

Modelling Longitudinal Survey Response: The Experience of the HILDA Survey

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1. Introduction

Like all sample surveys, longitudinal (or panel) surveys are affected by unit non-response. A distinctive feature of longitudinal surveys, however, is that non-response is not a one-off event and tends to accumulate over time as further waves of interviewing are conducted. Longitudinal surveys also face the problems of tracking sample members who relocate and of dealing with the respondent fatigue that is associated with repeated survey participation (Laurie, Smith and Scott, 1999).

As a consequence, many longitudinal surveys find, even after just a few waves of interviewing, that relatively large fractions of the responding sample from the initial wave are no longer participating. This has certainly been the case for the world's leading household panel surveys. The University of Michigan's Panel Study of Income Dynamics (PSID), for example, had lost just over one-quarter of its original 1968 sample by 1975 (i.e., wave 8) (see Fitzgerald, Gottschalk and Moffitt, 1998, Table 1).¹ More recent household panel studies, typically employing more complicated designs, report higher rates of sample attrition. After eight years of interviewing, the German Socio-Economic Panel (GSOEP), which commenced in 1984, and the British Household Panel Survey (BHPS), which commenced in 1991, both reported the loss of about 34 per cent of their original sample (Spieß and Kroh, 2004, Figure 9; Taylor *et al.*, 2005, Table 20), and in the case of the Dutch Socioeconomic Panel the rate of sample loss at the same stage was almost certainly in excess of 50 per cent.² Relatively high rates of sample loss have also been reported in the European Community Household Panel (ECHP), a multi-country study conducted over the period 1994 to 2001. Watson (2003), for example, reported five-year retention rates that varied from a high of 82 per cent

¹ This figure includes deaths. If deaths are excluded, the accumulated attrition rate declines to about 22 per cent.

² Winkels and Withers (2000) reported that only 42 per cent of the original sample remained after 11 years of interviewing.

in Portugal to a low of 57 per cent in Ireland (after excluding deaths and other movements out-of-scope). Finally, the Survey of Income and Program Participation (SIPP), run by the US Census Bureau, has reported cumulative rates of sample loss of up to 35 per cent (of households) over a four-year period (Westat, 2001, Table 2.5, p. 2-19).

Rates of attrition might be different in other types of longitudinal surveys employing different designs and covering different populations. Birth cohort studies, for example, often report very high response rates many years after the original sample was drawn (e.g., Wadsworth *et al.*, 2003; Hawkes and Plewis, 2006). Such studies, however, are distinctive in that interviewing is relatively infrequent, and hence respondent burden tends to be far less than in other panel surveys where interview waves are more frequent. Nevertheless, it is also true that frequent (e.g., annual) survey waves are not always associated with high rates of sample attrition. The National Longitudinal Study of Youth (NLSY), which follows cohorts of young people in the US until well into adulthood, for example, obtained a rate of attrition after eight years of interviewing from its 1979 cohort of just 8 per cent, and even after 21 years the rate of sample loss was still under 20 per cent (Bureau of Labour Statistics, 2003). The NLSY experience, however, appears to be the exception and not the norm, with most other youth cohort panels (e.g., the Youth Cohort Study of England and Wales and the various cohort studies that comprise the Longitudinal Surveys of Australian Youth) recording much higher rates of attrition.³

There is also mounting evidence indicating that the problem of sample attrition has been getting worse over time (Atrostic, Baytes and Silberstein, 2001; de Leeuw and de Heer, 2002; Tourangeau, 2003). The recent experience of the NLSY seems to be in line with this conclusion, with the rates of attrition for the 1997 cohort noticeably higher than the rates of attrition recorded for the 1979 cohort. After the first five waves, the overall sample retention

³ The 1998 LSAY cohort, for example, had lost around 45 per cent of its wave 1 respondents after just four years (i.e., by the end of wave 5).

rate, while still a healthy 88 per cent, was over eight percentage points lower than the rate reported at the comparable stage of the 1979 cohort.⁴ A similar deterioration over time has also been reported for the SIPP. Involving relatively short overlapping panels (ranging from 24 months to 48 months long), rates of cumulative sample loss over eight waves (32 months) averaged around 21 per cent for the panels commencing between 1984 and 1991 (Westat, 1998, Table 5.1, p. 45). For the 1992 and 1993 panels the rate of sample loss rose to around 25 per cent over the same time span, and for the 1996 panel the rate of loss was over 31 per cent (Westat, 2001, Table 2.5, p. 2-19).

High rates of sample attrition pose a serious problem for longitudinal studies. At a minimum, attrition reduces the precision of survey estimates, and at sufficiently high levels can threaten the viability of continuing a panel, especially if the initial sample size was relatively small. Further, since attrition tends not to be random, it may impart bias to population estimates. Survey administrators thus face pressures to both ensure that they employ design features and fieldwork procedures that will maximize sample retention and, since some non-response is unavoidable, deliver as much information as possible about non-respondents to assist data analysts to make inferences in the presence of missing data. Achieving both of these objectives requires good knowledge of the response process and the factors that give rise to sample attrition.

Surprisingly, published research on longitudinal survey response remains relatively scarce. Further, the body of research evidence that does exist is not as useful as it might otherwise be. The emphasis in most past work has been on relationships with personal and household characteristics, representing most, if not all, of the explanatory variables included in many studies (e.g., Beckett *et al.*, 1988; Behr, Bellgardt and Rendtel, 2005; Burkam and Lee, 1998; Fitzgerald *et al.*, 1998; Gray *et al.*, 1996; Hawkes and Plewis, 2006; Kalsbeek,

⁴ The initial samples for the two cohorts, however, were not identical. Specifically, the 1997 cohort was younger, ranging from 12 to 16 years, whereas the 1979 cohort was aged between 14 and 21 years.

Yang and Agans, 2002; Watson, 2003). This should not be surprising. First, and most obviously, detailed information about the characteristics of non-respondents is something that is readily available for all persons who exit longitudinal surveys. Second, differences in attrition propensities may be suggestive of possible attrition bias, and thus can be used to help correct for such bias, and it is this purpose which has driven most analysis of longitudinal survey response. What such studies, however, cannot tell us much about is how survey design features might be adjusted with a view to minimizing sample attrition.

A further weakness of many studies of longitudinal survey response is the treatment of response as the result of a relatively simple, one-step decision process by sample members. In fact, the response process is much more complex than this. Lepkowski and Couper (2002), for example, distinguish three distinct phases in the response process: (i) the sample member is located; (ii) contact with the sample member is established; and (iii) the sample member provides an interview. At each of these stages there is an opportunity for the sample member to be lost from the sample.

In this paper we estimate a model predicting response over the course of the first four waves of the Household, Income and Labour Dynamics in Australia (HILDA) Survey that seeks to rectify some of these deficiencies. In particular, in addition to sample member characteristics, we incorporate into our models variables describing both the interview situation and survey design features. In addition, we explicitly distinguish between the contact and cooperation stages of the response process.

2. The HILDA Survey Data

The HILDA Survey is a nation-wide household panel survey with a focus on employment, income and the family. Modelled on household panel surveys undertaken in other countries, and described in more detail in Watson and Wooden (2004), it began in 2001 with a large

national probability sample of Australian households occupying private dwellings. All members of those responding households in wave 1 form the basis of the panel to be pursued in each subsequent wave (though interviews are only conducted with those household members aged 15 years or older), with each wave of interviewing being approximately one year apart. Like many other households panels, the sample is extended each year to include any new household members resulting from changes in the composition of the original households. The original sample members form the initial group of permanent sample members (PSMs). New children of PSMs and person who have a child with a PSM also become PSMs. All other new sample members only remain in the sample for as long as they live with a PSM.

During waves 1 to 4, households were paid either A\$20 or A\$50 each year they participated, with the higher amount only paid when interviews were completed with all in-scope household members. In wave 5 the interview incentive was changed to \$25 per head, with a \$25 household bonus paid if all household members complete the person interview.

After adjusting for out-of-scope dwellings and households, and multiple households within dwellings, the number of households identified as in-scope in wave 1 was 11,693. Interviews were completed with all eligible members at 6872 of these households and with at least one eligible member at a further 810 households. Within the 7682 households at which interviews were conducted, 13,969 persons were successfully interviewed (out of a total of 15,127 eligible household members).

Details about the evolution of the responding sample over the first five waves are provided in Table 1. This table shows that 10,392 (or 74 per cent) of those persons initially interviewed in wave 1 were re-interviewed in wave 5. If deaths and movements out of scope are excluded, the five-wave sample retention rate rises to 78 per cent. The rates of response among persons joining the sample at later waves appear to be much lower, but this is largely

because many of these new sample members are only added to the sample on a temporary basis.

Table 2 provides the wave-on-wave response rates for waves 2 through 5. These response rates exclude people who have moved out-of-scope (i.e., have moved overseas, died between waves, or were temporary sample members who moved out of the sample households). The table distinguishes between previous wave respondents (who account for the large majority of in-scope sample members in any year), previous wave non-respondents, children turning 15 years of age, and new sample members. As can be seen, the wave-on-wave response rate for previous wave respondents (calculated as the proportion of in-scope previous wave respondents who provided an interview) has gradually improved over time, rising from 86.8 per cent in wave 2 to 94.4 per cent in wave 5. Furthermore, these response rates compare favourably with that reported in other leading household panel studies, such as the BHPS (see Figure 1).

TABLE 1
Individual Response (N) by Wave, HILDA Survey

<i>Wave first interviewed</i>	<i>Wave 1</i>	<i>Wave 2</i>	<i>Wave 3</i>	<i>Wave 4</i>	<i>Wave 5</i>
Wave 1	13969	11993	11190	10565	10392
Wave 2	-	1048	705	594	572
Wave 3	-	-	833	543	482
Wave 4	-	-	-	706	494
Wave 5	-	-	-	-	819
TOTAL	13969	13041	12728	12408	12759