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RDD Panel Attrition in Two Local Area Surveys

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ABSTRACT

This paper compares the magnitude and nature of attrition in two separate RDD panel surveys conducted in the City of Chicago (*i.e.* the surveys were independent studies and were not conducted as part of a planned experiment), each with a between-wave lag of approximately one year. For each survey, sampling at Wave 1 was performed via one-stage (*i.e.* simple) random-digit dialing. In Study 1, respondents' names were *not* elicited; thus, when telephone calls were made at Wave 2 of Study 1 interviewers could not ask for respondents by name. Instead, interviewers asked for respondents by using a gender-age identifier. In Study 2, respondent name identifiers were gathered during Wave 1 and were used in Wave 2 re-contact attempts. The magnitude of the attrition in Study 1 (*i.e.* the proportion of Wave 1 respondents not re-interviewed at Wave 2) was 47%, whereas in Study 2 it was 43%: a marginal difference in attrition rates. In both surveys, age, race, education and income were significantly related to attrition. Discussion is presented on the trade-off between minimizing attrition *vs.* minimizing respondent reactivity as potential sources of total survey error. Suggestions for decreasing the size of attrition in RDD panel surveys are discussed.

KEY WORDS: Panel attrition; Random-digit dialing; Telephone surveys.

1. INTRODUCTION AND LITERATURE REVIEW

For the past several decades the problem of panel attrition has received only passing attention in the survey methods literature. Published articles either have addressed techniques which can be employed to minimize the size of the attrition from panel studies (*e.g.* Droege and Crambert 1965; Crider, Willets and Bealer 1971; McAllister, Goe and Bulter 1973; Freedman, Thornton and Camburn 1980; and Burgess 1989) or have addressed statistical techniques that may be used to *adjust* for the effects of panel attrition (*e.g.* Lehnen and Koch 1974; Hausman and Wise 1979; Winer 1983; and Lepkowski 1989).

Few articles have reported on the magnitude and nature of the resulting attrition. And, even fewer have dealt with *random* samples of the public which would allow other researchers to estimate what to expect in future general population surveys. An exception was Sobol's (1959) reporting on the attrition that occurred in a five-wave panel studying economic attitude change. At Wave 1, in 1954, a probability sample of the non-institutionalized urban population of the United States was interviewed (n = 1,150). Subsequent waves were conducted six, 12, 18, and 33 months later. Compared to the original sample, attrition for each subsequent wave was 17%, 26%, 29% and 39%, respectively.

Sobol reported that, in general, "because of canceling variations, the demographic structure ... after five rounds of interviewing, remained very similar to that of the original [sample]" (p. 52). Yet there were some significant variations, with a disproportionate number of renters, lower income households, residents of large metropolitan areas, younger (under 25 years) and older (over 64 years) adults, and those not interested in the survey subject matter lost to the panel. Winer (1983) reported results of unpublished studies which generally confirmed Sobol's findings.

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It is important to note that in each of these studies interviewers knew Wave 1 respondents' full names. In fact, in their article on techniques to minimize panel attrition, McAllister *et al.* (1973) stressed the importance of gathering detailed information about the respondent's future whereabouts at the end of the interview, including "complete names and addresses of friends and/or relatives ... of the respondent" (p. 416).

Although it can be argued that panel attrition is a serious enough problem to prompt researchers to obtain the full name and other identifying information of each Wave 1 respondent, this approach may cause problems of its own. In those instances where a respondent's name is elicited as part of the Wave 1 interview, an explanation is sometimes given that the name is important because the respondent may/will be called back after some specified time to determine if any changes occurred. This raises concerns about "evaluation apprehension" (*i.e.* reactivity) on the part of respondents (*cf.* Crano and Brewer 1973). Whereas some authors explicitly address the trade-off between attrition and reactivity (*e.g.* Sobol 1959), it is implicit in most other articles, that authors typically regard reactivity as less a problem than attrition.

All of the aforementioned research was conducted with personal interviews. But what of panel attrition when telephone surveying is done, including those studies in which Wave 1 respondents' names are not recorded? In particular, what can be expected by a researcher who plans *a priori* to conduct a panel telephone survey and thus ask respondents for name identifiers *vs.* a researcher who does not gather respondent name identifiers, either because he/she explicitly chooses not to or because a decision is made *post hoc* to convert a cross-sectional telephone survey to a panel after Wave 1 interviewing is complete?

In an attempt provide a preliminary perspective on these issues, the present paper reports findings on the magnitude and the nature of attrition in two RDD (two-wave) panel studies conducted in the City of Chicago, each with a between-wave lag of approximately one year. It should be noted that these two surveys were conducted independently of each other, not as part a planned test of RDD attrition. As such, there are various differences in the substantive focus and specific execution of the two surveys, beyond the fact that in Study 2 a name identifier was known for most respondents whereas in Study 1 it was not. We explicitly acknowledge that these differences in focus and execution somewhat limit the conclusions that can be drawn from the comparison of the two studies.

For both surveys, one stage (*i.e.* simple) random-digit dialing was used to sample Wave 1 respondents. In Study 1, respondent names were not asked as part of the Wave 1 interview and respondents were not told that they would be re-contacted. In Study 2, name identifiers were gathered at the completion of the Wave 1 interviews and were used to reach respondents at Wave 2. Respondents most often did not provide their full names, instead giving their first name only or other name identifier, *e.g.* nickname or initials. (Interviewers did not probe for full names so as to not contribute to possible feelings of paranoia on the part of reluctant respondents.)

When respondents' names are not known, how does one go about re-contacting the original respondent? This was a problem faced in 1979 by the first author when trying to determine the efficacy of creating a panel from a 1977 cross-sectional survey. As nothing was found in the published literature to provide guidance, a pilot-test was conducted with a resulting 50 percent of the 1977 respondents re-interviewed by asking for them by *gender and age*.

The results of this pilot-test were encouraging enough to recommend the procedure for use in the first study reported here. In Study 1, interviewers dialed the same telephone numbers as the Wave 1 completions, verified each number whenever the call was answered, and informed the listener that approximately one year ago a person at the telephone number had completed an interview. The original respondent was identified by *gender* (*e.g.* "a man" or "a woman") and by *age* (*e.g.* "in his early twenties" or "in her late sixties").

In Study 2, a name identifier was known for more than eight out of 10 of the Wave 1 respondents. For these respondents, Wave 2 interviewers asked for the respondent using the name identifier, after first verifying the telephone number. For the respondents with no name identifier, interviewers asked for the respondent by using demographic identifiers, as in Study 1.

In reporting the results from these studies, it is our modest intention to shed preliminary light on the magnitude and nature of attrition in RDD panels. Although the results should not be generalized to a national RDD sample, they are suggestive. Given the prevalence of RDD sampling, we believe it is important to build a knowledge-base about the attrition that can be expected in panel studies where Wave 1 sampling is done via random-digit dialing, especially when researchers have no Wave 1 name identifier for respondents. By doing this, we can better consider strategies to reduce the size and effects of this attrition.

2. STUDY 1

2.1 Methodology

In February, 1983, a city-wide (one-stage) RDD survey was conducted by the Northwestern University Survey Laboratory to gather baseline data for professors who were evaluating a series of community crime prevention programs in Chicago neighborhoods. (The questionnaire took an average of 20 minutes to administer.) Approximately 2,800 telephone numbers were dialed in the process of completing 814 interviews. For each residence contacted, one head-of-household (male or female) was systematically selected as the designated respondent (*cf.* Lavrakas 1987; pp. 99-100). Whenever necessary, Spanish-language questionnaires were administered by bilingual interviewers. Up to seven call-backs were made to hard-to-reach respondents. Of all telephone numbers dialed, 1,247 were found to ring in eligible households (defined by the survey sponsors as English-speaking or Spanish-speaking households with at least one adult 19 years of age or older); those eligibles not interviewed either were unavailable at the time calls were made or refused to participate.

One year later, in February, 1984, the Wave 1 telephone numbers were re-dialed to gather "post-test" data for the evaluation project. In those instances where the telephone was answered within eight call-attempts (across different days and times), the following introduction was read by interviewers:

> Hello, is this _____ ? My name is _____, and I'm calling from Northwestern University. About a year ago (February 1983) we conducted an interview with a _____ at this number. May I please speak with (her/him)?

The interviewer first verified the telephone number and then gave her/his own name. The third *blank* contained pre-recorded Wave 1 demographic information (gender and age) about each respondent: *e.g.* "woman in her mid 30s," or "man in his early 70s." For those few respondents who had not given their year of birth at Wave 1, the third blank simply contained the gender identifier, "woman" or "man."

Once the interviewer was speaking to the original respondent he/she continued with the following explanation, before beginning the interview:

> The information you gave us last year was a big help in understanding the concerns of residents like yourself. We are calling back now to find out some things about the quality of life in Chicago neighborhoods during the past year.

The purpose of this statement was to reinforce the respondent's willingness to cooperate with the Wave 2 interviewer by reminding the respondent of his/her cooperation in the Wave 1 survey.

Coinciding with the purpose of this evaluation project, respondents who had moved or changed their telephone numbers were not interviewed at Wave 2. This was due to the need to interview only those persons who resided at the same address as the previous year, since many of questions dealt with perceived neighborhood change since February, 1983.

2.2 Results

Due to a clerical error in processing the Wave 1 questionnaires and call-records, duplicate or incorrect respondent I.D. numbers were assigned to 17 Wave 1 respondents by the survey sponsors' staff. For the purposes of this paper, these respondents were dropped from our analyses because we could not match correctly their Wave 2 dispositions with their respective Wave 1 data. Thus the following analyses are based on the 797 respondents whose Wave 1/ Wave 2 match was certain.

The magnitude of the attrition. As shown in Table 1, approximately one-half of the Wave 1 sample was re-interviewed (53%). Of the 375 respondents who were "lost" to the panel, the greatest proportion was due to telephone numbers that rang in a new household or in an original household from which the respondent had moved; this accounted for approximately 40% of the attrition. Second most frequent were those persons whose Wave 1 telephone number was no longer in service; this accounted for a fourth of those lost. Next in frequency of those lost were respondents who refused in some way. The fourth most prevalent reason for losing respondents were those who were never home during the Wave 2 field period when their telephone was answered, even after eight call-backs; (these 33 persons were verified to be the original respondent by someone else in their household).

Table 1

Dispostion of Wave 1 Samples for Study 1 (Names not known) and Study 2 (Names known)

Wave 2 disposition	Study 1 - No names		Study 2 - Names	
	Absolute frequency	Relative frequency	Absolute frequency	Relative frequency
		%		%
No Wave 2 contact made				
Non-working, disconnected	95	11.9	94	9.4
Never answered	17	2.1	45	4.5
Contact made				
Completion	422	52.9	572	57.4
Respondent gone from number	165	20.7	163	16.4
Respondent never available	33	4.1	30	3.0
Respondent refusal/partial	37	4.7	57	5.7
"Gatekeeper" refusal	21	2.6	13	1.3
Incapacitated, deceased	3	0.4	13	1.3
Misc. other	4	0.6	10	1.0
Total	**797**	**100.0**	**997**	**100.0**

The nature of the attrition. As shown in Table 2, the group of Wave 1 respondents in Study 1 who were re-interviewed differed significantly on several factors from those who were lost to the panel. In terms of age, those adults less than 30 years of age at Wave 1 were re-interviewed with only 42% success *vs.* adults in the 40-59 year group of whom 60% completed Wave 2 surveys. Blacks were significantly less likely to be re-interviewed than Whites. In terms of household income, those respondents who reported Wave 1 annual household incomes of less than $10,000 were re-interviewed with only 44% success *vs.* those with incomes over $20,000 of whom 63% were re-interviewed. Married respondents were more successfully re-interviewed (57%) than those not married (49%). Sixty-two percent of home owners were re-interviewed compared with 47% of renters. The longer one had lived in the neighborhood and the more likely one reported at Wave 1 that he/she would not move, the more likely he/she was re-interviewed.

3. STUDY 2

3.1 Methodology

During November and December of 1983, a city-wide (one-stage) RDD survey was conducted by the Northwestern University Survey Laboratory for professors who were examining economic well-being/hardship among Chicago families. (The questionnaire took an average of 20 minutes to administer.) Approximately 3,900 telephone numbers were dialed in the process of completing 997 interviews. For each residence contacted, one head-of-household (male or female) was systematically selected as the designated respondent. Up to 20 call-backs were made to increase the likelihood of completing interviews with hard-to-reach respondents. In total, 1,659 eligible households were reached; those eligibles not interviewed either were unavailable at the time calls were made or refused to participate.

Sixteen months later (Spring 1985), all 997 telephone numbers were re-dialed to gather Wave 2 data. Unlike Study 1, in which respondents were not tracked if they had moved or changed their telephone numbers, an effort was made to find respondents whenever possible, although this effort resulted in only few successes as the respondent's full name (first and last) was typically not available. As in Wave 1 of Study 2, at least 20 call-backs were used with the hardest-to-reach respondents.

More than 80% of respondents had given a name identifier at Wave 1. This information was used by interviewers as follows:

> Hello, is this _____ ? My name is _____ , and I'm calling from Northwestern University. About 16 months ago, in late 1983, we conducted an interview with a (man/woman) named _____ at this number. May I please speak with (her/him)?

As with Study 1, the interviewer first verified the telephone number and then gave her/his own name. The third blank contained the pre-recorded name identifier given by the respondent at Wave 1. Those respondents who did not give a name at Wave 1 were asked for by using the same procedure used in Study 1 (*i.e.* asking by gender and age, or by gender only).

3.2 Results

The magnitude of the attrition. As shown in Table 1, nearly six in 10 of the Wave 1 sample were re-interviewed (57.4%). Overall, the pattern of Wave 2 dispositions in Study 2 was very similar to what was observed in Wave 2 of Study 1. Of the 425 respondents who were "lost"

Table 2

Respondent Characteristics of Wave 2 Re-interviews for Study 1 (Names not known) and Study 2 (Names known)

Respondent characteristic	Percentage Re-interviewed at Wave 2	
	Study 1	Study 2
Gender:		
Females	55	56
Males	49	60
Age:		
< 30 years	42*	--
30-39 years	54	--
40-59 years	60	--
>59 years	55	--
< 34 years	--	54*
35-49 years	--	64
50-64 years	--	61
> 64 years	--	50
Race:		
Asian	68***	42*
Black	49	53
Hispanic	44	62
White	58	61
Education:		
Not high school graduate	45**	49**
High school graduate	57	58
Some college	50	53
College graduate	60	64
Graduate school	--	68
Household income:		
< $10,000	44**	--
$10,000-$19,999	55	--
$20,000-$29,999	63	--
$30,000 or more	63	--
< $12,000	--	50**
$12,000-$17,999	--	59
$18,000-$23,999	--	66
$24,000 or more	--	64
Marital status:		
Married	57*	57*
Divorced	--	68
Separated	--	43
Single	--	57
Widowed	--	51
Not married	49	--
Residential status:		
Own	62***	59
Rent	47	56
Residential tenure in neighborhood:		
< 3 years	44***	--
3-9 years	55	--
10 or more years	56	--
Likelihood of moving in next 2 years:		
Definitely will	37***	--
Probably will	47	--
Probably will not	57	--
Definitely will not	60	--

Note: Chi-square tests of significance were employed.
*** $p < .001$
** $p < .01$
* $p < .05$

to the panel, the greatest proportion (nearly four in 10) was associated with numbers that rang in a new household or in an original household from which the respondent had moved with no new number available. Second most frequent were those persons whose Wave 1 telephone number was no longer in service, accounting for nearly one in four of those lost to the panel. Next in frequency were respondents who refused in some way. The fourth most prevalent reason for losing Wave 1 respondents were those persons whose original telephone numbers were never answered at Wave 2.

The nature of the attrition. As shown in Table 2, the group that was interviewed at Wave 2 of Study 2 differed significantly on several factors from the group which was lost, with patterns similar to what was observed in Study 1. In terms of age, those adults less than 34 years of age and those more than 64 years of age at Wave 1 were least likely to be re-interviewed. Asians and Blacks were less likely to be re-interviewed than were Hispanics and Whites. In terms of education, those with less formal education were least likely to be re-interviewed. Those respondents who reported Wave 1 annual household incomes of less than $12,000 were re-interviewed with only 50% success *vs.* those with incomes over $24,000 of whom 64% were re-interviewed. Divorced respondents were most successfully re-interviewed (68%), whereas those who said they were separated at Wave 1 were least likely to be re-interviewed (43%).

4. DISCUSSION

4.1 Summary of Findings

The two independent studies reported here were two-wave RDD telephone surveys, one with a 12 month lag between waves and the other with a 16 month lag. In Study 1, where names were not known for use at Wave 2, attrition was 47.1%. In Study 2, where name identifiers from Wave 1 were known for 83% of the respondents, attrition was somewhat less, at 42.6%.

This marginal difference in attrition rates (χ^2 (1) = 3.51, $p < .10$) is best considered within the following contextual differences between the studies: Study 1 respondents were **not** explicitly told at Wave 1 that they would be called back a year later and, thus, their names were not asked. In Study 2, respondents were told that they would be called back at some future time. Given the particular nature of the research in Study 1, no effort was made to track Wave 2 respondents who had moved or changed their telephone number. On the other hand, an effort was made to do this in Study 2, although with little success. Study 1 employed a Spanish-language version of the questionnaire; in Study 2, Hispanics who could not speak English were not interviewed.

In both studies, the vast majority of those lost to the panel were respondents who could not be reached via their Wave 1 telephone number, either because the number reached an entirely new residence, the respondent had moved from the household, or the number was no longer in service.

Taken together, the findings of these two telephone studies are fairly consistent with past findings from in-person surveys (*e.g.* Sobol 1959) in identifying the types of persons most likely to be lost in panel studies. In both Study 1 and 2, younger and older adults, non-Whites, the less educated, and those with lower income were less likely to be re-interviewed than other demographic subgroups.

4.2 Implications

Given the cost/benefit attraction of RDD surveys, added to the analytic benfits associated with panel studies, it is worthwhile to consider options that may improve the representativeness

of the final panel in surveys that use RDD for Wave 1 sampling. But before discussing these considerations, the issue of asking for respondents' names in telephone surveys merits further discussion.

Asking for respondents' names at Wave 1. As mentioned above, the issue is purportedly one of increasing the likelihood of reaching and, thus, re-interviewing the respondent at Wave 2 *vs.* the possibility of creating an evaluation apprehension effect (Crano and Brewer 1973) which may bias Wave 2 data. Yet, more than this trade-off enters into consideration.

The issues of confidentiality and informed consent also come into play: it is common practice in academic survey research for a survey organization to never provide respondent telephone numbers to anyone, with the possible exception of the sponsor, and only when he/she is planning a panel study or conducting follow-up interviews with respondents who have explicitly given permission for this. This practice follows from the reasoning that an assurance of confidentiality given to Wave 1 respondents is not violated when respondents are called back as part of the *same* on-going research. The fact that so few Wave 1 respondents refuse to participate at Wave 2, coupled with the observation that it is demographically predictable who is most likely to refuse at Wave 2, provides strong support for the conclusion that calling respondents back without having asked their permission at Wave 1 is *not* a problem.

When a telephone survey sponsor can pay for the expense of tracking respondents who have moved, it appears logical to record respondents' full names at Wave 1, since those who have moved may be tracked through telephone directories; calling new numbers given by telephone company recordings; or, even by calling former neighbors to get a forwarding telephone number in those cases where a respondent's address is also known and a reverse-telephone directory is used. But if respondents will not be tracked at Wave 2, how useful is it to be able to ask for the respondent by name?

It cannot be denied that interviewers say they prefer it. That is, most interviewers feel more comfortable asking for "John" or "John Smith" *vs.* asking for "a man in his mid-50s." Yet the marginal difference in attrition rates in the two studies reported here, even considering the four-month longer lag time between waves in Study 2 which gathered name identifiers at Wave 1, does not provide compelling evidence of the advantage of names. We acknowledge that an unfortunate limitation of our paper is that other differences in these two RDD panel surveys may have contributed to the observed differential in attrition rates: *e.g.* Wave 2 callbacks were greater in Study 2 (eight in Wave 2 of Study 1 *vs.* 20 in Wave 2 of Study 2). Thus, this issue will remain unresolved until more controlled research is conducted.

Given the current state of knowledge, we believe that it remains the responsibility of the individual researcher using an RDD panel to weigh the competing tensions of possibly biasing measures of the phenomenon under investigation by alerting respondents that they will be "measured" again (*i.e.* the "reactivity" effect) *vs.* the possibility of experiencing slightly less attrition by asking for names at the time of the Wave 1 interview.

Considerations to minimize attrition effects. Some suggestions can be considered in the attempt to minimize the effects of RDD panel attrition.

Sobol (1959) suggested the possibility of a Wave 1 *over-sampling* of those types of respondents who were most likely to be lost in subsequent waves. At first, this suggestion may sound appealing. This initial appeal follows the reasoning that if one knows who is most likely to be lost, then one can project an over-sampling of those groups at Wave 1. As was shown in Sobol's work, and as found in the two studies reported here, one could estimate what types of persons should be over-sampled at Wave 1; *e.g.* older and younger adults. Over-sampling could be accomplished through the use of a screening procedure introduced late in the Wave 1 field period; (although this clearly would increase Wave 1 total survey costs).

Although it is possible to over-sample, is it also desirable? In asking this question, one is ultimately asking whether the resulting panel is more than just an *on-the-surface* demographic match of the population of interest. In other words, is it enough to merely be concerned with getting, for example, the right number (*i.e.* proportion) of senior citizens in the final wave of a panel, or should one also be concerned whether one has the right "mix" of seniors?

This is an empirical question that the present studies cannot answer. Clearly, more research is needed before survey researchers can be more certain whether it is preferable to over-sample at Wave 1 or to "compensate" for attrition through statistical adjustments to subsequent waves of panel data.

Another aspect of the attrition problem is associated with efforts to minimize the loss of those persons whom interviewers are able to re-contact at Wave 2; *i.e.* respondents who refuse or who are "never at home" to complete the Wave 2 interview. This type of loss accounted for 29% of the Study 1 attrition, and 34% in Study 2. What can be done so that interviewers might be more successful at minimizing these losses, other than merely employing traditional interviewer training techniques and making many call-back attempts?

In this age of microcomputers it is quite feasible for interviewers to be given a Wave 1 "profile" of each respondent, so as to be more familiar with the person to be re-interviewed. Care would have to be exercised to avoid creating expectations on the part of interviewers that might bias respondents' Wave 2 answers. We are not suggesting that the interviewer necessarily use this information in verbatim form to identify the Wave 1 respondent; we believe name, gender and age are adequate for that purpose. But, there may be subtle changes in an interviewer's verbal behavior that may lead to increased success at re-interviewing when the interviewer has a more detailed idea of "who" the respondent is. This suggestion must await testing before it can be confidently endorsed, but were it to prove effective without introducing bias into the data, it would be relatively easy to do.

Similarly, introductory statements read by interviewers at Wave 2, could be targeted with special appeals to those demographic groups who appear most likely to refuse at Wave 2: in this case we are referring to the elderly, those with less formal education, those with relatively lower income, and especially those who were rated by Wave 1 interviewers as showing little interest and/or cooperation. Here again, a computer could be programmed to generate special Wave 2 introductory spiels based on Wave 1 data about particular respondents.

These appeals must contain incentives for such persons to participate at Wave 2, as they are often persons with the least intrinsic motivation to participate in surveys. When planning for subsequent waves, surveyors should think of "why" such people would want to cooperate and work such reasoning into the interviewers' introduction for these persons. Such introductions may be lengthy and may even contain some rapport-building questioning. It may even be possible to give the prospective respondent some feedback about Wave 1 findings, without biasing Wave 2 responses. If so, the respondent may regard the re-contact attempt to be more of a "two-way" exchange.

Regardless, computers could be used to generate these special introductions, which in turn would be matched only with those respondents for whom the message is targeted. Again, we have no empirical evidence to cite regarding the efficacy of this suggestion, but we believe it merits consideration and study.

5. CONCLUSION

Our findings suggest that attrition in RDD panels when respondent names are unknown is not of such magnitude as to render the surveying technique invalid or impractical. Due to

its nonreactivity, it would certainly appear to be the preferred approach in two-wave RDD panels in which the researcher has *a priori* reason not to want Wave 1 respondents to know they will be re-contacted. These findings also should provide encouragement for those who are thinking about converting an RDD cross-sectional survey into a panel. We hope that this primarily descriptive paper will encourage other survey methodologists to conduct and report the results of more controlled studies that investigate the nature and magnitude of RDD panel attrition, so that eventually, researchers can more confidently implement strategies to reduce the level of attrition. We suggest that this research should be guided by the observation that reductions in the magnitude of RDD panel attrition appear most likely to occur with well-organized surveying in which each respondent is approached as the individual that he/she is.

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