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Authors
Thomas, Duncan
Frankenberg, Elizabeth
Smith, James P.

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Duncan Thomas
Elizabeth Frankenberg
James P. Smith

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Lost but not Forgotten:
Attrition and Follow-up in the Indonesia Family Life Survey

Duncan Thomas
RAND and UCLA

Elizabeth Frankenberg
RAND

James P. Smith
RAND

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Abstract

Data from three waves of the Indonesia Family Life Survey (IFLS) are used to examine follow-up and attrition in the context of a large scale panel survey conducted in a low income setting. Household-level attrition between the baseline and first follow-up four years later is 6%; the cumulative attrition between the baseline and second follow-up after a five year hiatus is 5%. Attrition is low in the IFLS because movers are followed: around 12% of households that were interviewed had moved from their location at baseline. About half of those households were "local movers." The other half, many of whom had moved to a new province, were interviewed during a second sweep through the study areas ("2nd tracking"). Regression analyses indicate that in terms of household-level characteristics at baseline, households interviewed during 2nd tracking are very similar to those not interviewed in the follow-up surveys. Local movers are more similar to the households found in the baseline location in the follow-ups. The results suggest that the information content of households interviewed during 2nd tracking is probably high. The costs of following those respondents is relatively modest in the IFLS. While the analytical value of re-interviewing movers will vary depending on the specifics of the research, we conclude that, in general, tracking movers is a worthwhile investment in longitudinal household surveys conducted in settings where communication infrastructure is limited.

1. INTRODUCTION

A legitimate concern in any household panel survey involves the extent of sample attrition and the degree to which attrition is non-random. While attrition is potentially important in every longitudinal study, it is thought to be particularly pernicious in household surveys conducted in developing countries, where communication infrastructure is substantially less advanced than in the United States and attrition occurs largely because respondents have moved. In the developing world, respondents are rarely just a phone call away. Following movers can, therefore, involve considerable investment in terms of time and money. However, failure to follow movers may yield a panel sample that is seriously deficient for many descriptive and analytical purposes.

While longitudinal household surveys remain rare in developing countries, the marginal contribution of such surveys to scientific and policy knowledge is probably extremely high. These are the countries currently undergoing dramatic social, economic and demographic transformation and our understanding of the transitions that people living in those countries are experiencing is, at best, sketchy. Yet, proponents of new large-scale panels in low income settings have few successes to which they can point as justification for making investments in these sorts of data.

This paper examines attrition in a new longitudinal household survey in Indonesia. The first wave of the Indonesia Family Life Survey (IFLS1) was conducted in 1993. We focus primarily on the first follow-up in 1997 (IFLS2) but also draw on a follow-up of a sub-sample in 1998 (IFLS2+). Evidence is presented on the magnitude of attrition between the waves along with a characterization of the households that were not re-interviewed. Special attention is paid to the effects of strategies adopted in the field to follow-up respondents who moved and also to the impact of not following movers on the information content of such re-surveys. Specifically, we divide the sample of households that were re-interviewed into three groups: those found in their origin location, those found in the vicinity of the origin location, and those who had moved a substantial distance from the origin location. These distinctions have special significance in a developing country context for two reasons. First, the costs of tracking are relatively low for those who still reside in the vicinity of the original location but are potentially very high for longer-distance movers. Second, among the few "panel" surveys that have been attempted in developing countries, the majority have only attempted to re-interview respondents who still live in their original housing structure. A small number of surveys have included local tracking. Those that have attempted to track longer-distance movers can be counted on one hand.

Our results suggest that the pessimistic view that panels in developing countries inevitably suffer from high rates of attrition is wrong. 94% of the households interviewed in 1993 were re-interviewed in 1997. In terms of attrition, this places the IFLS in the same league at the best longitudinal surveys in the United States. Completion rates in 1998 were slightly *higher* than in 1997: re-interviews were conducted with 95% of all IFLS households and almost 99% of the households that had been interviewed in 1998.

The issue of non-response has a long and rich history in the survey research and statistical literatures; see, for example, Sudman and Bradburn (1974) Madow, Nisselson and Olkin (1983), Little and Rubin (1987) and Lepkowski (1989). Groves and Couper (1998) provide a very insightful review of the literature in conjunction with a wealth of empirical evidence on non-response in several major cross-section surveys in the United States. Attrition in panel surveys is one type of non-response and, at a conceptual level, many of the insights regarding non-response in cross-sections carry over to panels. The consequences of attrition in panels is discussed in Hausman and Wise (1979). As panels have become longer and the use of longitudinal surveys in social sciences more commonplace, there has been an explosion in the empirical analysis of attrition in these surveys. Most of that work has focussed on panels in the United States and Europe; see, for example, Becketti, Gould, Lillard and Welch (1988); Fitzgerald, Gottschalk and Moffitt (1998); Lillard and Panis (1998); MaCurdy, Mroz and Gritz (1998); Zabel (1998). There is a substantially more limited literature on attrition from panels in developing countries; see, for example, Ashenfelter, Deaton and Solon (1986); Dow *et al.* (2000), Alderman *et al.* (2000).

The next section of this paper provides a brief overview of the IFLS study design. As background for our analysis of between wave attrition, the third section models patterns of baseline non-response observed in the IFLS1.

Section 4 summarizes the principal results of our analysis of between-wave attrition. In the spirit of Fitzgerald, Gottschalk and Moffitt (1998), we begin with an examination of the correlates of attrition in the Indonesian survey. In many panel surveys in the United States (such as HRS, AHEAD and PSID; see Jasso, Rosenzweig and Smith, 2000), respondent refusal accounts for a large fraction of attritors. Refusal rates in IFLS are much lower: attrition primarily reflects the fact that households were not found. Surveys in contexts with more developed infrastructure rely heavily on making initial contact through telephones. In contrast, in Indonesia, relocating a respondent who has moved involves travelling to the new location and finding the respondent.

With this in mind, implications of not attempting to track movers are explored. Distinguishing households that did not move from those who moved locally, long distance movers and those not found is

key. First, the four groups are all significantly different from each other in terms of observable characteristics. Second, non-movers and local movers are relatively similar but both groups are very different from long-distance movers, who share more in common with those not found. This suggests that attrition of movers will affect the representativeness of a panel survey and that long-distance movers are especially important to follow because they are most similar to the hardest to follow.

Attrition is related to more than respondent characteristics. The analyses uncover a multi-factor model of attrition that also incorporates the role of communities, field staff, and tracking procedures. Our results on panel attrition parallel those for non-response in cross-sections discussed in detail by Groves and Couper (1998).

The final section presents our conclusions. The empirical results suggest that the information content associated with long-distance movers who are re-interviewed is likely to be very high. The costs of tracking in the IFLS are not overwhelming and so we conclude that, under reasonable assumptions, the benefits easily outweigh the costs. Tracking is not only feasible; it is also desirable.

2. BACKGROUND

The IFLS is an on-going longitudinal survey of individuals, households, families, communities and facilities that collects extensive and detailed information on the lives of the respondents and the environments in which they live. The study is designed to capture the tremendous cultural, geographic, and economic heterogeneity of Indonesia, an archipelago comprising more than 13,000 islands that span three time zones and are home to 300 ethno-linguistic groups. The IFLS is also designed to document Indonesia's dramatic social and economic transformation over the last few decades through the combination of retrospective data collection and a prospective panel.

Thirty years ago, Indonesia was one of the poorest countries in the world. Until the recent financial crisis, it enjoyed high economic growth rates and was on the verge of joining the middle income countries. On average, GNP per capita grew by 4.5% per annum from the mid-sixties until 1998 when GNP collapsed by around 10-15%. Neither that growth nor decline has been uniform across the country; if anything, heterogeneity has tended to increase over time. During the same period, there has been dramatic demographic and social change. Secondary school enrollment rates have risen from a mere 6% in 1960 to over 50% today while life expectancy has increased by 50% during the same period.

The IFLS Sample

The baseline, IFLS1, was fielded between August and December 1993. Enumerators attempted to interview over 7,000 households spread across 13 provinces on the islands of Java, Sumatra, Bali, West Nusa Tenggara, Kalimantan, and Sulawesi. Overall, the IFLS sample is representative of approximately 83% of the Indonesian population. The second wave, IFLS2, was fielded four years later, between August 1997 and February 1998. As that fieldwork was drawing to a close, the Indonesian rupiah collapsed and the country fell into a major economic crisis. IFLS2+ was fielded between August and December 1998 in an attempt to measure the immediate impact of the crisis. IFLS3 will be completed in late 2000.[1]

While Indonesia's richness and diversity is one of IFLS' greatest strengths, it is also, potentially, its Achilles heel: the same richness and diversity makes tracking respondents difficult.[2] IFLS provides a unique opportunity both to monitor the correlates and consequences of long-term economic growth and to understand the behavioral and distributional impacts of a severe economic shock. The research community's willingness to use the IFLS for these and other purposes rests on having confidence in the underlying quality of the survey. That evaluation is the subject of this paper.

The IFLS sampling scheme was designed to balance the costs of surveying the rugged and sparsely-populated regions of Indonesia against the benefits of capturing the ethnic and socioeconomic diversity of the country. After stratifying on provinces, 321 enumeration areas (EAs) were randomly selected within the 13 IFLS provinces, drawing on a nationally representative sampling frame which was, in turn, based on the

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[1]IFLS1 is described in Frankenberg and Karoly (1995); Frankenberg and Thomas (2000) describe IFLS2 and introduce the panel aspects of the study along with providing some main results. The design of IFLS2+ is briefly reviewed in Frankenberg, Thomas and Beegle (1999) who present preliminary evidence on the impact of the economic crisis on individual and household well-being in Indonesia.

[2]The IFLS is very comprehensive and the breadth of information contained in the survey is a second key strength. At the household level, the survey collects information on household composition, consumption, business enterprises, income and assets. In interviews with each individual in the household, contemporaneous and retrospective data are collected on his or her education, health status and use of health services; in addition, adult respondents provide a concurrent and retrospective reporting of wages and labor supply; marriage; migration; fertility and contraception. The survey is designed to go beyond the household and capture the role of the family in influencing behaviors and so collects extensive data on the characteristics of non co-resident parents, siblings and children, as well as transfers of income, goods and services to and from these individuals. A health worker visits each respondent and collects a series of physical assessments which, in IFLS2 and IFLS2+, include anthropometrics, hemoglobin, lung capacity, blood pressure and a test of mobility. In addition to individual- and household-level data, the IFLS contains an innovative community and facility survey. Village (or municipality) leaders and heads of the village women's group provided information in each of the enumeration areas from which households were drawn and detailed data are collected through visits by enumerators to over 7,000 schools, health facilities, and markets that serve IFLS respondents.

1990 Census.[3] As is common in these sorts of surveys, for cost reasons, urban EAs were over-sampled. Because Java is the most densely populated island in Indonesia, EAs outside of Java were over-sampled. In each urban EA, 20 households were included in the target sample; in rural EAs, 30 households were selected for the sample. IFLS2 sought to recontact all households included in IFLS1.

IFLS2+ was conceived and implemented within the space of a few months, in response to the financial crisis, and so was scaled down to include 90 of the IFLS EAs (slightly over 25% of the frame). To keep costs low, seven provinces were selected and EAs were sampled purposively within those provinces so that the IFLS2+ sample spans the socio-economic and demographic diversity reflected in the fuller IFLS sample.

Completion rates at baseline

A total of 7,730 households were included in the IFLS sampling frame with the goal of obtaining a final sample size of 7,000 completed households in IFLS1. The assumed non-participation rate of about 10% was based on the experience of the Indonesian Central Statistical Bureau. In fact, as shown in column 3 of Table 1, 7,224 (or 93%) of households were interviewed. Approximately 2% of households refused (column 4) and 5% were not found (column 5).[4] Completion rates for each province are reported in the following rows: they range from a low of 89% to a high of 98% across the thirteen provinces. Refusals account for about 25% of the households that were not interviewed and refusal rates are low in every province, reaching 5% in only one province, Jakarta, the capital. The final sample of 7,224 completed households consists of 3,436 households in urban areas (91% completion rate), and 3,788 households in rural areas (96% completion).

For each IFLS1 household, representative members (typically the female and male household heads) provided household-level demographic and economic information. In addition, several household members were randomly selected and asked to provide detailed individual information. The decision to interview

[3]The frame used for the 1993 IFLS baseline is the same frame that was constructed for the SUSENAS conducted in February 1993, and contained over 60,000 households. (SUSENAS is an annual cross-section survey conducted by the Central Bureau of Statistics of Indonesia.) The SUSENAS frame thus provided a very recent listing and mapping of all the SUSENAS EAs, which were used by the IFLS field teams in each EA to randomly select the IFLS households. Drawing on that listing resulted in substantial cost savings. The IFLS followed the standard definition of a household used in most surveys (inside and outside Indonesia): namely, a group of people whose members reside in the same dwelling and share food from the same cooking pot.

[4]Households were deemed not found if the building on the sample listing had been vacated (20% of the cases), no one was at home on repeated visits (40%), the building had been demolished or it could not be located (40%).

selected household members rather than all household members was made because of the costs of interviewing all household members.

Post baseline attrition

A key design decision in longitudinal surveys is whether respondents who have moved from the location where they were last interviewed will be tracked and interviewed in their new location. Most panels in developing countries have revisited the original housing structure and interviewed whoever is there, if anyone.[5] However, it is potentially important to find and re-interview the movers as well as the stayers. First, at a descriptive level, it is movers whose lives have likely changed the most and so, by ignoring movers, one risks missing important changes for a subset of the original study population. Second, many of the advantages associated with panel data require tracing the same individual (or collection of individuals) through time in order to, for example, better understand dynamics over the life course or to control unobserved characteristics that do not change over time.

In the 1997 wave of IFLS, we attempted to interview every 1993 household, regardless of whether the household had moved from its 1993 location. For the purposes of this paper, we define a household as having been re-interviewed if at least one person from the original household was re-located and a roster which listed the current whereabouts of all original household members was completed.[6] If a "target" household member had split-off from the original household, then that member was followed, thereby generating a new household in IFLS2.[7] About 11% of the households found in 1997 spawned at least one new household (and so there are more households in IFLS2 than there were in IFLS1). Some households spawned two split-offs and a few spawned three. A handful of households merged together to form a single household. In our analysis of attrition between 1993 and 1997, attention is focussed on whether or not a 1993 household was re-interviewed. (Households with split offs in 1997 are therefore treated as a single household that was found in the analyses described in this paper.)

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[5]This is, for example, the protocol recommended for longitudinal surveys in the World Bank's Living Standards Measurement Study (Glewwe and Jacoby, 2000). They argue that "following dwellings is the simplest option, because dwellings almost never move" (page 283).

[6]In IFLS2, over 99% of the households that completed a roster also completed the household-level books on consumption, family enterprises and wealth. Over 95% of current household members completed the individual-specific books. For a discussion of individual-level attrition in IFLS, and its consequences in particular models, see Frankenberg and Thomas (2000).

[7]As explained above, only the head, spouse and a subset of other household members were administered individual books in IFLS1; those respondents, in addition to all IFLS1 household members born before 1967, were designated IFLS2 "target" individual respondents. They were tracked if they had split off from the original household.

In 1998, we sought to interview all 1993 households (whether or not they had been interviewed in 1997) as well as all the new households in 1997 that were generated by split offs. The only exception to the recontact rule in both 1997 and 1998 was that, for cost reasons, we did not attempt to track households that had moved to a province that was not one of the 13 IFLS provinces or households that had moved abroad.

Although loss of respondents through attrition is a problem that confronts all panel surveys, the IFLS faced particularly daunting challenges. The four year interval between the first two waves (with no contact between rounds) is long when compared with most prominent social science surveys. Moreover, the mid-1990s was a period of substantial economic development and growth -- making the re-location of respondents in 1997 more difficult than it would be in a more static environment. Then, in 1998, the Indonesian economy was in the midst of a financial crisis and the country was in the throes of considerable social and political turmoil; the prospect of searching for and re-interviewing respondents in this environment should give anyone reason to pause.

A follow-up survey of the magnitude of IFLS had never been attempted in Indonesia, and there was considerable skepticism that it was feasible. The survey instruments are complex and demanding, not only by Indonesian standards, but compared with most household surveys in the U.S. The interviews take several hours for a household to complete -- the median interview time with a household in IFLS2 is nearly 8 hours. It would be understandable if some IFLS households were not eagerly anticipating having this experience in 1997 and, then, again in 1998.

The physical and social geography of Indonesia makes travel and communication difficult. The study sites are spread out over thousands of miles and located on 17 separate islands. Many households are quite isolated, requiring interviewers to climb mountains, ford rivers, and even cross seas to find their assigned respondents. Once they found the respondents, enumerators were confronted with having to conduct the interview in one of the many languages that were used in IFLS. (Interviews were conducted in over 20 languages in IFLS2.)

Telephone interviewing is not a realistic option in Indonesia because the vast majority of the population does not own a telephone.[8] Data are therefore collected in a face-to-face personal interview, either directly with the respondent (for adults) or with a proxy respondent (for children, infants and temporarily absent household members). Teams of 6 to 8 household interviewers were assigned a set of EAs

[8]In IFLS2, respondents were asked to provide a telephone number at which they could be contacted; for many, this was the number of a neighbor, friend, family member or employer. Fewer than 20% were able to provide such a contact.

within a province and they travelled to each EA where they attempted to locate all the respondents. The fact that respondents cannot be contacted by telephone renders tracking in the follow-up surveys especially difficult since every "target" respondent that has moved needs to be physically tracked to their new location. In many cases, when an interviewer got to the new location, the respondent had moved again -- in which case, the tracking procedure was started anew.

The possibility of significant attrition in IFLS2 and IFLS2+ was real. A good deal of thought and resources were put into the design and implementation of field procedures that sought to minimize attrition, while maintaining quality of responses. Before summarizing the results, those procedures are described next.

Field procedures and recontact protocols in the IFLS follow-up surveys

To keep the exposition simple, we describe the procedures used in IFLS2; essentially the same procedures were adopted in IFLS2+. As noted above, we define finding a household as finding at least one of the 1993 household members. When that person was located, the 1993 household roster was updated to identify who from the 1993 household was still a household member, who had left the household and who had died. New members were added to the roster and information was collected about when they had joined the household. Basic socio-economic and demographic data were collected about every household member except those who had died. The same information was collected about every 1993 member who had split off from the household in addition to the date of departure from the household, reason for departure and his or her current location.

The field period was divided into phases. During the first phase of field work (which we label the "main" field period), teams of interviewers were assigned to visit between 12 and 16 of the 321 IFLS EAs. In each EA, the team was responsible for finding the IFLS households and interviewing all current members. If no 1993 household members still resided at the 1993 location, field workers were instructed to obtain information about their current whereabouts from neighbors, relatives, friends, former employers and local community leaders.

The procedures for movers depended on where they were thought to have gone. Those thought to be within the vicinity of the original EA were treated as "local tracking" cases and attempts were made to interview them during the "main" fieldwork phase while the team was in the origin EA. As a rule of thumb, "local tracking" was implemented if the household lived within about one half hour by public transport from the origin EA. The rule was adapted to the circumstances: in more remote areas, local tracking was undertaken for more distant movers to avoid returning to that area later in the fieldwork.

In other cases, the target respondents had moved too far away to be interviewed locally. These respondents were slated to be interviewed during the second phase of fieldwork, which we call the "2nd tracking" phase.

In many instances, a household was tracked to a new address and found to have moved again, in which case the tracking process would re-start with a new address. Thus, "local tracking" cases converted to "2nd tracking" and, in some instances, "2nd tracking" cases were followed back to the vicinity of the original EA.

A key component of the recontact protocol involved managing the information about respondents' whereabouts and monitoring the progress of the team. This component had many elements. First, to facilitate the field staff's job of looking for IFLS1 households, we provided them with detailed information about the household based on the 1993 data. In addition to extensive economic and demographic information, these "relocation sheets" included the name of a person who might know their whereabouts in a few years time, as reported by each household in 1993.[9] The information that provided the key to finding a particular respondent varied across respondents and it is our sense that it was the combination of all the information that contributed to successfully re-locating IFLS respondents.

The last aspect of managing the tracking information involved getting information to and from the field and formulating a work plan for each team to follow during its tracking period. After completing fieldwork in each EA, the teams sent to the IFLS office in Indonesia an electronic version of all the completed questionnaires along with the information gathered about each household that had not been located and thus needed to be tracked.[10] The electronic and paper versions of the information on tracking cases were cross-checked and the resulting database was used to generate assignments for the tracking period. Each

[9]The relocation sheet included information on the address in IFLS1 and the names, ages, and gender, of everyone in the household in 1993. For "target" individuals (who were to be tracked if they had split-off), we listed places of employment and schools; place of birth and all places they had ever lived, and names of non-co-resident family members including parents, siblings and children.

[10]In IFLS2, a system of Computer-Aided Field Editing (CAFÉ) was introduced: every team of household interviewers was accompanied by three editors who, in addition to conducting manual edits, used a laptop computer to enter each questionnaire as soon as it had been completed by an interviewer. The data entry program assisted the editors in identifying problems and inconsistencies in the responses. These were either resolved on the spot, by the interviewer, or, if necessary, with a return visit to the respondent. In addition to improving the quality (and consistency) of editing, CAFÉ provide two key advantages. First, the electronic data files mailed to the Indonesia office were used by the team leadership to monitor progress, identify problems in the field and provide additional supervision in real time based on the actual data. Second, the electronic files played a key role in managing tracking of respondents and significantly enhanced our ability to monitor and improve re-contact rates during the fieldwork.

tracking case was assigned to a team who would visit the destination locale and attempt to locate that case during the tracking phase.[11]

Recontact rates in the IFLS follow-up surveys

The right-hand panel of Table 1 reports household-level completion rates in IFLS2. Overall, we succeeded in re-interviewing 93.5% of the IFLS households. In some households, all the 1993 household members had died by 1997; excluding those households, the re-interview rate is 94.4%.[12] Refusal rates are low (1%). As with the baseline, the vast majority of the households that were not contacted were not found (specifically 4.6% of all IFLS households).[13]

Of the households that were not found, 17% were not eligible for tracking either because they were no longer living in any of the 13 IFLS provinces (15%) or had moved out of Indonesia (2%). For slightly over 50% of the remainder of the households, we have some address information but it turned out to be inadequate to locate the respondent.

Across provinces, the re-interview rates vary from a high of 99% in Central Java and West Nusa Tenggara to a low of 88% in the capital city, Jakarta. The lower rate in Jakarta partially reflects its position at the center of economic development in Indonesia. For example, in 1997, when we returned to one of the IFLS communities in Jakarta, we discovered that the entire EA had been bulldozed and replaced by a shopping and apartment complex. None of the respondents from the 20 households that were interviewed in 1993 still lives there. The team took tracking respondents who moved seriously: 18 of those households were tracked and interviewed, with many of them having left Jakarta altogether. Since all members of one household had died, the completion rate among households who had lived in this bulldozed community and could possibly be interviewed is 95%.

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[11]In the field, the teams used their tracking assignment list to design a route to follow during tracking. Once the teams began their tracking period, they sent in progress reports several times a week. We communicated frequently with each team to spell out priority cases and determine when the tracking should stop. For some of the teams, it was advantageous to keep a few interviewers working for several additional weeks after other interviewers had stopped. In addition, in the last few weeks of the fieldwork, we recruited some of the best interviewers from teams that had completed their fieldwork to assist in areas that were not finished. The final stage of tracking lasted several months with the work slowly tapering off.

[12]In 69 households, all target respondents had died between 1993 and 1997. 80% of those were single-person households in 1993 and all but 3 of the rest were two-person households. These respondents were relatively old in 1993.

[13]Adjustment for mortality of respondents in households that were not found would increase the completion rate of eligibles; we have not attempted that adjustment.

IFLS2+ was conducted about a year later in 7 of the IFLS provinces. We sought to re-interview all IFLS2 respondents (including split-offs) as well as all households that had not been contacted in 1997. As shown in Table 2, 95% of the target households were re-interviewed. Conditional on at least one household member still being alive in 1998, the completion rate rises to over 96%. This success rate is even *higher* than that achieved in 1997, in spite of the fact that the denominator in the calculation includes both households in the 90 EAs that were interviewed in IFLS1 *and* all split offs from those households. As in 1997, refusal rates were low and the vast majority of those not interviewed were not found. In IFLS2+, Jakarta and South Kalimantan stand out as the provinces with the highest rates of attrition. Almost half of the attrition in South Kalimantan is accounted for by two of the 13 EAs: one neighborhood is another casualty of development since all the residents are being moved to make way for a shopping center, and the other is a transmigration area which is inherently transient.

Had IFLS2+ restricted itself to only those households interviewed in 1997, it would have achieved a 99% re-interview rate. From a scientific standpoint, it is important to attempt to find every household in the original frame so as to maintain the representativeness of the sample. 60% of the households that were interviewed in 1993 but missed in 1997 were interviewed 5 years later in 1998. This is an important point: a substantial fraction of households that are missed in one round can be located in later rounds. (See, for example, MaCurdy, Mroz and Gritz, 1998, for an insightful discussion in the context of the National Longitudinal Survey of Youth.)

We conjecture that there are three key reasons why IFLS2+'s 4% rate of attrition among all target households -- including those not found in 1997 -- was lower than the attrition rate in IFLS2. First, there was a good deal of learning by doing during IFLS2 which was of substantial benefit to IFLS2+. This is true for the project leadership and for the interviewers and supervisors in IFLS2+, all of whom had worked in IFLS2 and who had a better grasp of how to make tracking a success. It would be difficult to overstate the importance of the commitment of the fieldworkers to the success of the enterprise. Second, experience in IFLS2 indicated several ways in which CAFÉ could be more effectively used in the management of the tracking database. Implementing those improvements clearly contributed to the higher success rate. Third, IFLS2 was resource-constrained during the fieldwork. Had resources that were earmarked for IFLS but not under our direct control been made available to us at that time, we are confident that at least some of the 60% of respondents who were found in 1998, but not in 1997, would have been located in 1997.

Comparisons with attrition in other surveys

In summary, 93% of the target households were interviewed in the baseline IFLS survey. Of those that are included in the sample, 94% were re-interviewed in the first follow-up four years later. In IFLS2+, five years after the baseline, 95% of the target households were re-interviewed. Before discussing our analysis of attrition in the IFLS, it is useful to put these numbers into some perspective.

The Panel Survey of Income Dynamics is the longest-running longitudinal household economic survey in the United States. At the baseline, in 1968, interviews were completed by the heads in 78% of the target households. All households heads as well as all spouses of heads at baseline that split off to form a new household were eligible for follow-up in future waves. In the first re-survey, a year later, 88.1% of the eligible respondents were re-interviewed; 86% were re-interviewed after two years.[14] (Becketti, Gould, Lillard and Welch, 1998; Fitzgerald, Gottschalk and Moffitt, 1998). It may be argued that technology has changed so much that it is unfair to compare recontact rates today with these results. The Health and Retirement Survey is a potentially good standard against which to judge attrition in the first few waves of a new longitudinal social survey. At the baseline in 1992, 81.6% of the target households were interviewed. The first follow-up, two years later, interviewed 91.1% of the households and in the second follow-up, four years later, the cumulative re-contact rate was 83.7%. (Jasso, Rosenzweig and Smith, 2000.)

Among large-scale surveys in developing countries, the China Health and Nutrition Survey, conducted by a team led by Barry Popkin at the University of North Carolina, has probably been among the most successful in terms of keeping attrition low. The first round in 1989 interviewed 3,795 households in 8 provinces in China; the second wave, two years later, interviewed 95% of the households and the third wave, four years after baseline, interviewed 91% of the original households (China Health and Nutrition Study, 1998). One of the reasons for their success is the decision to follow respondents who moved within the vicinity of the EA. By design, however, longer distance migrants are systematically excluded from the follow-up. The effects on the selectivity of the resulting sample will be discussed below in the context of results from the IFLS.

Most large-scale multi-purpose surveys in low income settings have not tracked local migrants. Attrition poses a bigger problem in those surveys. For example, the Cebu Longitudinal Health and Nutrition Survey, also directed by Popkin and his collaborators, was a very intensive survey of pregnant women who

[14]The comparable re-interview rate in IFLS2 is 93.9%. It is based on all IFLS1 household heads and those spouses that had split off by 1997 excluding the 2% of households in which both head and spouse had died by IFLS2.

were interviewed 14 times over 2 years after the birth of their child. The study identified 3,327 women in Cebu, a province in the Philippines, who gave birth between May 1983 and April 1984; those women and their children form the target sample. Among them, 2,179 completed all 14 longitudinal interviews -- an attrition rate of about 1/3 (Cebu Longitudinal Health and Nutrition Study Team, 1996). Alderman *et al.* (2000) report attrition rates of about 1/3 in surveys in Bolivia and Kenya which each had a two year hiatus between the baseline and first follow-up. Movers were not tracked in the Cebu, Bolivian or Kenyan surveys and so the vast majority of attrition is due to migration.

A "longitudinal" component is included in a small number of the surveys conducted as part of the World Bank's Living Standards Measurement Study. In the follow-up surveys, interviewers return to the original dwelling and interview whoever is there. (This is the same protocol adopted by the Current Population Survey in the United States. Glewwe and Jacoby, 2000, explain the motivation for the World Bank's adoption of the protocol and describe lessons from 15 years of designing the surveys.) The first such survey was conducted in Cote d'Ivoire in 1985. 800 dwellings were followed up a year later and 87% of households were matched to the baseline households. Experience in Ghana was not as good. 1,600 households were surveyed in 1987/88 and resurveyed a year later. Only 50% could be re-matched. The experience in Lima, Peru was very similar to that in Ghana. 1,280 dwellings were surveyed in 1985-86 and re-surveyed in 1990. About 55% of the households in the first round can be matched to households in the second round. While this, and other, repeated cross-section designs have some advantages, it is not at all clear what to make of the "panel" respondents in this sample unless movers are randomly drawn from the population. We will present evidence below to demonstrate that is not the case in Indonesia.

Surveys that do not track movers will systematically exclude particular sub-groups of the population. How important those respondents are depends on the context, population of interest (and extent of migration), goals of the study and cost of tracking. Of course, including tracking in the design does not guarantee success. For example, the Malaysian Family Life Survey, conducted by RAND in 1976, drew a random sample of 1,262 ever married women in Peninsular Malaysia. The second wave, 12 years later, did try to follow movers but re-interviewed only 73% of the original primary respondents (Haaga *et al.*, 1994).[15]

With these facts in mind, we turn to attrition in the IFLS. Special attention is paid to the implications of a study design that excludes all tracking and a design that includes only local tracking. A brief discussion

[15]We have obviously not attempted to provide a complete enumeration of all panel surveys but rather highlight some of the surveys that are broadly comparable with the IFLS and identified the main strategies adopted with regard to follow-up.

of attrition at baseline sets the stage. We then focus on attrition between the first and second wave of the IFLS and draw on evidence from the third wave to the extent that it sheds additional light on the issues.

3. ANALYSIS OF ATTRITION AT BASELINE

Because we know essentially nothing about the households who were non-responses in IFLS1, our ability to understand the reasons underlying baseline non-response is limited. However, it is important to characterize in some fashion the nature of selectivity of baseline non-response if only as background for the analysis of attrition in subsequent rounds. Consequently, we present results based on analyses conducted at the EA level. The outcome examined is the percentage of households in each EA that completed the survey at baseline. There are a number of attributes of an EA that may make it easier to complete interviews. These include its geography, location, and remoteness. In the IFLS, these characteristics are recorded for each of the 321 EAs in the community survey, which is conducted independently of the household survey. Completion rates may also depend on the characteristics of households who live in the EA. We have constructed measures of these characteristics based on the answers aggregated across all interviewed households in each EA in IFLS1, recognizing that the measures are based on selectively-truncated distributions.

The results are presented in Table 3. The first column shows a strong negative relation between the percentage of households interviewed at baseline and the resources of the average household in the EA, measured by the mean of the logarithm of *per capita* expenditure (PCE). Completion rates were lowest in the economically better-off EAs. The second column explores this relationship further by searching for non-linear effects of average community resources, and by also adding a set of other potentially relevant community-level attributes to the model. The covariates reflect the average household in each EA (characterizing households by their size, the fraction of households with a couple as the head, the age and education of the head[16] and the proportion who own their homes) and survey-relevant aspects of the geographical terrain (urban area, mountainous or hilly place, a place where the road is open all year, and whether an EA is in the capital of a kecamatan, which corresponds roughly to a county in the United States). Since the variance of the dependent variable in these regressions is inversely proportional to the number of target households in each EA, estimates for the multivariate model with weights equal to the EA target

[16]If the household is headed by a couple, we include the characteristics of the male head.

sample size are reported in the third column. The difference between the weighted and unweighted regressions are very small and not substantively important.[17]

Two covariates stand out: *per capita* resources and household size. The negative association between EA baseline completion rates and community-level economic resources is non-linear and concentrated in the upper quartile of the PCE distribution. Completion rates are lower among the richest quarter of communities, with little relation between average baseline completion and economic resources below that threshold. Holding *per capita* resources constant, completion rates are significantly lower in EAs that have larger households. Since household size appears in the denominator of PCE, the total effect of household size on completion rates is given by the coefficient on household size minus the coefficient on PCE; at the top of the PCE distribution, the total effect is small. In fact, the observed correlation between average household size and completion rates is entirely driven by the 1% of EAs with the largest households. (Average household size is greater than 7 in these EAs.)

The reasons a completion rate was not 100% can be separated into two components -- the percentage of households that refuse and the percentage that were not found. Economic resources have very similar effects on both components but average household size only affects the probability a household was "not found" and, again, only in the top 1% of the distribution. It seems likely, therefore, that this reflects the greater work load associated with very large households and decisions regarding the allocation of time to complete each EA in IFLS1.

Apart from the province controls, none of the other covariates is a significant predictor of the overall completion rates. There are no statistically significant differences in refusal rates by province so that province effects are completely due to an inability to find households. There is, however, some evidence that EAs with older people as household heads are more likely to refuse to participate.

We turn now to an analysis of attrition between the waves of the IFLS.

4. ANALYSIS OF BETWEEN-WAVE ATTRITION

Attrition could result from difficulty in locating a household or implicit or explicit refusal of households to participate in the survey after they were found. The characteristics of respondents,

[17]An indicator variable for each province is included in the multivariate models. The coefficients are suppressed from the table. The F test reported at the foot of the table indicates the province effects are statistically significant. OLS estimates are reported in the table. All target households were interviewed in nearly 50% of the EAs suggesting a censored regression model might be more appropriate. Tobit estimates are substantively identical to the OLS estimates as are estimates based on ordered probits.

communities, and survey personnel and budgets all play a role in determining which respondents attrit and which do not. While attrition may be selective on many attributes of respondents, we begin with a focus on the role of household economic status, our initial measure of which continues to be PCE.[18]

Correlates of attrition between IFLS1 and IFLS2

The first model of attrition listed in Table 4 sets the stage for what is to follow. In this model, the only covariate is ℓnPCE, measured at the household level in IFLS1. The outcome examined is whether an IFLS1 household completed the IFLS2 survey. Table 5 presents coefficient estimates from logit regressions in which the dependent variable is unity if the household was interviewed in IFLS2. Paralleling the results for baseline attrition noted above, the first model indicates that there is a strong and statistically significant negative relationship between PCE and the probability of remaining in the survey. On average, higher economic status households were more likely to attrit between the two waves so that without weighting, IFLS2 will be less representative of higher economic status households than would a random household survey.

Why would this be so? A first step toward answering that question is contained in the second column of Table 4. In this specification, we have relaxed the implicit assumption in the *per capita* measure that the effects on attrition of expenditures and household size are equal in magnitude and opposite in sign. Not surprisingly, that assumption is strongly rejected. Holding PCE constant, an increase in family size (in 1993) is associated with a higher probability that the household was re-interviewed (in 1997). Since both consumption expenditures *per capita* and household size have strong independent effects on attrition, this suggests that there must be multiple mechanisms through which these effects operate.

The next step involves examining possible non-linearities in these relationships. Figure 1 provides a non-parametric plot of the relation between the probability of completing the interview and PCE, measured on a logarithmic scale.[19] The relationship is clearly non-linear: the probability of re-interviewing a household rises with PCE in the bottom quartile of the distribution (delineated with a dashed vertical line).

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[18]In most developing countries, including Indonesia, money income measures of well-being are problematic as large numbers of households have limited connection with the formal and paid labor market sector. Consequently, the IFLS devoted considerable survey time to a consumption module which collects information on over 50 groups of major items in the household budget. The value of expenditures, production for own consumption and transfers are aggregated to calculate household "expenditure."

[19]The figure presents a locally weighted smoothed scatter plot of the relation, using a biweight weighting function with a 25% bandwidth (see Cleveland, 1979).

Above the 25th percentile, there is a roughly monotonic decline in the probability of completing the IFLS2 interview as PCE increases.[20]

The third column in Table 4 builds on this graphical representation and demonstrates that non-linearities exist in both the numerator and dominator of PCE. While there now appears to be little effect of increasing PCE on attrition in the lowest quartile, there is a statistically significant negative impact on completion above the bottom quartile threshold. Based on these results, attrition appears to be more concentrated among the more affluent.

The association between attrition and household size is also non-linear. Re-interview rates rise as household size increases and these effects are strongest moving from households with one to two members. A plausible interpretation is that if someone leaves a single person household, the entire household no longer exists in that location and tracking will be more difficult. This interpretation is taken up again below.

To this point, we have discussed these relationships as if they were stemming solely from the attributes of households. However, the characteristics of the communities in which respondents reside may also be important. As in most places in the world, residential living in Indonesia is quite segregated along economic lines. Some *desas* (villages) are very poor. On the other side of the tracks, it is easy to pick out the areas where the more well-to-do co-reside. Frequently, homes in these communities are collectively as well as individually secured by walls or fences and interviewers and supervisors must first gain entry to the residence before they can directly approach the respondents. In addition, survey workers may feel intimidated about approaching an area where they feel that they do not belong or are unwanted.

The characteristics of neighbors of the targeted respondent may also be crucial. Neighbors and friends are often an invaluable source of information in finding respondents. Some communities are closely knit where everyone (or at least someone) knows where everyone else is, when they will return, or the place to which they have relocated. Inter-personal relations in other communities, especially in urban areas, areas around markets (which tend to be particularly transient in Indonesia) and areas around training schools and universities, may be more reserved. In these places, individuals may come and go, leaving few clues about their current whereabouts. In addition, some EAs are easily accessible, while reaching others poses

[20]Re-interview rates are also highest among middle income households and lowest among the poorest and highest income households in PSID (Becketti, Gould, Lillard and Welch, 1998; Fitzgerald, Gottschalk and Moffitt, 1998).

formidable logistical problems.[21] In column 4 of Table 4, our simple model is extended by adding measures of enumeration area specific PCE.[22]

We explored possible non-linearities at the community level and found little evidence for any in average household size in the community, but a possible break in the EA mean ℓnPCE at the upper quartile. An increase in *per capita* consumption at the community level increases attrition, an effect that may accelerate among the wealthiest quarter of EAs. Larger average household size in the community is also associated with increased attrition. At first blush, this result parallels the lower completion rates among EAs with very large households in the baseline; we will return to the issue below.

Finally, and most important, including community level measures fundamentally alters the individual household level PCE effects. Now there is no impact on attrition of household economic resources above the 25th%ile, but, among households in the lowest quartile of the PCE distribution, there is a positive association between additional resources and completing the survey. This suggests that, within a community, households at the bottom of the distribution are most likely to move and, if they move, they are the least likely to retain connections with their former neighbors. To assess whether PCE is proxying for some other characteristic, we determine whether the result is sustained in more comprehensive multivariate models.

Column 5 in Table 4 provides one such model and includes additional household and community level characteristics. At the household level, the models include age and education of the head of household, whether the household head is married, and whether the household lives in an owner-occupied dwelling. A parallel set of variables are measured at the EA level: average age and education of household heads in the EA, fraction of households headed by a couple, and fraction of owner-occupied dwellings. In addition, we control for whether the EA is in a mountainous or hilly place, accessible by road all year, whether it is an urban area and whether it is the capital of the kecamatan.

Among the additional household level covariates, attrition is higher if the head is younger, better educated and if the household did not own its home in 1993. All three characteristics are almost certainly proxies for the geographical mobility of households. Many studies have documented that geographic mobility increases with education, declines with age and is lower among those who are home owners (see, for

[21]As one of many examples, one of the IFLS EAs is on a small island off the coast of Sumatra. To reach the EA, the interviewers travel by public transport to the end of the tarred road, wade through a river, take an ox-cart part of the way and walk the final leg. The journey from the largest town on this small island takes about 3 hours.

[22]EA means are based on all IFLS1 households, whether or not they were followed up. Several of the characteristics are directly measured in the IFLS community survey. All covariates in these regressions are based on responses recorded in IFLS1.

example, Rosenzweig, 1986, and Smith and Thomas, 1998). Between wave mobility is clearly a key reason why some households cannot be found and why an interview is not completed. Controlling these characteristics, single-person and two-person households are no less likely to be re-interviewed, suggesting that they were proxying for higher mobility households in the previous regressions; rather, the evidence indicates that the interview teams were as successful at obtaining information on the whereabouts of these small households as they were for any others that moved.

Among the additional community level covariates, completion rates are lower in mountainous areas. Although the survey team tried valiantly to climb every mountain, it may have been difficult to climb back up over and over and over again. Completion rates are also lower in urban locales (although this is significant only when team controls are included). Given the often transient nature of many of its residents, the anonymity of neighbors, and that some physical structures did not survive the four year hiatus between waves, lower completion rates in urban centers is not surprising.

The model in column 5 confirms the fact that there is a very different relation between economic resources and completion rates when these resources are measured at the household level and when they are measured at the community level. The impact of community level resources is substantially muted by the inclusion of additional controls in the model suggesting that resources are a proxy for an array of community characteristics. That said, completion rates tend to fall with average PCE in EA with the effect being stronger (and significant at the 10% level) in the upper quartile of communities. Controlling the average level of economic well-being in a community, it is still the case that attrition is highest among the lowest resource households.

To this point, we have been silent about the role of survey personnel and budgets. Interviewers and supervisors can have as much to do with whether a case is complete as the characteristics of the respondents themselves. The survey staff must not only be facile in the administration of the survey instrument, they are also the front line soldiers in locating respondents, convincing sometimes reluctant respondents to cooperate and tracking those respondents who have moved. In addition to being well-trained in techniques of tracking, motivation and unrelenting determination are keys to their success. In IFLS2, interviewers were organized into 23 teams. The model in column 6 of Table 4 incorporates a set of indicator variables, one for each team to control these effects. (The coefficient estimates are not reported.) A χ^2 test indicates that the team effects are strongly jointly statistically significant. (The test statistic is 106.2 with 22 degrees of freedom; the p-value is less than 0.00001.) We will explore interpretations of this result in more detail below.

Two of the community-level coefficient estimates present a puzzle in the model in column 5: attrition rates are higher in communities with larger households and younger household heads. Both of these effects disappear when team effects are included in the model. Teams are close proxies for specific geographic areas and the largest households are concentrated in a small number of communities. It is our impression that these communities are of two types. Some are predominantly Chinese and they were among the most reluctant to participate in IFLS2. Others are located near training schools and universities where boarding houses are common and residents tend to be young and transient.

Types of attrition in IFLS2

There are many reasons for non-response in any survey -- be it a cross section or panel (Groves and Couper, 1998). As a first step in this direction, attrition in IFLS2 has been separated into two components: those households that were not found and those who refused to participate in the interview. To explore whether the household and community characteristics affect these reasons for attrition differently, Table 5 reports a multinomial version of the regression in the final column of Table 4. The dependent variable is defined as one of three mutually exclusive outcomes: completed the IFLS2 interview, did not find the household, and household was found but refused to participate in IFLS2. Households who completed the interview are the reference group in the multinomial logit.

Distinguishing attritors in this way is instructive. First, household characteristics associated with difficulty in re-interviewing respondents largely reflects an inability to locate the households; none of these characteristics is significantly related to refusals. Households that were larger in 1993 were easier to re-interview. In part, this is simply because the probability one member is found rises with household size; in part, it is because the probability that all members had moved from the 1993 location tends to decline with household size. Similarly, couples, households with older heads, those with less well educated heads and those who were owner-occupiers were all much more likely to be found and all of these characteristics are associated with lower geographic mobility.[23]

[23]Table 4 indicated that single-person households were more difficult to re-interview and we suggested this may be because when such a respondent moved, he or she may leave little trace. Table 5 demonstrates that is not the full story. Single-person households are more likely to refuse to participate in the survey (controlling age, education or household resources). While the effect is not significant, the coefficient estimate is large. IFLS is designed as a multi-faceted instrument with a household-level questionnaire targeted at the female head, one targeted at the male head and then an individual-level questionnaire for every household member. In single-person households, the survey burden is large. In IFLS2, for example, the median time to complete the household questionnaires and an adult individual questionnaire was 2 hours and 20 minutes.

Turning to the community-level characteristics, households are less likely to have been relocated if they lived in EAs with higher levels of economic resources at the time of the baseline suggesting that connections among residents in these areas are looser than elsewhere. Urban dwellers are no less likely to be found than rural residents -- instead, our lower completion rate among urban households is primarily due to higher refusal rates. This likely reflects a higher value of time for these people, after controlling all household and community characteristics.

Households who lived in mountainous EAs in 1993 were both less likely to be found and more likely to refuse. The most plausible explanation has to do with the time costs associated with visiting, and re-visiting, these households. Households in these EAs tend to be widely dispersed. If no one was at home on the first contact, the interviewers would return multiple times until contact was made. In those cases in which the household had moved, interviewers would search for contact information from neighbors and other people in the vicinity. In these EAs, multiple visits and visits to neighbors involved substantial time costs and so there were not as many visits as in more compact EAs. Along the same lines, if a household refused to cooperate, a supervisor visited the household to explain the importance of the survey and try to obtain cooperation. In mountainous areas, each of these re-visits was expensive in terms of time; while the rate of initial refusals may not have been different in these EAs relative to more accessible EAs, the rate of refusal conversions was probably lower in the mountainous areas.

Types of tracking in IFLS2 and IFLS2+

Successful follow-up of respondents depends on how extensive and effective are the tracking procedures. If, as is the case with many surveys in developing country settings, tracking stops at the original residence of the respondent, attrition is almost guaranteed to be non-trivial and highly selective on traits associated with geographic mobility. Partly due to the four year hiatus between IFLS1 and IFLS2 and partly due to the suspected mobility of individuals and households in a growing economy, an elaborate set of tracking protocols were employed. These protocols (described in Section 2) were implemented in two stages. Local tracking was conducted in the vicinity of the original EA during the main fieldwork period. If a household had moved to a place "close" to the 1993 location, the field workers attempted to find the household and conduct the interview then and there. The 2nd phase of tracking took place after the teams had completed their main sweep through all the IFLS EAs. Teams were sent to those areas in their provinces where respondents who had moved were thought to be currently living; if the respondent was located, an interview would be conducted. If the respondent had moved again -- and some had -- the interviewers sought

information on the new location and that information was used to assign the case to the appropriate team. During this phase, therefore, some respondents were tracked and interviewed in locations that are close to their original EA. Obviously, tracking is an iterative process and it is a judgement as to when the costs exceed the benefits.

Two questions regarding the effects of tracking on the sample are investigated. First, what is the "yield" in terms of additional completed cases? Second, are the households that were found during the tracking phases different from the households found during the main fieldwork, in terms of observable characteristics?

Table 6 lists the distribution of cases according to their final field status. The top panel of the table presents the marginal distribution of the final outcomes in IFLS2 (in column 1) and in IFLS2+ (in column 2). Among those households re-interviewed in IFLS2, about 84% were completed in their original EA during the main survey, 4.5% were found and interviewed in the vicinity of the original EA during the local tracking phase, and 6% were found during the follow-up 2nd tracking phase. Both phases of tracking were clearly important: instead of a completion rate of 84%, the final completion rate in IFLS2 is 94.4%. Put another way, the combined tracking procedures reduced attrition by two-thirds. The results for IFLS2+ are roughly similar: in that survey, there was a 72% reduction in attrition because of tracking.

The lower panel of Table 6 presents the joint distribution of outcomes in IFLS2 and IFLS2+ for those households included in the 90 IFLS EAs that made up the IFLS2+ sample. Failure to track in both surveys would have had a devastating impact on the representativeness of the sample: only 77% of the target respondents were found during the main fieldwork in both surveys. Since IFLS2+ re-interviewed 96% of the households, tracking reduced attrition by over 80%. These numbers unambiguously demonstrate the cumulative benefits in terms of completion rates of tracking in multiple-round panel surveys.

Besides yielding a higher number of cases, households that are tracked may be important in terms of the information content they contain. This issue is taken up in the next section.

Characteristics of households that were tracked in IFLS2

In the absence of tracking, households that were interviewed in either phase of the tracking would have been non-responses. In most developing country panel surveys, such households are non-responses by design. An examination of the characteristics of the households that were tracked, relative to the households interviewed in their origin location, will provide some insight into the analytical costs of that design. Moreover, since tracked cases may be similar to movers, they may provide some information about the

selection mechanism leading to non-response in the IFLS. To examine these issues, Table 7 reports estimates from multinomial logit models in which the IFLS respondents are divided into five mutually exclusive outcomes: refusals, those not found, those found during the 2nd tracking phase, those found during local tracking and those found during the main fieldwork. The latter are the reference group.

Two models are reported. The first, in panel A, is analogous to the first model in Tables 3 and 4, above, and records the bivariate relationship between household ℓnPCE in 1993 and the likelihood a case ends up in each group. The estimates provide a simple description of the selectivity of each group, as measured by economic status, relative to the reference category. The results are striking. The cases obtained through the 2nd phase of tracking have much the same relationship with household ℓnPCE as those cases that were never found -- a 1% increase in PCE increases the probability of 2nd tracking and not found cases by about the same amount. At one level, this result should not be surprising. Most of the 2nd tracking and not found respondents likely involve situations where the household had relocated outside (and, in some cases, far outside) the original EA. However, it is potentially an analytically powerful result as it implies that the 2nd tracking cases may offer evidence about the nature of the IFLS cases that were never found.

The second model in Table 7 provides a more complete multivariate description of the selection pathways. Our previous conclusion that households found during 2nd tracking and those never found are very similar in terms of observed household characteristics is maintained in this specification although the relationships with PCE are substantially muted in both cases. The effects of household size, whether the household is headed by a couple, age of the head, education of the head and whether the household is an owner-occupier on the probability of being interviewed during 2nd tracking are very similar to the effects on the probability of not being interviewed at all.[24]

The estimates in Panel A indicate that households found during local tracking tend to be higher in economic status than those found in their origin location but not as high as those found in 2nd tracking and those not found at all. As with the other outcomes, the economic status differences disappear when controls for a broader array of characteristics are included in the regression. The key differences between households found during the main fieldwork and those found during local tracking mirror some of the differences associated with the 2nd tracking cases and are associated with greater geographic mobility: local movers tend to have smaller households, tend to be younger and tend to not own their homes.

[24]None of the estimated coefficients is significantly different at the 5% level although two are different at the 10% level: whether the household is an owner-occupier and whether it is headed by a couple. A χ^2 test for equality of all the household level covariates in the two branches is not rejected.

Refusals are more common among higher PCE households. Results from previous tables are replicated in the model with a broader set of controls: none of the household characteristics is associated with a higher refusal rate.[25]

The attributes of the communities in which the households were interviewed in 1993 have a significant influence on the probability a household ends up in any one of the five categories specified in the model. There is, however, no systematic pattern in these associations. For example, local tracking is common in urban EAs; to some extent, this is because public transport networks are much more dense in urban areas (and IFLS interviewers travelled by public transport to keep costs down) and because of the definition of local tracking (interviews conducted with households who live within about half an hour of the origin location). In many of the urban areas, travelling for half an hour would take one across the whole town rendering local tracking substantially more feasible than in rural areas with less extensive public transport. Local tracking is also more common in EAs with smaller and older households; older respondents are less likely to move far away.

The positive effect of the average education of household heads in the community on the probability a household was found in the 2nd tracking suggests that, conditional on community and household resources, these communities are likely to provide better information on the whereabouts of respondents who moved far away. Respondents are least likely to be found if they lived in relatively better off EAs and EAs with younger heads; we suggested above that residents of these types of EAs are likely to have more tenuous connections with their neighbors and so obtaining good information about their current whereabouts is harder. The reverse argument likely applies to those households that were living in the kecamatan capital in 1993; they are the least likely to not be relocated, *ceteris paribus*. The kecamatan capitals tend to be small and a large fraction of the residents are civil servants; there are, therefore, many sources of potential information to identify the whereabouts of those who have moved. The evidence suggesting residents from mountainous EAs were more likely to not be found and also refuse and the fact that urban residents are more likely to refuse emerges again in these specifications; those results were discussed above.[26]

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[25]None of the household covariates is individually significant and they are not jointly significant (p-value=0.14).

[26]The multinomial logit estimates impose the assumption of independence of irrelevant alternatives (IIA). It can be tested by contrasting the estimates based on the full model (including all 5 alternatives) with each of four models in which one of the alternatives is excluded from the analysis. The difference in the coefficient estimates between the full model and each one of the models with an alternative excluded is, in all cases, small and never close to significant at the 5% level. The Durbin-Wu-Hausman χ^2, which tests for the joint significance of all differences in coefficient estimates, are also small: they are never greater than 1.0 and the p-values are never smaller than 0.90. IIA is not rejected in the models. This is also true for the trinomial logit models in Table 5.

Qualitatively the same results emerge using the IFLS2+ data although the sample is about one-quarter the size of IFLS and estimates are not as precise. Recall that interviews were completed with 60% of the households who had lived in one of the 90 IFLS2+ EAs in 1993 but were not interviewed in IFLS2. An examination of the characteristics of these respondents indicates that while, on average, the households interviewed during 2nd tracking in IFLS2 are similar to those not interviewed, the latter group is drawn from a distribution with greater heterogeneity. Some of the respondents found in IFLS2+ who were not in IFLS2 were temporarily away from their home at the time of IFLS2, others had not strayed far from their 1993 home and others were long distance movers. In fact, the results in Table 7 provide an early glimpse of this result: the standard error on ℓnPCE in Panel A is greater for the households that were not found relative to those found during 2nd tracking.

Can we do better? The role of the teams of interviewers and supervisors

We have noted that respondents are by no means the only people standing between a survey instrument and an observation in a public use data set. Highly trained, dedicated, and committed interviewers and supervisors are an essential input, not only for obtaining high quality interviews, but also in tracking down respondents and securing their co-operation so they participate in a survey (Sudman and Bradburn, 1974; Groves and Couper, 1998; Zabel, 1998). The models discussed above that have included team fixed effects have all indicated that those effects are significantly related to interview completion rates. In this section, we take this result a step further by asking what attributes of the interviewers and their teams mattered for this dimension of data quality.

In each of the 13 IFLS provinces, we recruited interviewers locally. This is because Indonesia is culturally and linguistically very diverse, and it is imperative that the interviewers be fluent in the local languages. The interviewers were organized into 23 teams. In 7 provinces, there was only one team; there were between two and four teams in the remaining six provinces. In multi-team provinces, EAs were assigned to teams prior to the start of fieldwork based on the geography of the province to maximize efficiency of the fieldwork. Those assignments were essentially random.[27]

Table 8 summarizes the characteristics of interviewers in IFLS2. The characteristics have been aggregated into averages, one for each team; summary statistics for those averages are displayed in the table.

[27]Interviewers within teams were not assigned randomly to cases -- we wanted to re-interview as many households as possible. Interviewers who were more effective at finding people were more likely to be sent off to find someone; interviewers who were more effective at obtaining co-operation were sent to the more difficult respondents. During the final stages of 2nd tracking, we retained our best interviewers and re-structured some of the teams.

The interviewers were chosen so that men and women are equally represented. They are relatively young (an average team age of 26), and they are highly educated relative to their countrymen: three-quarters of the interviewers have received a bachelors degree. This was no accident and reflected the commitment to quality by the survey. (Most of the interviewers were recent college graduates who had been recruited from the population study center in each of the IFLS provinces.)

In addition to these standard demographic attributes, our evaluation of interviewer quality went a step further. All IFLS2 interviewers were given a short self-administered questionnaire to complete at the end of the IFLS fieldwork. The questionnaire inquired about their prior survey experience and their incomes on their last jobs. The interviewers were given a short mathematics test (which had a top score of 30). They were also asked to provide a series of self-evaluations. First, in an effort to capture self-perceived psychological traits, they were asked whether they considered themselves to be assertive, shy, careless, etc. Second, they were asked whether their prior job experience helped them in IFLS2, whether they received help from other team members, and whether their supervisors had helped them. These evaluations were based on a scale from 0 (completely disagree) to 10 (completely agree).

Given that the data in Table 8 represent averages across all team members, one is struck by how much variation exists across teams. To some extent, this is another reflection of the heterogeneity across Indonesia. Several teams were far less educated than the average, some had little prior experience while others had a good deal, some helped each other and others did not, personality traits varied a great deal and finally they have quite varied perceptions of the help received from their supervisors.

The next step in assessing interviewer quality is to see whether average team traits are correlated with the team fixed effects estimated in our prior models. These results (with 23 observations in each regression) are provided in Table 9. The first column is based on the team fixed effects estimated in the logistic model of the probability a household was interviewed in IFLS2 (reported in column 6 of Table 4.) Columns 2 to 5 are based on the estimates of the team fixed effects in the multinomial logistic model that distinguishes types of tracking, refusals and households that were not found (reported in panel B of Table 7).

Consider first the estimates based on the logistic model for completing a case. Interviewer quality apparently matters: teams with higher average mathematics scores and higher salaries in their job prior to IFLS2 were significantly more likely to produce higher household interview completion rates, even after controlling characteristics of the households and the communities. Each of the coefficients on these two team quality indicators is significant at a 10% size of test; the F statistic for the joint significance of the two covariates is 4.52 (p-value=0.027). There was also a completion benefit from a sense of receiving more

assistance from the supervisors. (None of the personality variables listed in Table 8 ever mattered in these models and so they were not dropped from consideration.)

Moving to the multinomial logistic specification, it is important to remember that the reference group is households that were interviewed during the main fieldwork. Interviewers with higher incomes in prior jobs were more likely to complete cases (first column in Table 9); that benefit is primarily because they completed more cases during the main fieldwork and not during the tracking phases. In particular, they were less likely to complete local tracking cases. One interpretation is that these are high opportunity cost interviewers whose motivation wanes when confronted with the long and often frustrating hours that must be spent finding households who have moved. In both IFLS2 and IFLS2+, time wages were increased and bonuses were paid for completing cases during the 2nd tracking phase. Devising a scheme to reward interviewers for local tracking cases would likely have been a good investment.[28] Help from supervisors was apparently of greatest value during the main fieldwork; in part, this reflects the fact that the 2nd phase of tracking was not closely supervised because of the nature of the task (pairs of interviews searching for respondents), a shortage of hands and a severely limited budget. The results suggest that more resources for supervision at this time would have been profitable.

Estimates of the costs of tracking

Summarizing the results thus far, well-formulated tracking protocols with high quality interviewers who are committed to implementing tracking can yield a high return in reducing attrition in longitudinal surveys in developing countries. Respondents who have moved and are subsequently tracked tend to carry a lot of information in the sense that they differ systematically from respondents found in the origin location and they are, in many observable dimensions, similar to respondents who are not found.

The benefits of tracking are clear. What of the costs? While the main fieldwork and local tracking are conceptually different, as a practical matter it is very difficult to distinguish those phases since the activities were undertaken concurrently. It is more straightforward to separately estimate the costs of 2nd tracking. Taking into account only the marginal costs of additional fieldwork, in both IFLS2 and IFLS2+, completing a case during 2nd tracking cost between 50 and 60% more than the combined cost of completing a case during main or local tracking.

[28]It was deemed infeasible to institute a randomly-assigned payment scheme that varied across interviewers or interview teams because many of the interviewers were in contact with interviewers in other teams and the impact on morale would likely have been negative. Some small-scale quasi-experiments involving higher bonuses for especially difficult types of cases suggested that we would have had to pay very large bonuses to elicit significantly more completed cases of those types.

A substantial fraction of the costs of any survey are independent of whether households are tracked; these include the costs of design, training, printing and equipment and transporting personnel and supplies. Taking those costs into account, in IFLS2 and IFLS2+, 2nd tracking cases cost, on average, between 15 and 20% more than other cases. In both surveys, tracking raised the total training and fieldwork budget by about 20%.

Thus, we would conclude that, in developing countries, panel surveys with low rates of attrition are highly desirable on scientific and policy grounds, they are feasible and they are not excessively costly. Given the level of resources currently devoted to such surveys, the social return to increasing that investment is likely to be very high.

5. CONCLUSIONS

In many ways, attrition is the Achilles heel of longitudinal household surveys. This is particularly true in developing countries where there are few large-scale longitudinal surveys that have achieved recontact rates between waves that would place them in the same league as the best surveys in the United States. There is, therefore, considerable skepticism that it is worth investing in panel surveys in low income settings. The IFLS demonstrates that such skepticism is unfounded -- even with a substantial hiatus between waves. After 4 years, IFLS2 succeeded in re-interviewing 95% of the households that were contacted in IFLS1 in which one household member was still alive. After 5 years, IFLS2+ re-interviewed 96% of the eligible IFLS households. It is feasible in low income and dynamic settings to conduct large scale household panels that meet -- and possibly even exceed -- the standards set by the best longitudinal surveys in the world. Moreover, the costs of panel surveys in low income countries are not prohibitive.

This paper has laid out the protocols that were used to minimize attrition and described the costs and benefits of our approach. A key element of our success in achieving low attrition rates is our commitment to track people who moved.

Had we followed the approach used in most other panel surveys in developing countries -- and currently espoused as the "right" way to conduct these surveys by the World Bank -- we would have visited the original housing structure and interviewed whoever lives there. We would have contacted about 84% of the IFLS households in IFLS2 and only 77% of the target households in IFLS2+. A small number of surveys interview people who still live in the community; we added about 4% to our completion rate with local

tracking in each survey. We added another 5-6% by following people who had moved out of their neighborhoods -- many of whom had gone to different provinces.

Our regressions can be summarized as indicating that, in terms of observable characteristics, households that were interviewed during the 2nd tracking phase share much in common with households that were not relocated; local tracking households have more in common with those found in the original location than those not interviewed. The three groups of respondents who were re-interviewed are all significantly different from each other. Movers, and especially longer-distance movers, are especially important because, relative to those that do not move, these respondents arguably carry more information about those respondents that were not re-interviewed at all.

We conclude that following up movers is an essential element of a successful panel survey. In the United States, a lot of tracking is done by telephone. In Indonesia, tracking involves obtaining as good an address as possible, physically visiting the new location and often finding that the respondent has moved again in which case the process has to be started anew. While tracking is time-consuming and requires careful planning, resources, and commitment, we think the evidence is overwhelming that the benefits in terms of the scientific value of the survey easily outweigh the costs.

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Figure 1

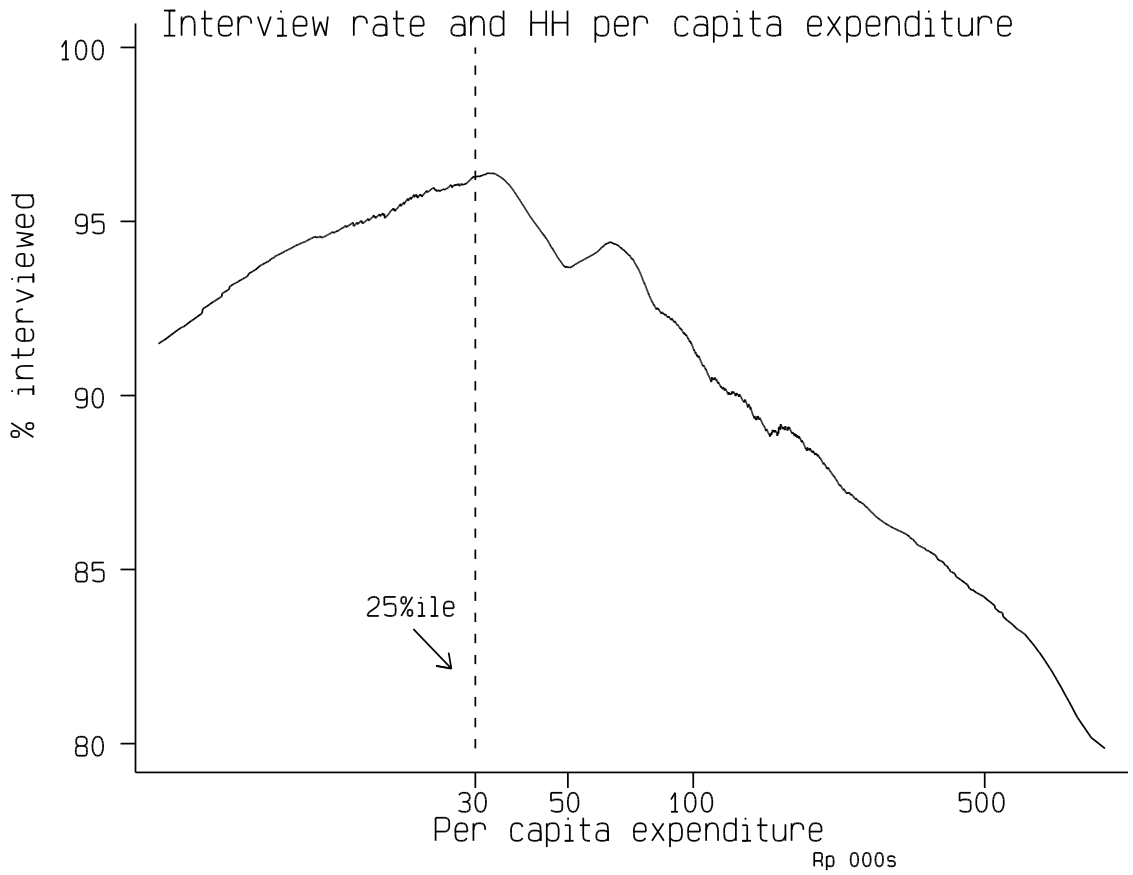
Interview rate and HH per capita expenditure
% interviewed
100
95
90
85
80
25%ile
30
50
100
500
Per capita expenditure
Rp 000s

Table 1
Household completion rates: IFLS1 and IFLS2

Province	# EAs (1)	Target # HHs (2)	IFLS 1 (1993) Inter-viewed (3)	% Refused (4)	% Not ivwd (5)	IFLS 2 (1997) Inter-viewed (6)	Conditional on being alive Ivwed (7)	%Refuse (8)	%Not ivwd (9)
Total # HHs (% HHs)	**321**	**7730**	**7224 (93.4)**	**(1.9)**	**(4.7)**	**6751 (93.5)**	**(94.4)**	**(1.0)**	**(4.6)**
North Sumatra # (%)	26	620	563 (90.8)	(1.9)	(7.3)	502 (89.2)	(89.5)	(2.9)	(7.7)
West Sumatra # (%)	14	360	351 (97.5)	(0.6)	(1.9)	324 (92.3)	(93.6)	(0.0)	(6.4)
South Sumatra # (%)	15	370	349 (94.3)	(1.4)	(4.3)	316 (90.5)	(91.1)	(2.9)	(6.1)
Lampung # (%)	11	300	274 (91.3)	(0.3)	(8.3)	259 (94.5)	(94.5)	(0.0)	(5.5)
Jakarta # (%)	40	800	731 (91.4)	(4.9)	(3.8)	633 (86.6)	(87.7)	(0.8)	(11.5)
West Java # (%)	52	1250	1111 (88.8)	(2.5)	(8.7)	1051 (94.6)	(95.9)	(1.1)	(3.0)
Central Java # (%)	37	920	878 (95.4)	(1.7)	(2.8)	857 (97.6)	(98.8)	(0.6)	(0.6)
Yogyakarta # (%)	22	500	478 (95.6)	(1.2)	(3.2)	445 (93.1)	(94.3)	(0.4)	(5.3)
East Java # (%)	45	1120	1044 (93.2)	(2.1)	(4.7)	995 (95.3)	(96.1)	(1.0)	(2.9)
Bali # (%)	14	350	340 (97.1)	(0.9)	(2.0)	321 (94.4)	(94.7)	(0.6)	(4.7)
West Nusa Tengarra # (%)	16	420	407 (96.9)	(0.5)	(2.6)	398 (97.8)	(98.8)	(0.7)	(0.5)
South Kalimantan # (%)	13	330	323 (97.9)	(0.6)	(1.5)	294 (91.0)	(91.6)	(2.2)	(6.2)
South Sulawesi # (%)	16	390	375 (96.2)	(1.0)	(2.8)	356 (94.9)	(95.7)	(0.3)	(4.0)

Table 2
Household completion rates: IFLS2+ (1998)

Province	# EAs (1)	Target # HHs (2)	Inter-viewed (3)	Conditional on being alive in 1998 Ivwd (4)	%Refuse (5)	%Not found (6)	Conditional on Ivw in 97 %Ivwd (7)	Conditional on No ivw in 97 %Ivwd (8)
Total # HHs (% HHs)	**90**	**2335**	**2218 (95.0)**	**(96.4)**	**(0.5)**	**(3.1)**	**(98.9)**	(59.5)
North Sumatra # (%)	10	240	229 (93.4)	(95.8)	(0.8)	(3.4)	(97.5)	(84.0)
South Sumatra # (%)	15	406	383 (94.3)	(94.8)	(1.2)	(4.0)	(98.1)	(62.5)
Jakarta # (%)	11	207	191 (92.3)	(92.7)	(0.5)	(6.8)	(98.2)	(54.2)
West Java # (%)	13	336	323 (96.1)	(97.9)	(0.6)	(1.5)	(98.9)	(87.5)
Central Java # (%)	17	464	452 (97.4)	(98.3)	(0.2)	(1.5)	(100.0)	(57.1)
West Nusa Tengarra # (%)	11	306	298 (97.4)	(98.0)	(0.0)	(2.0)	(99.6)	(37.5)
South Kalimantan # (%)	13	376	342 (91.0)	(91.4)	(0.5)	(8.0)	(98.6)	(37.1)

Table 3
Models of EA-level completion rates at baseline

OLS estimates

	Unweighted		Weighted
	(1)	(2)	(3)
Mean characteristics at time of baseline of households in EA			
ℓn(mean PCE)	-6.561	.	.
	[3.16]		
ℓn(mean PCE): 0-75%ile	.	0.573	0.509
		[0.27]	[0.27]
ℓn(mean PCE):75-100%ile	.	-19.968	-21.047
		[2.76]	[2.94]
Mean ℓn(HH size)	.	-17.224	-17.093
		[2.59]	[2.41]
Mean fraction couples	.	9.471	6.863
		[1.61]	[1.27]
Mean age of HH head	.	-0.142	-0.132
		[0.78]	[0.74]
Mean education of head	.	-0.906	-0.755
		[1.74]	[1.51]
Mean fraction owner occupiers	.	-1.551	-1.058
		[0.30]	[0.21]
Geography of EA			
(1) if mountainous	.	-2.783	-2.444
		[0.94]	[0.86]
(1) if hilly	.	-1.975	-2.029
		[1.52]	[1.66]
(1) if road open all year	.	3.897	4.059
		[1.43]	[1.51]
(1) if Kecamatan capital	.	-2.190	-2.259
		[1.45]	[1.56]
(1) if urban	.	-0.820	-0.994
		[0.63]	[0.76]
Province effects?	No	Yes	Yes
F(province effects)		4.20	4.18
p value		[0.00]	[0.00]
R^2	0.077	0.323	0.314
F(all covar)	10.00	4.59	4.71
p value	[0.00]	[0.00]	[0.00]

Notes: 321 EAs included in each regression. t statistics in parentheses based on infinitesimal jackknife estimates of variance-covariance matrix and are robust to heteroskedasticity. Dependent variable is percentage of target number of HHs in each EA that were interviewed; the target was 20 HHs in each urban EA and 30 HHs in each rural EA. Weights used in third column are target number of households in each EA. PCE is *per capita* expenditure. All covariates measured at time of IFLS1.

Table 4
Logistic models of household re-interview rates in IFLS2

	PCE only (1)	Add HH size (2)	+HH compos (3)	Community resources (4)	Full characs (5)	+Team effects (6)
Household-level characteristics at time of baseline						
ℓnPCE	-0.520	-0.404	.	.	.	.
	[6.89]	[5.54]				
ℓnPCE (0-25%ile)	.	.	0.113	0.408	0.387	0.441
			[0.60]	[2.33]	[2.16]	[2.25]
ℓnPCE (25-100%ile)	.	.	-0.497	-0.099	0.049	0.048
			[6.82]	[1.15]	[0.47]	[0.45]
ℓn(Household size)	.	0.807	0.400	0.948	0.530	0.547
		[7.49]	[1.94]	[9.26]	[2.40]	[2.47]
(1) if single person HH	.	.	-0.767	.	-0.336	-0.342
			[2.27]		[0.95]	[0.96]
(1) if 2-person HH	.	.	-0.263	.	-0.420	-0.399
			[1.19]		[1.78]	[1.66]
(1) if couple heads HH	.	.	.	.	0.367	0.396
					[2.16]	[2.24]
Age of HH head	.	.	.	.	0.011	0.012
					[2.27]	[2.43]
Education of HH head	.	.	.	.	-0.046	-0.050
					[2.70]	[2.82]
(1) if owner occupier	.	.	.	.	0.850	0.846
					[5.27]	[5.13]
					(6.30)	(6.26)
EA level characteristics at time of baseline						
ℓn(mean PCE): 0-75%ile	.	.	.	-1.277	-0.391	-0.487
				[3.91]	[1.14]	[1.55]
ℓn(mean PCE):75-100%ile	.	.	.	-1.437	-0.706	-0.656
				[5.94]	[1.90]	[1.72]
Mean ℓn(HH size)	.	.	.	-0.693	-1.197	-0.244
				[2.21]	[2.60]	[0.51]
Mean fraction couples	.	.	.	.	0.325	0.480
					[0.55]	[0.78]
Mean age of HH head	.	.	.	.	0.040	0.020
					[2.67]	[1.35]
Mean education of head	.	.	.	.	-0.039	-0.017
					[0.81]	[0.35]
Mean fraction owner occ	.	.	.	.	0.253	-0.142
					[0.65]	[0.38]
(1) if mountainous	.	.	.	.	-0.968	-0.807
					[2.83]	[2.97]
(1) if hilly	.	.	.	.	0.236	0.232
					[0.94]	[0.97]
(1) if road open all year	.	.	.	.	-0.056	-0.063
					[0.20]	[0.23]
(1) if Kecamatan capital	.	.	.	.	0.314	0.313
					[1.60]	[1.93]
(1) if urban	.	.	.	.	-0.412	-0.536
					[1.84]	[2.78]
Constant	4.977	3.468	2.436	6.562	1.498	0.457
	[14.99]	[9.83]	[3.59]	[4.56]	[0.95]	[0.30]
χ^2(all covariates)	47.53	92.53	136.14	211.29	368.89	448.85
Pseudo R^2	0.03	0.05	0.06	0.09	0.15	0.19

Notes: Dependent variable=1 if household interviewed in IFLS2. Sample includes 7,155 households interviewed in IFLS1 with at least 1 target member still alive in IFLS2. Asymptotic t statistics in parentheses robust to heteroskedasticity. χ^2 for team effects in column 6 is 106.2 (with p value<0.00001).

Table 5
Multinomial logistic models of types of attrition in IFLS2

Probability of HH not being found and HH refused to participate, relative to HH interviewed

	HH Not Found (1)	HH Refused (2)
Household level characteristics at time of baseline		
ℓnPCE (0-25%ile)	-0.336	-0.653
	[1.71]	[1.36]
ℓnPCE (25-100%ile)	-0.074	0.047
	[0.64]	[0.23]
ℓn(Household size)	-0.749	0.188
	[3.04]	[0.43]
(1) if single person HH	0.008	1.289
	[0.02]	[1.64]
(1) if 2-person HH	0.220	0.960
	[0.86]	[1.75]
(1) if couple heads HH	-0.576	0.351
	[2.97]	[0.93]
Age of HH head	-0.021	0.017
	[3.59]	[1.81]
Education of HH head	0.054	0.022
	[2.81]	[0.55]
(1) if owner occupier	-1.096	0.299
	[5.81]	[0.77]
EA level characteristics at time of baseline		
ℓn(mean PCE): 0-75%ile	0.413	0.505
	[1.23]	[0.77]
ℓn(mean PCE):75-100%ile	0.836	0.385
	[2.03]	[0.49]
Mean ℓn(HH size)	0.282	0.211
	[0.53]	[0.22]
Mean fraction couples	-0.389	0.260
	[0.56]	[0.22]
Mean age of HH head	-0.022	0.023
	[1.48]	[0.73]
Mean education of head	-0.001	0.079
	[0.03]	[0.84]
Mean fraction owner occ	0.196	-0.194
	[0.49]	[0.29]
(1) if mountainous	0.868	0.909
	[2.91]	[2.11]
(1) if hilly	-0.220	-0.142
	[0.84]	[0.32]
(1) if road open all year	0.054	0.182
	[0.17]	[0.42]
(1) if Kecamatan capital	-0.330	-0.255
	[1.85]	[0.82]
(1) if urban	0.375	1.312
	[1.77]	[2.70]
Constant	0.320	-8.483
	[0.19]	[3.14]

Notes: 7,155 HHs in sample; robust asymptotic t statistics in parentheses. χ^2 for significance of all covariates is 56,758; pseudo-R^2=0.22. χ^2 for significance of team effects is 15,022 (not found), 28,578 (refuse) and 42,480 (joint).

Table 6
Distribution of households by tracking status in IFLS2 and IFLS2+

A: Marginal distributions in each wave

	IFLS2 % cases (1)	IFLS2+ % cases (2)
HHs re-interviewed		
HHs found in "Main" fieldwork (in original location)	84.0	86.9
HHs found in "Local tracking" (vicinity of original location)	4.5	4.1
HHs found in "2nd tracking" (long distance movers)	5.9	5.3
Total re-interviewed	94.4	96.4
HHs not found	4.6	3.1
HHs refused to be interviewed	1.0	0.5

B: Joint distribution in IFLS2 and IFLS2+
(Includes only HHs in the 90 IFLS2+ EAs)

	IFLS2+: Main	Found in Local Tracking	2nd Tracking	Not Found	Refused
IFLS2:					
Found in Main	76.9	2.3	1.6	0.4	0.2
Local tracking	4.9	0.5	0.4	0.0	0.0
2nd tracking	5.3	0.4	2.3	0.3	0.2
Not found	1.9	0.9	1.1	2.4	0.0
Refused	0.0	0.0	0.0	0.1	0.2

Table 7
Multinomial logit models of attrition in IFLS2

Probability of refusal, HH not found, HH found in 2nd tracking, found in local tracking relative to found during main fieldwork

	Local tracking (1)	2nd Tracking (2)	Not Found (3)	Refused (4)
Panel A:				
ℓnPCE	0.391	0.617	0.655	0.322
	[5.10]	[7.45]	[7.71]	[2.06]
Panel B:				
Household-level characteristics				
ℓnPCE (0-25%ile)	0.074	-0.269	-0.367	-0.693
	[0.24]	[1.47]	[1.84]	[1.44]
ℓnPCE (25-100%ile)	0.023	0.050	-0.061	0.059
	[0.20]	[0.51]	[0.53]	[0.29]
ℓn(Household size)	-0.425	-0.938	-0.867	0.094
	[2.00]	[4.29]	[3.51]	[0.21]
(1) if single person HH	0.129	-0.296	0.172	1.356
	[0.30]	[0.75]	[0.42]	[1.71]
(1) if 2-person HH	0.103	-0.119	0.263	0.976
	[0.37]	[0.46]	[1.00]	[1.77]
(1) if couple heads HH	-0.014	-0.191	-0.600	0.324
	[0.07]	[1.09]	[3.07]	[0.85]
Age of HH head	-0.016	-0.014	-0.025	0.014
	[3.07]	[2.90]	[4.32]	[1.50]
Education of HH head	-0.001	0.061	0.064	0.029
	[0.06]	[3.73]	[3.31]	[0.72]
(1) if owner occupier	-1.037	-0.904	-1.275	0.096
	[6.98]	[6.06]	[6.88]	[0.25]
EA-level characteristics				
ℓn(mean PCE): 0-75%ile	-0.117	-0.327	0.289	0.457
	[0.31]	[0.83]	[0.83]	[0.70]
ℓn(mean PCE):75-100%ile	0.336	0.555	1.131	0.591
	[0.57]	[1.08]	[2.96]	[0.77]
Mean ℓn(HH size)	-1.374	-0.411	0.004	0.104
	[2.23]	[0.75]	[0.01]	[0.11]
Mean fraction couples	1.529	-0.602	-0.483	0.269
	[1.81]	[1.00]	[0.67]	[0.23]
Mean age of HH head	-0.046	-0.004	-0.032	0.018
	[2.83]	[0.27]	[2.03]	[0.56]
Mean education of head	0.052	0.125	0.021	0.087
	[1.03]	[2.38]	[0.36]	[0.93]
Mean fraction owner occ	-0.619	-0.634	0.013	-0.304
	[0.92]	[1.51]	[0.03]	[0.47]
(1) if mountainous	-0.320	-0.259	0.835	0.899
	[0.94]	[0.76]	[2.64]	[2.13]
(1) if hilly	-0.057	-0.149	-0.247	-0.154
	[0.24]	[0.61]	[0.89]	[0.35]
(1) if road open all year	-0.647	-0.071	0.003	0.154
	[1.82]	[0.30]	[0.01]	[0.36]
(1) if Kecamatan capital	-0.258	-0.186	-0.394	-0.281
	[1.41]	[0.97]	[2.16]	[0.92]
(1) if urban	0.552	0.152	0.397	1.331
	[2.31]	[0.72]	[1.84]	[2.75]
Constant	2.858	2.377	2.410	-7.195
	[1.61]	[1.22]	[1.36]	[2.64]

Notes: 7,155 HHs in sample; robust asymptotic t statistics in parentheses. For Panel A, pseudo R2=0.02; for Panel B, χ^2(all covariates)=69,052; pseudo-R^2=0.19. χ^2 for significance of team effects is 42,189, p-value<0.00001. Durbin-Hausman-Wu tests for IIA are less than 1.0 for all combinations in which one outcome is excluded from the analysis. All covariates measured at time of baseline.

Table 8
Characteristics of Teams
(Means of interviewers in each team)

	Mean (1)	Standard Deviation (2)
Fraction interviewers who are male	0.554	0.116
Average age of interviewers	26.1	1.14
Fraction who have Bachelors degree	0.750	0.306
Average mathematics score[a]	22.3	4.94
Average monthly income in last job[b]	389.4	217.2
Fraction with prior experience on survey	0.503	0.287
Scaled responses[c]		
Prior experience was helpful	7.85	0.808
Received help from teammates	7.52	0.910
Supervisors were helpful	6.49	1.37
Consider self to be...		
Assertive	8.08	1.04
Shy	3.54	1.31
Careless	2.65	1.26

Notes: Statistics based on 300 interviewers; their responses have been aggregated into 23 team averages. Mean of team averages reported in column 1, standard deviation of team averages reported in column 2.

[a]Maximum score on mathematics test is 30.

[b]Thousands of Rupiah. At start of IFLS2, $1≈Rp2,000.

[c]Measured on a scale from 0 to 10; 0 ⇒ complete disagreement, 10 ⇒ complete agreement.

Table 9
Team characteristics and estimated team fixed effects
OLS estimates

	Logistic (Table 4) (Col 6)	Multinomial logistic (Table 7, Panel B)			
	Interview completed	(Col 1) Local tracking	(Col 2) 2nd tracking	(Col 3) Not found	(Col 4) Refused
	(1)	(2)	(3)	(4)	(5)
Math score	0.061	0.050	-0.015	-0.190	-0.668
	[1.77]	[1.27]	[0.49]	[0.44]	[1.05]
ℓn(Income)	0.647	-0.951	-0.531	-3.870	0.925
	[1.89]	[2.43]	[1.58]	[0.88]	[0.14]
Work experience	-0.101	0.053	0.214	-1.930	1.317
	[0.47]	[0.22]	[1.00]	[0.69]	[0.33]
Help from teammates	-0.300	0.193	0.122	1.116	5.478
	[1.40]	[0.79]	[0.58]	[0.41]	[1.37]
Help from supervisors	0.371	-0.079	-0.260	-2.241	-3.229
	[2.27]	[0.43]	[1.63]	[1.07]	[1.06]
Intercept	-7.758	8.894	6.225	70.304	-34.969
	[1.74]	[1.74]	[1.42]	[1.22]	[0.42]
R^2	0.376	0.299	0.211	0.148	0.180

Notes: Observations are fixed effects estimated from regressions listed in heading of each column; 23 observations in each regression; t statistics in parentheses.