injury or disablement allowance.....18
A pension from a spouse's previous employer.....03	Disability living allowance/ care component.....19
A private pension/annuity.....04	Disability living allowance/ mobility component.....20
A widow's or war widow's pension.....05	Disability living allowance/ components not known.....21
A widowed mother's allowance.....06	Disabled person's tax credit.....22 (Formerly disability working allowance)
	Attendance allowance.....23
	Invalid care allowance.....24
	War disability pension.....25
	Incapacity benefit.....26 (Formerly invalidity benefit/NI sickness benefit)

CARD 3	CARD 4
Income support.....32	Educational grant (not student loan).....51
Job seeker's allowance.....34	
Child benefit.....35	Trade union/friendly society payments.....52
Child benefit (lone parent).....36	Maintenance or alimony.....53
Working family tax credit.....37 (Formerly family credit)	Payments from a family member not living here.....54
Maternity allowance.....38	Rent from boarders or lodgers (not family members) living here with you.....55
Housing benefit/rent rebate or allowance.....39	
Council tax benefit.....40	Rent from any other property.....56
Any other state benefit.....41	Foster allowance.....57
	Sickness or accident insurance.....58
	Any other regular payment **(PLEASE GIVE DETAILS)**.....59

Reactive Dependent Interviewing

Independent questions, as above, followed by:

For each income source reported at Wave 8 but not Wave 9:

Can I just check, according to our records you have in the past received < SOURCE > . Have you received < SOURCE > at any time since < INTDATE > ? For which months since < INTMON > have you received < SOURCE > ?

Proactive Dependent Interviewing

For each income source from Card 1 reported at Wave 8 (i.e., received in one or more months between September 2000 and the Wave 8 interview, September 2001–February 2002):

> *According to our records, when we last interviewed you, on < INTDATE >, you were receiving < SOURCE >, either yourself or jointly. For which months since < INTMON > have you received < SOURCE > ?*

Then:

> **CARD 1:** *I am going to show you four cards listing different types of income and payments. Please look at this card and tell me if, since < INTDATE >, you have received any other of the types of income or payments shown, either just yourself or jointly.*

Then equivalent questioning for each of Cards 2, 3 and 4 in turn (excluding Codes 41 and 59 from the initial proactive question).

10. References

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