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Remembrances of Things Past: Test-Retest Reliability of Retrospective Migration Histories

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REMEMBRANCES OF THINGS PAST:
TEST-RETEST RELIABILITY OF
RETROSPECTIVE MIGRATION HISTORIES

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Summary. Matched retrospective life history data collected from the same individuals in two waves of the Malaysian Family Life Survey provide a unique opportunity to evaluate the quality of long term recall data in a rapidly changing developing country. Recall quality, measured by consistency of incidence and dating of moves reported twelve years apart, is higher among the better educated. Respondents better remember more salient moves, those linked with other important life events such as marriage, childbirth or a job change and moves that lasted a long time. Migrations that dim in memory as time passes are typically shorter duration or local moves, often made while the respondent was young. Dating of moves is also significantly improved when linked with other salient events. Our findings suggest concrete and practical steps that can be followed to improve the quality of retrospective life histories collected in field surveys.

Keywords: Retrospective data; Recall; Migration

1. Introduction

In recent years, there has been an explosion in the quality and quantity of household survey data from developing countries. These data have yielded important insights about the lives of families and individuals in low income settings (Srinivasan and Behrman, 1995; Deaton, 1997). However, the vast majority of these household surveys are cross-sectional, limiting how much can be learnt about the dynamics that have brought each society to its current status quo. In most developing countries, longitudinal surveys are probably still years away, and panel surveys launched today can, at best, only tell us about the future and not the past. Yet, it is the demographic and economic transitions of the past few decades that are crucial for understanding the process of development. The only realistic option then is to rely on recalling past events. Indeed, in recent years, there has been a substantial increase in the amount of information collected retrospectively in surveys conducted in developing countries: for some very good examples, see the Demographic and Health Surveys (DHS) which have been conducted in over 50 countries during the last decade.

Retrospective reporting has a long history in household budget surveys, demographic surveys and surveys of labor market behaviors conducted in North America and Europe (Hansen *et al.*, 1960). A large literature has developed on response errors, in general, and the quality of recall data, in particular. Sudman and Bradburn (1974), Dex (1991), and Bound *et al.* (2001) provide insightful summaries. In recent years, survey researchers have increasingly paid attention to how respondents answer questions and the study of autobiographical memory is an area of fertile collaboration between survey researchers and cognitive psychologists (Rubin, 1996; Schwarz and Sudman, 1994; Sudman *et al.*, 1996).

The literature indicates that a question about an event that occurred decades ago tends to yield a less reliable response than a query about a similar event which took place last week or last year. The more salient an event, the more likely it will be recalled, particularly as time since the event increases. Some studies have shown that salience of an event is also associated with a tendency to report the event as having taken place more recently than it actually did (forward telescoping).

Whereas much has been learnt in observational and experimental studies conducted in the developed world, very little research has been conducted in a developing country context. This is an important gap in our knowledge given the increasing reliance on retrospective data collection in those settings. Moreover, evidence garnered in North America and Europe may not translate directly to contexts where social and economic change is very rapid and where respondents typically have relatively little education. This paper seeks to contribute towards filling that gap.

Focusing on residential location and migration, we undertake a detailed evaluation of retrospective life histories reported by the same respondent in two waves of a longitudinal survey conducted in Malaysia, a rapidly growing economy. The matched migration histories cover the same period of the respondent's life and were reported independently by the respondent in the First and Second Malaysian Family Life Surveys (MFLS1 and MFLS2), which were conducted 12 years apart. We seek to provide an evaluation of the quality of these data and insights into the extent and nature of biases inherent in these kinds of data. See Auriat (1993) for a comparison of migration histories with Belgian administrative records.

Migration events are examined for three reasons. Changes in geographic location are often important lifetime events giving an *a priori* expectation that there will be some concordance between the two histories reported 12 years apart. The fact that not all moves are equally well-remembered will be exploited to gain some understanding of the nature of recall bias in these data. Second, migration plays a critical role in the process of economic development and understanding how mobility changes with development is a central theme running through the social science literature. Third, putting aside the paucity of such data from developing countries, collecting panel surveys of migrants is expensive. Migrants are the most costly respondents to follow (and most likely to attrit from any sample) precisely because they have moved from their original location. For analyses of residential mobility over the life course, retrospective surveys will often be the only viable source.

The rest of this paper is divided into five parts. The next section describes the structure of the Malaysian surveys. Section 3 discusses hypotheses that will be tested and Section 4 presents a descriptive summary of the reliability of the data in the surveys. Multivariate analyses of correlates of the quality of retrospective migration histories are presented in Section 5 and the final section summarizes the results.

2. Sources of data

The first MFLS was a precursor for many of the demographic and socio-economic surveys conducted in developing countries over the last two decades, including, the DHS and the World Bank's Living Standards Measurement Surveys. The original design of MFLS1 drew heavily on work of T. W. Schultz (1961) and Gary Becker (1975) emphasizing the role of the family and the inter-relationships among economic and demographic outcomes in decision-making in low income settings. The research focus of several of the key people in that design was on contraception, reproduction and investment in young children. Since it was perceived that questions about contraception and pregnancy could not be asked of unmarried women, the research team decided to only ask the battery of detailed life course questions to ever married women and their husbands. Our analytical sample is, therefore, limited to ever married respondents. The issues raised by this restriction are discussed below.

 MFLS1 collected data from over 1,200 ever-married women aged 18 to 49 along with their spouses (some 900 men). The survey was conducted in 52 communities in Peninsular Malaysia over three rounds, four months apart, during 1976 and 1977 (Butz and Da Vanzo, 1978). Besides socio-demographic attributes of the household, each male and female respondent was asked to provide an extensive life history covering, *inter alia*, schooling and training, marriage, occupation, labor supply, earnings and residential location.

MFLS2, conducted in 1988-89, re-interviewed the same people surveyed in MFLS1. All MFLS2 respondents were asked to provide an account of their life history covering the same substantive ground as in MFLS1. Since our goal is to evaluate the quality of retrospective autobiographies collected in a survey setting, attention is restricted to those respondents who completed life histories in both MFLS1 and MFLS2. Of the 1,262 primary respondent females in MFLS1, almost three quarters were relocated and complete migration histories were recorded in both waves of the MFLS for 851 women. About 80% of the women

were still married at the time of MFLS2 and their spouses were eligible for the male interview. Migration histories were completed in MFLS1 and MFLS2 by 663 men.

While some life history modules in MFLS1 and MFLS2 differ, migration histories were designed to be identical. Each male respondent was first asked his place of birth (district and state) and residence at age 15; he was then asked whether he had ever moved to a different district since then and stayed there for at least 3 months. If so, he was asked "When did you move to a different district?" and "What district and state was that?" The sequence was repeated until all moves across a district line were accounted for, including the move to his place of residence at the time of the interview. Parallel questions were asked of each female respondent except that she was asked about each time she had "shifted house" so that all moves of three months duration were recorded. For both sexes, a move to or from a foreign country is counted as a migration event.[1]

The two waves of the MFLS offer a unique opportunity to evaluate the quality of demographic retrospective data. For pre-1977 moves, each respondent is asked to describe precisely the same migration events in two independent interviews twelve years apart. The degree of correspondence, or discrepancy, between the migration histories that correspond to the pre-1977 time span forms the basis of our evaluation of the extent and nature of recall error in retrospective migration data.

A potential concern is that a move which was made before 1977 may be telescoped forward in the second survey and reported as having taken place after 1977 or, *vice-versa,* post 1977 events may be telescoped back to pre 1977. Because we know the respondent's location in 1977 and 1988 with certainty (because he or she was interviewed there), almost all these telescoped moves can be identified and excluded

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[1]Foreign moves account for 2.4% of all moves reported in MFLS. Neighboring Singapore is the destination of 60% of all these moves. Since women were asked to report every change in location, they report moves within a foreign country. Men were asked to report only moves that involved crossing a district boundary within Malaysia or across an international boundary if outside Malaysia. The number of moves made by men within foreign countries is likely to be small. Only 5% of male respondents report ever having moved to a foreign destination. For 56% of them, the only foreign destination was Singapore which would be treated as a single district and so no inter-district moves are missed. This leaves 3% of male respondents who reported a foreign move that was not to Singapore. The data on women suggests that the frequency of within-foreign country moves is small -- only 6 such moves are reported. This is not surprising as moves to foreign countries are of short duration. The time that male respondents lived abroad accounts for only ½ of one per cent of the entire time span covered in this study. Thus the time during which men are at risk of a within foreign country move is very small and the prospects of multiple moves quite limited. Finally, we experimented with including a control in the regression models below for whether a move is to or within a foreign country. It is not significant in any of the models. We conclude that the absence of male moves within foreign countries does not contaminate our results on recall bias.

from (or included in) the list of candidate moves used in the MFLS1-MFLS2 matching. While there are a small number of ambiguous cases which may have been telescoped, as a practical matter, they are not a serious concern: they account, for example, for less than ½% of all matched male moves.

A difficulty in recalling migration histories stems from changes in district boundaries which have been made throughout its post World War II history. Most adjustments involved small changes in boundaries although in some cases, as economic development proceeded and population expanded, single districts were subdivided into two districts. In the most complex case, boundaries have been reconfigured among districts around Kuala Lumpur (the capital city) as a consequence of rapid growth with a new district emerging that draws from parts of many districts.

Respondents and survey personnel were instructed in MFLS1 to use 1970 district boundaries to define their places of residence, and to use 1980 boundaries in the MFLS2. While not unusual for any country over time, these revisions raise some issues. The revisions may cause confusion for either respondents or survey personnel concerning the relation between current district contours and those that were in place when the respondent lived there some time ago. To some extent, we will capture the consequences of any confusion that may have resulted by including controls in our analyses for districts whose boundaries were altered.

Even if this problem were unimportant, district boundary changes between 1970 and 1980 add a complication that must be dealt with to make comparisons between MFLS1 and MFLS2 meaningful. Given the geographic subdivisions that took place between the two surveys, some events that are inter-district migrations in MFLS2 would not have been inter-district moves in MFLS1. To preserve comparability, MFLS2 inter-district migrations that would not have been inter-district migrations using the MFLS1 district boundaries were redefined as intra-district moves and excluded from analyses of inter-district mobility.

As noted above, the design of MFLS restricts our sample to ever married women and their spouses which raises questions about whether the sample design is informative for an evaluation of recall bias. Selection on having ever been married is not an important restriction in Malaysia since virtually every adult who reaches age 50 has been married. For example, in the 1970 Census of Peninsular Malaysia, 99% of females and 96% of males age 45-49 had ever married. Thus, concern regarding selectivity of the sample revolves around age-specific marriage rates -- or the respondent's age at interview and timing of marriage. The women in our sample are restricted to age 18 through 49. According to the 1970 Census (and two

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additional sources) about 78% of all women in this age range would have been ever married.[2] The

percentage married increases to 90% when women age 18 through 21 are excluded (and they are a small

fraction of our sample). Ninety-eight percent of women aged 27 through 49 are married.[3]

The extent to which this selectivity biases our results on the quality of migration histories does not

depend on whether married people move more or less than single people but on whether ever married people

are better or worse at recalling their moves. To explore this issue, we estimated all our models of quality

of recall over three samples -- the full sample of respondents; a sample of female respondents age 22 through

49 and males age 25 to 60 (representative of 90% of the population) and a sample of females age 27 through

49 plus males age 30 through 60 (representative of 98% and 95% of the population, respectively). If

selection on marital status is important for reporting quality, we would expect to see differences in the results

across the three sub-samples. We find no such differences across these samples. Given the potential import

of selection, the results reported below are based on the intermediate sub-sample that is restricted to 816

women age 22-49 and 641 men age 25-60.[4]

In any panel survey, migrants are the hardest to follow and attrition warrants special attention here

since it raises concerns regarding a second form of selectivity of the sample. Of the original MFLS1

respondents, about 70% were followed in MFLS2. They are about the same age, slightly less educated and

had, on average, made slightly fewer moves by 1976 than those respondents who were not re-interviewed

in MFLS2. All of these differences are small and none is significant. There is one dimension in which the

samples are significantly different: men in our matched sample are less likely to have ever moved (t

statistic=2.6). However, since our analyses condition on a move having been reported in MFLS1, under-

sampling migrants does not directly affect representativeness for our purposes.

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[2]We have drawn on three sources of data to examine the issue. The 1970 Census provides age and marital status
while MFLS1 contains a household roster which provides the age and marital status of all household members at
the time of our survey. Third, a new refreshment sample was added to MFLS2 in 1988 that was not restricted to
ever married adults. All three sources yield essentially identical results.

[3]Men in our sample range from age 20 through 60. About 75% of men in this age range were married. Restricting
to 25 through 60 year olds, around 90% were married. Among men age 30 through 60, 95% were married.

[4]Excluding young respondents resulted in dropping 35 females and 22 males, 4% and 3% of the entire MFLS1
sample, respectively.

The key question for this research study is whether attrition between the two rounds of the MFL surveys affects analysis of the quality of migration reports, or whether (conditional on observables) there is a correlation between the propensity to attrit and the propensity to accurately report a migration event (Heckman, 1980; Ridder, 1990). While we cannot observe how attritors would have reported in MFLS2, the design of MFLS does support several tests which provide insights into the quality of survey reports of attritors compared with respondents who were re-interviewed in the second wave.

First, MFLS1 was conducted in 3 rounds and some questions were repeated across rounds. Of particular relevance for this study, females were asked the place of birth and place of location at age 15 in the first round of MFLS1 and again 4 months later in the second round. The rate of consistency in responses from this test-retest experiment are presented in panel A of Table 1. The first two columns refer to states (of which there are 14 in Malaysia, and all foreign countries are treated as a fifteenth state). The remaining columns refer to districts (which are analogous to counties in the United States).

About 98% of respondents reported the same state of birth and residence at age 15 in the two interviews; about 95% reported the same district. The table separates respondents interviewed in both 1976 and 1998 (first row) from those who were interviewed only in 1976 (second row). If attrition is correlated with the quality of reporting, the consistency rates should differ. They do not: the differences are reported in the third row. In all cases, they are very small and none is significant. In this dimension, there is no evidence that women followed-up in MFLS2 provided better or worse reports than those who attrited.

Second, we have examined the quality of information about moves reported by male and female respondents in the MFLS1 interview. In some cases, a respondent reported a move but was able to recall only the state and not the district of destination. If attrition between the waves of MFLS is correlated with quality of recall, we would expect the probability a respondent failed to report district in MFLS1 to be correlated with subsequent attrition. As shown in the upper panel of Table 2, it is not. Respondents were also asked to report the month and year of each move. Adjusting for race, age and education (which are correlated with completeness of date), there are no differences in the probability that month is reported by respondents who were re-interviewed relative to those who attrited.

Third, we have compared responses about the same event provided by a husband and wife. Consistency of marriage dates, reported in the lower panel of Table 2, does not vary with whether the

respondents were re-interviewed in MFLS2. Consistency of dates reported for moves that were made jointly by the couple is also independent of attrition.

Taking all these results together, there is no evidence that the quality of migration histories, as measured here, are different for those who attrited from the survey relative to those who were interviewed in both MFLS1 and MFLS2 and are included in our analytical sample. We conclude, therefore, that sample attrition is not likely to be informative about recall error in these data.

3. Recall error and the quality of retrospective data

Autobiographical memory is an active area of research in cognitive psychology (Conway, 1990) and survey design (Sudman *et al.*, 1996). Much has been learnt about how memory is organized and several mechanisms underlying an individual's recall of facts have been distinguished. This has led to general agreement that exploiting our understanding of the hierarchical organization of memory will improve the design of retrospective surveys. There is less agreement on how to fully exploit the implications of theoretical and laboratory-based insights from cognitive psychology, suggesting that a good deal will be learnt from actual field experience. Our goal is to provide some evidence from such experience. Since we draw on data from a low income setting, our tests of hypotheses in the literature will provide insights into their generality beyond a developed country setting.

Ebbinghaus (1894) pointed out that an event which took place longer ago is harder to remember. This was documented in "forgetting curves" which link the probability of recall to time since event and suggest a convex shape. (See Rubin and Baddeley, 1989, for a discussion.) While this insight has been replicated in many studies, the existing literature suggests that the relationship between memory and time since the event is complex. "Forgetting curves" may shift with attributes of respondents, characteristics of the migration event itself, and the temporal coincidence of other life-course events. For example, as the frequency of events increases, they may blur together so that remembering each single event becomes more difficult. For most people, migration is a relatively infrequent event, so this is unlikely to afflict many respondents in MFLS. But, there are some respondents who do report many moves in our data and the reports of their migrations may provide sufficient power to test this hypothesis.

Second, laboratory experiments and field studies indicate that more meaningful material is forgotten more slowly (Sudman *et al.*, 1996). As an example from the economics literature, longer unemployment spells are typically remembered very well but shorter spells are much more likely to be forgotten (Bound, *et al.*, 1994; Duncan and Hill, 1985; Paull 1996; Dex and McCulloch, 1998). This suggests that salient migrations will be recalled with greater frequency. Three distinct aspects of salience are potentially important. The first relates to characteristics of the move. The initial migration event, those of longer duration, involving greater distance or the move that brought the respondent to the current location may be more salient and thus more readily recalled. The second element of salience involves other landmark events linked with the migration. The co-incidence of these events has been shown to be associated with improved recall (Auriat, 1993). This may be because some coincident events -- such as a move coincident with marriage -- are more salient although studies in psychology suggest that it may be because recall of one event is triggered by cues associated with another linked event. The MFLS data are particularly valuable in examining the role of lifetime marker events because each respondent reports a life history covering not just migration but also marriage, child-birth and work.

Third, the salience of events may change in the years between repeat measurement as the respondent's life experiences are also changing (Elias, 1991).[5] This may be especially important for younger respondents, who, in many ways, are not the same person at the re-interview twelve years later, and consequently may rank events differently (Pearson *et al.*, 1992). For example, a move back to a parent's home at age 22 may seem extremely important at age 25, but much less so at age 37.

In addition to whether events are remembered at all, the quality of retrospective data could be judged by accuracy of recall. For example, studies in economics have found that retrospective reports that are based on estimation of the total amount of unemployment in a period (calendar year) are reasonably accurate, but reports of spell length that are based on dating of specific spells are less accurate (Duncan and Hill, 1985).

The focus of much of the survey design and cognitive psychology literature has been on the accuracy of dating and on telescoping. The accuracy of dating has been shown to be related to the salience of the event. The empirical evidence on telescoping is more mixed (c.f. Bradburn *et al.*, 1994). Neter and

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[5]He argues that the social representation of an event may change through time which will, in turn, affect the likelihood with which it is reported. He provides evidence on retrospective reports of sex outside marriage which has a very different meaning today than it did in the past.

Waksberg (1964) report that when respondents are asked about events occurring between the present and a reference date, they tend to telescope events forward into the reference period. While many studies of event dating have found more events are reported in the more recent past (Sudman and Bradburn, 1974 and Loftus and Marburger, 1983), others report backward telescoping. Becker and Mahmud (1984) sought to validate retrospective birth history data from Matlab, Bangladesh, by matching retrospectively reported birth dates with vital statistics gathered prospectively from the same household on a biweekly basis over 25 years. While event reporting is good, women tend to place the event too far back in time.

The evidence is also mixed on the characteristics of events that are more prone to telescoping. Some have argued that more vividly remembered ("accessible") events will be forward telescoped (Brown *et al.*, 1986). But, not all studies support this "accessibility" hypothesis. Thompson *et al.* (1988) fail to find any relationship between clarity of recall and the extent of forward telescoping whereas Kemp (1988) reports that forward telescoping is greater for less well-remembered events. Auriat (1993) reports that in retrospective migration histories, dating errors are reduced when moves are temporally linked to landmark events. We will present additional evidence on this issue below.

The value of landmark events in aiding recall suggests that other characteristics may be associated with the quality of a person's retrospective responses. Comparisons of retrospective reports with validation data have indicated that certain demographic characteristics -- particularly education, age and gender -- are related to the quality of reporting (c.f. Becker and Mahmud, 1984; Auriat, 1993). Increasing age was generally thought to negatively affect recall (Sudman and Bradburn 1974), but Mathiowetz and Duncan (1988) did not find this association for reporting of unemployment events. The relevance of understanding links between recall error and respondent characteristics is clear if we think about education. One of the best documented facts in the migration literature is that mobility rises with education. However, if better educated people give more complete migration histories, part of that correlation will have nothing to do with behavior but will simply reflect differences in respondent error by education. Inferences regarding the link between human capital investments and development may be seriously misleading.

Finally, question wording, instrument complexity and survey conditions have been shown to be important in eliciting responses (retrospective or otherwise) (Sudman and Bradburn, 1974; Sudman *et al.*, 1996). In the Belgian migration study, Auriat (1993) argues that the small advantages of interviewing

husbands and wives together are outweighed by the additional costs. In addition to examining this issue, we will assess whether the time taken to complete the interview is associated with recall quality and also use independent evaluations of the respondent's interest and reliability as measured by the interviewer. In empirical applications, data on survey practice are extremely valuable if it contains information associated with the quality of the recalls but is unrelated to the underlying behaviors that are being examined -- as in the relationship between mobility and education.

In sum, the literature suggests that recall of an event may depend on attributes of the event, the respondent, and survey practices. Besides the time since the event occurred, many dimensions of migration salience may improve memory. These include the uniqueness and significance of the migration itself (such as duration, position in sequence, total number of moves) as well as the coincidence of other important life events. These coincident life events may also affect whether the dating of migration events are forward or backward telescoped with one prominent hypothesis, the accessibility hypothesis, arguing that more salient events are likely to be forward telescoped. Survey practices such as length of interview, who is present at the interview, and the perceptions of interviewers, may all impact recall accuracy.

4. Correspondence of retrospective responses in MFLS1 and MFLS2

4.1. Residence at birth and at age fifteen

Before comparing migration histories, we extend our analysis of the correspondence between location at birth and at age 15. In addition to the four month short term test-retest of location at birth and at age 15 available for women, the same questions were asked again, of male and females, twelve years later in MFLS2. As shown in the second panel of Table 1, longer term test-retest reliability is also very high and there is little differentiating females from males. Over 95% of the respondents report the same state of birth and slightly fewer report the same state at age 15. Discrepancies are more common at the district level with about 85% of respondents reporting consistent districts at birth and at age 15 in the two waves of the MFLS. Given the fact that district boundary definitions have changed over time, some of these discrepancies are likely to be spurious. With this in mind, the fourth and sixth columns of the table report the fraction of consistent responses if geographically adjacent districts are included as matches.

Whether due to faulty memory or the problems associated with changing district boundaries, respondents locate themselves at birth and at age 15 in the same place, or somewhere close by, in over 90% of cases. Discrepancies in the four month test-retest experiment in MFLS1 have little to do with differences in recall error over time and so are a useful benchmark for evaluating the results from the longer-term experiment. We conclude there is very little difference in reporting of location at birth (a salient event) and age 15 and that while recall does decay over time, the rate of decay is slow with about half the inconsistent states and a third of the inconsistent districts in MFLS1 and MFLS2 are not associated with memory lapses that occurred in the twelve year hiatus between the surveys.[6]

4.2. Correspondence in reported number of moves

We turn to migration histories reported by the same respondent covering the same time span from age 15 through to the MFLS1 interview or, more precisely, to the move that brought the respondent to his/her location at the time of the MFLS1 interview (taking into account contamination due to telescoping).

To provide some background, mobility rates are reported in Table 3. The average male in our sample reported 1.49 inter-district moves in MFLS1. Women are less mobile and the average woman reported 0.86 moves across district boundaries. Underlying these numbers is a great deal of heterogeneity. Fifty-two percent of men report no inter-district moves in MFLS1, while the most mobile moved 14 times; conditional on ever moving, a male moved 3.1 times on average. The largest number of female inter-district moves is 11 and, since 55% of women in MFLS1 reported no moves, those who did move, made 1.9 inter-district migrations. Women also report intra-district moves, which are considerably more common: the average woman reports 1.44 intra-district moves and only 23% report no such moves.

The correspondence between histories reported in the two interviews is summarized in panel 2 of Table 3. A comparison of the relative number of moves reported in the two survey waves is one index of the rate of forgetting.[7] In MFLS1, 957 moves are reported by men. But 69 fewer moves are reported in

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[6]The Malaysian data compare very favorably with test-retest reliability in re-interview studies in the United States decennial Census (Bureau of the Census, 1993). The percentage of people who report the same state of birth in the Census and a re-interview six months later is 95.3%. This is slightly lower than the four month test-retest reliability in MFLS1 and exactly the same as the twelve year test-retest reliability in MFLS1 and MFLS2.

[7]The number of moves in both surveys is obtained by summing the episodic reports of migration; there was no separate question asking the respondent to estimate the number of moves.

MFLS2 suggesting that, on net, some moves were forgotten during the twelve year hiatus between the two surveys. Similarly, women reported 9 more inter-district moves in MFLS1 compared with MFLS2.

The biggest differences in recall are not between men and women but lie in the stark contrast between inter-district and intra-district moves (reported only by women). Intra-district moves are much more common, and fully 20% fewer were reported in the second interview than in the first. This tilt in favor of the first survey is not surprising as the additional 12 year distance from each event in MFLS2 apparently took a greater toll on recall of shorter distance, and the apparently less memorable, intra-district moves.

4.3. Matching migration events

This comparison of counts does not tell us whether respondents reported moves to the same place at the same time. Dex (1991) discusses methods for assessing the quality of retrospective histories. Responses can be checked against a contemporaneous diary or some other record or independent criterion, an option that does not exist in this application. Second, one can conduct consistency checks of measures across different studies an option that she does not recommend and with which we concur. Finally, one can cross-validate responses from multiple interviews with the same respondent at different times which is the approach we pursue here. We attempted to find exact matches for all migration events reported in the two interviews. For each MFLS1 move a search was made across all MFLS2 migrations reported by the same respondent to the same destination to identify one with which the MFLS1 move could be paired. In this pairing, a MFLS2 move could only be used once; when there were multiple moves to the same destination, we used the sequence of moves to judge the best match. Ties were broken by picking the match that minimized the time discrepancy between the moves.[8] No information other than destination and date was used in matching moves.[9]

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[8]We allowed the less than one-half of one per cent of moves to match to a move that had not already been matched and which was within a year of that move, irrespective of the destination.

[9]A legitimate concern is whether we can separate respondent's recall error from our matching error. Fortunately, the matching of moves was seldom ambiguous. Why would a MFLS1 move not be matched to an MFLS2 move? In most cases, there were not enough MFLS2 migrations so there was no possibility of a match. The clearest example involves respondents with some moves reported in MFLS1, but no moves reported in MFLS2 so that none of the MFLS1 moves can be matched. This accounted for almost half the unmatched moves. More generally, when there are more moves reported in MFLS1 than in MFLS2, not all MFLS1 moves can be matched. In most cases, it was unambiguous from inspection of destination and dates of moves which MFLS1 moves should not be matched. The fraction of cases in which there were not enough MFLS2 moves to match to MFLS1 moves account for nearly 90% of all unmatched inter-district moves. The second reason for a non-match was that destinations were different in MFLS1 and MFLS2. The third reason moves were not matched was that although destinations

The match rate for male inter-district moves (in row 2.4 of Table 3) is 58.4%. It is significantly higher among women: 69.2% of their original inter-district migrations were also listed in the follow-up survey (t-test for the difference between men and women is 2.4). There is a similar match rate for female intra-district moves. By this metric, women provide more consistent retrospective migration histories.

In row 2.5 of Table 3, the procedure is reversed. Instead of taking all moves reported in MFLS1 and searching for a matching move in the history reported in MFLS2, we take all moves reported in MFLS2 and search for a matching move in the MFLS1 history. If the hypothesis that more salient events are less likely to be forgotten with time is true, then a move that took place prior to MFLS1 and is *reported* in MFLS2 will be more salient than a move *only reported* in MFLS1. This clearly characterizes intra-district moves for which the difference in the two match rates is large in magnitude and significant: 66% of intra-district moves reported in MFLS1 were also reported in MFLS2, whereas over 80% of those reported in MFLS2 were remembered at the MFLS1 interview (t-test for the difference is 8.0).The differences for inter-district moves are very small suggesting that those moves are more salient than local moves.

For some purposes, the value of recall geographic data centers around knowing where respondents were in the past. For example, we may want to understand how local labor market forces affect economic outcomes or how the quality of local infrastructure, such as health facilities or family planning programs, alter health or fertility. A useful summary statistic is the percentage of time respondents would have been located in the same district in both surveys. It is 86% for male and 89% for female respondents in these data. This more positive evaluation of recall migration data stems in part from the fact that the "forgotten" migrations are of relatively short duration so that their impact on time spent in a particular location over the life course is less consequential.

Another measure of recall quality concerns dating of moves reported in both surveys. Summary statistics of date discrepancy are listed in the third panel of Table 3. Figure 1 provides non-parametric

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were the same, dates were wildly discrepant or the sequence of moves were inconsistent between the two interviews. These cases are very rare. (Only three unmatched male moves in MFLS1 are of this type.) Similarly, there was little ambiguity when a match was made. A clear-cut match arises if a respondent reported only one move to the same destination in both surveys (accounting for about two-thirds of the matched inter-district moves). In fact, three quarters of all matched moves involve cases in which exactly the same number of moves are reported by a respondent to a particular destination in both MFLS1 and MFLS2. There is an unmatched MFLS2 move available to the same destination as an MFLS1 move which could have been matched to the MFLS1 move in only 11% of cases.

estimates of distributions of date discrepancies: they are all centered at or close to zero and fat-tailed. The distributions for male and female inter-district moves are remarkably similar, whereas the distribution for intra-district moves is more fat-tailed. The median of the absolute value of differences in dates is between 10 and 11.4 months and the inter-quartile range is about two years.

To test whether dating is prone to telescoping, we divided dates into three groups; those within one month of each other (treated as the same), those where MFLS1 precedes MFLS2, and those where MFLS2 precedes MFLS1 (rows 3.4-3.6 of Table 3). If moves are forward telescoped, it should be more common for the MFLS1 date to precede the MFLS2 date. This appears only to be significant for female inter-district moves. If forward telescoping is greater as elapsed time since event increases, the absolute value of the date discrepancy should be larger when the MFLS1 move precedes the MFLS2 move. Because of heterogeneity in discrepancies, we adopt the quartic root of the (absolute value) of the monthly difference in dates.[10] Differences in the mean discrepancies are small (between one and three months) and not significant indicating that, on average, migration events are not systematically forward or backward telescoped.[11]

5. Multivariate analysis of quality of migration retrospectives

To provide insights into the relation between recall error and characteristics of moves and of respondents, we turn to an analysis of two dimensions of the quality of retrospective data -- the probability of reporting a move in the second survey given that it is reported in the first and, for moves reported in both surveys, the absolute value of differences in reported dates. On the first outcome, let m^* be an indicator variable for whether a particular move was made and let m_1 and m_2 be indicator variables denoting a move is reported in the first and second wave of the survey, respectively. We examine characteristics of those moves that are reported in the second wave, conditional on being reported in the first wave. These include characteristics of the respondent, x_i, the survey design, x_s, and characteristics that describe the move, x_m. Thus, we estimate the correlates associated with the conditional mean function:

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[10]This measure is robust to outliers; square roots and trimmed means provide similar results.

[11]As a comparison, we examined telescoping in two dates likely to be well-remembered. Reported birth dates are virtually identical in the two surveys indicating little telescoping (for both men and women). Marriage dates tend to be backward telescoped by approximately nine months, although there are no significant gender differences.

$$E (m_2=1 \mid m_1=1) = pr(m^*=1) \circ pr(m_1=1|m^*=1) \circ pr(m_2=1|m^*=1)$$

$$+ pr(m^*=0) \circ pr(m_1=1|m^*=0) \circ pr(m_2=1|m^*=0)$$

$$= \pi^* \, r_1 \, r_2 + (1-\pi^*) \, q_1 \, q_2$$

where π^* is the probability a move took place, r_w is the probability that a move which took place is reported in wave w and q_w is the probability that a move that did not take place is reported in wave w. We have assumed, conditional on a move having taken place, that reporting errors in the two surveys are independent. We further assume that the probability a move is reported which was never made, q, is small. This seems very reasonable in the context of the relationship between the propensity to report a move and characteristics of the move, x_m. With these assumptions, the conditional mean function is approximately:

$$E (m_2=1 \mid m_1=1) \approx \pi^* \, r_1 \, r_2 = \pi(x_i, x_s, x_m, \varepsilon)$$

where ε captures unmeasured factors that are associated with the probability that reports match. This measurement model clarifies the interpretation of our regressions: they identify characteristics associated with the joint probability a respondent made a move and reported it in both survey waves. Table 4 lists probit estimates of this model, namely the probability a move is reported in MFLS2 given it was reported in MFLS1. A parallel strategy examining whether moves reported in MFLS2 were also reported in MFLS1 was explored. Estimation of $E (m_1=1 \mid m_2=1)$ provided no additional insights, suggesting the assumptions above do not significantly violate the data. Those results are not discussed further.

Attention shifts in Table 5 to the second measure of quality, the discrepancy in dates for matched migration events (using the quartic root of the absolute value of the difference in migration dates).[12] Results for male inter-district moves are reported in the first pair of columns in each table, the second pair corresponds to female inter-district moves and the final pair to female intra-district moves. Covariates in the models fall into three generic categories: personal attributes, survey characteristics and attributes of the moves themselves. Summary statistics of covariates are given in Appendix Table 1.

5.1. Personal Attributes

Many studies have shown that recall decays with distance from the event, often in a non-linear fashion suggesting that the decay in memory does not continue over time but stays stable for a long period

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[12]Since only moves reported in both surveys are included, the models in Table 5 are based on fewer observations than the match rate regressions.

of time (Dex, 1991). To examine this "forgetting" function, the probability a move is reported in both MFLS interviews is allowed to depend on age and (a linear spline in) years since migration (both measured at the time of MFLS1). Since date discrepancies are determined by a given month and year, any time-dimensioned covariates would have a purely mechanical relation with that outcome. Consequently, covariates that are linear in time are eliminated from the regressions in Table 5.

Controlling age, years since migration isolates "forgetting" from aging. The results in Table 4 indicate a tendency for moves that took place during the 5 years prior to MFLS1 to not be recorded 12 years later in MFLS2. This initial part of the forgetting function is particularly steep and significant for female (inter-district) moves.[13] Several moves reported in 1976 that took place only a few years prior to the interview were apparently not remarkable and by, 1988, had been forgotten. However, for moves prior to 1970, the function becomes essentially flat especially for moves that took place prior to 1960.

Holding years since migration constant, an increase in the respondent's age at the time of MFLS1 increases the age when the migration occurred. As discussed in Section 3, otherwise identical moves that take place during adolescence or early adulthood may be less salient than migrations later in adulthood. The results for male inter-district moves support this hypothesis. In contrast, a woman's recall of migration events is not associated with when in the life course the move took place, although her recall of dates is related to her age, at least for intra-district moves (in Table 5).[14]

MFLS interviews are demanding, asking respondents to organize and remember complex sequences of their life histories. Education is an important correlate of the quality of recall in the migration histories, particularly for men, suggesting that more educated respondents may have less difficulty with this task. Controlling observables in the regression, a man with 6.5 years of schooling (the average) is 40% more likely to report a move in both interviews than a man with no education. The impact for female inter-district moves is only half as big (and not significant) and there is no relationship for intra-district moves.

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[13]This is consistent with many studies. For example, Bailar (1989) reports that lengthening the period form 1 to 3 months substantially reduced the number of repairs reported and much more for small jobs than for large ones. She says that "the evidence points to loss of data with longer recall periods."

[14]Because this is our only control for time in the latter regressions, it is not possible to distinguish between an effect of aging and an effect of longer recall.

Many studies have shown that mobility rises with schooling. Does this reflect behavioral migration differences instead of differential reporting propensity across education groups, at least among men?   This generic issue, which applies to many research questions, highlights the value of having side-by-side comparisons of the reporting and behavioral migration functions. In our sample, post-secondary school male graduates report about 5 inter-district moves compared to about one for men with no schooling. Differential reporting propensities are small in comparison and so they certainly cannot fully explain the observed rise in the number of migrations across education levels. We note, also, that more years of schooling are associated with reduced inconsistencies in the dating of inter-district migrations by men and women.

5.2. Survey characteristics

Several variables capture dimensions of survey operations that may be related to the quality of responses. The presence of other people during the interview is a controversial survey practice although it is often unavoidable in households in low income settings, like Malaysia. In MFLS2, we know who was present at each interview and whether anyone helped the respondent during the interview. Two categorical variables are created from this information-—whether the spouse was present, and whether any help was received during the interview. We find no impact on any dimension of recall quality when a person other than the spouse assisted the respondent. The presence of a spouse does affect the quality of responses, albeit in an asymmetric fashion. A wife's attendance at the MFLS2 interview reduces the odds that a MFLS1 move was reported by a man in the follow-up survey -- a result in contrast with Auriat's (1993) finding for Belgian couples. When this result is explored more deeply, we find that the wife's presence has no effect on match rates of post-marriage moves but the effect is concentrated entirely in pre-marriage moves. A man is liable to not report some moves he made when single if his wife is listening. On a more positive note, a husband's presence lowered the time discrepancy in dates of intra-district moves reported by women.

In MFLS2, an interviewer assessment was made about the quality of each life history module. Interviewers were asked their subjective evaluation of the reliability of the respondents' answers. Those cases for which the interviewer judged the answers to be very reliable or of average reliability had consistently higher match rates for female inter-district migrations and lower time discrepancy for male migrations. Survey characteristics such as evaluations of respondent reliability are quite valuable because they are part of an assessment of the quality of retrospective migration data, but do not belong in a model

explaining the behaviors underlying migration decisions. Therefore, these evaluations are potentially good candidates for statistical instruments to distinguish the behavioral migration function from the function describing the probability of reporting migration events.[15]

Another characterization of the interview is the total length of the male or female life history modules (of which migration is only a small part). While long interviews are more complete ones, fatigue may be a factor in a particularly long interview tempting respondents to truncate. The average MFLS1 interview was about 1 hour for men and nearly 2 hours long for women; MFLS2 interviews were typically shorter. There is no systematic evidence that response quality declines as the time burden rises.[16]

Given the potential problems due to changing district boundaries over time, it is reassuring that, once districts were made comparable in the two surveys, an indicator variable that identifies migration involving a post-1970 district is not associated with differences in the quality of male reporting. Although these adjusted districts are characterized by higher quality of reports for female inter-district moves, this effect disappears when we include a control that identifies moves to the capital city, Kuala Lumpur (not reported).

5.3. Characteristics of moves and migration salience

The final covariates capture dimensions of the move itself. For men and women, move duration is strongly related to the likelihood of reporting migrations. Roughly a third of male moves in MFLS1 lasting less than six months are also reported in MFLS2, whereas over three quarters of moves that lasted at least 20 years are reported in both interviews. In a regression context, moves lasting at least five years or longer are the most likely to be recalled, those that lasted two to five years are slightly less likely to be remembered

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[15]Interviewer opinions may be transmitted to respondents and alter the nature of the interview. This interaction could improve interview quality if respondents try to please interviewers or could reduce it if a negative attitude by the interviewer results in respondents becoming less interested and unresponsive. In either case, the strict separation between respondent (memory) effects and the interviewer assessment is lost. If there are attributes (such as education) which are related to both recall and to migration decisions which are not included in the recall function, interview evaluations may pick up their influences. To explore these issues, we estimated ordered probit regression models of interviewer evaluations. For men, we find that neither education nor number of moves reported in the survey is significantly associated with the interviewer evaluation. For women, in contrast, evaluations tend to be more favorable if women are better educated and if they report more moves. While interviewers could affect respondents mood and attitude toward the interview, Raphael and Cloitre (1994) show no effect of mood congruence on recall of event occurrence- that is respondents in more negative mood did not show enhanced recall for negative life events relative to respondents in better moods.

[16]On the one hand, time discrepancies in female intra-district moves rise with interview time in MFLS1, but, on the other hand, match rates for female inter-district moves improve as length of the MFLS1 interview increases.

and those of shorter duration are significantly more likely to be forgotten. These results illustrate the potential and limitation of recall migration histories. Migration histories do not appear to be a useful way of collecting information on shorter duration, often circular migration patterns, that are commonplace in many developing countries. Respondents do far better, however, with the more salient longer duration moves, of which up to 80% are remembered. This result is consistent with studies of labor markets in developed countries. Paull (1996) reports the likelihood of a match of an unemployment spell increases with the length of the spell: for those less than one month, 53% match, for those over a year, 97% match. Short unemployment spells are very likely to be forgotten. Mathiowetz and Duncan (1988) report two-thirds of unemployment spells in company records were not recalled in survey interviews with the affected workers.

Our next measures concern distance. It is captured by geographic distance between district centers and by indicators for whether moves involved crossing a state line. Match rates are significantly higher for male and female inter-state moves, and the twelve year gap apparently took a greater toll on female intra-district moves. Controlling for other covariates, female reporting rates are 19 percentage points higher if the move crossed a district boundary. Geographic (or straight-line) distance per se is not associated with the memorability of the move. This is not just because long distance moves are captured by inter-state controls: distance is not significant even without those controls.[17] Table 5 indicates that none of these measures of distance has any detectible impact on the consistency of reported migration dates.

Moves involving greater adjustments in the new locale may be more readily recalled suggesting that moves between the rural and urban sector would be the most memorable. To test this hypothesis, each district was assigned to either the rural or urban sector with this assignation changing over time (reflecting the increasing urbanization of Malaysia). There is no evidence that, among males, reporting propensities or the accuracy of timing of moves vary with the origin or destination of the move. Among females, moves originating in urban areas are more likely to be recalled. Female urban to rural and urban to urban inter-district moves are significantly more remembered relative to rural-rural moves, (p value=0.01) and female urban-urban moves are more likely to be recalled than rural-rural moves. Finally, the timing of female urban-urban inter-district moves are reported with greater accuracy and these moves are telescoped forward.

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[17]Given the geographic impediments like mountains ranges, straight-line distance may not be a good proxy for actual distance or moves. The deterrent effect of distance may also change with development as more and better roads are put in place, easing the burden of moving across a given distance.

Studies linking migration with economic development have focused on rural-urban mobility of males (Harris and Todaro, 1970). Our results suggest that retrospective histories of those moves are recalled no differently from other moves by males. This does not carry over to females. Re-location is apparently more memorable when a woman leaves an urban area, no matter what the destination. This is, perhaps, because she leaves behind community resources such as health and transport services, schools and stores with which she has become familiar and she has to re-build this location specific "social" capital in her new community.

Sequencing of Moves

How a move fits into a lifetime migration sequence may affect its meaning. We find that the move that first brought the respondent to the district he or she lived in at the time of the MFLS1 interview is particularly memorable (although dating is no better than any other move for women). In contrast, there is little evidence that the first move after age 15 adds special meaning in a respondents' ability to recall.

Our models distinguish moves made before and after marriage and, within post-marriage moves, those made jointly with a spouse or taken alone.[18] Joint moves should be more memorable due to the greater disruption caused when the entire family pulls up roots. This intuition is correct: joint moves made while married are much more easily remembered although they are no more accurately dated. If two heads are better than one, it seems plausible that joint moves will be reported with higher probability if the spouse is present at the interview. We tested that hypothesis but find no evidence to support it.[19]

Many migration sequences especially in developing countries are circular, with an individual moving for temporary employment or reasons associated with family care, and then subsequently returning again to place of origin. Given their temporary nature and the lack of commitment to the intermediate destination, migrations that are within a circular pattern may be less salient. While the statistical significance is often weak, there is a suggestion that male circular moves are more likely to be forgotten.

When there are several similar events in a history, they may merge together and not be easily recalled. This is not a problem for inter-district moves which are relatively few in number. Match rates are

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[18]Whether joint moves took place is only known for inter-district moves and is included in only those regressions.

[19]The interaction of an indicator for a joint move with one for spouse at interview is not significant in any of the regressions. The results are not reported in the tables.

much lower among women who report many intra-district moves (although they do a better job on timing conditional on reporting the move).

Coincident Events

The existing literature shows that events are more memorable when temporally coincident with another salient life event which helps trigger memories associated with the events (Dex, 1991). Since the emotional and cognitive power of coincident events may differ among people, the impact of three markers are explored: marriage, birth of a child to the wife, and the start of a significant new job by the husband. We select these three because marriage is an important event in all cultures and, in Malaysia, it is traditional for women to return home to their mothers around the time of childbirth. While labor force participation rates are low among women, labor market concerns are a primary motivation for many male moves.

Family-oriented events -- marriage and birth -- have no detectible impact on the ability of men to recall a move or when it occurred. In contrast, the start of a new job significantly increases the probability a move is reported in his interview and reduces the time discrepancy in the dates he reports.

Matters could hardly be more different for women for whom family-centered events serve as a strong memory aid. Marriage significantly increases the odds a woman reports a concurrent intra-district migration and reduces the difference in reported dates of the move, whether or not it involves crossing a district boundary. The birth of a child has no statistically significant effect on the probability of reporting a migration event, but a birth does reduce date discrepancies for female intra-district moves. Career changes of their husbands also help women recall their migrations. This memory enhancing value of other salient life events for re-creating migration life histories suggests that they should be incorporated explicitly into the survey design.

Telescoping

Telescoping refers to the tendency of respondents to report events as occurring more recently (forward telescoping) or further back (backward telescoping) than they actually did. If an event is forward telescoped and if the extent of telescoping depends on time since the event, the date reported in MFLS1 will tend to precede that reported in MFLS2. When the MFLS1 date precedes the MFLS2 date, the time discrepancy will tend to be larger. Recall that evidence in the bottom panel of Table 3 provides little support for the hypothesis that all migration events are forward telescoped. This result carries through to the

multivariate context. Controlling all personal, survey and move attributes included in the models in Table 5, there is no difference in the probability an event is forward telescoped relative to backward telescoped. Excluding those moves that are within a few months of each other (and are, therefore, uninformative about telescoping given that not all reported dates are precise), the first panel of Table 6 shows there is no difference in the discrepancy in dates if an event is reported earlier in MFLS1 relative to being reported earlier in MFLS2.

It has been suggested that forward telescoping is greater among more salient events, the "accessibility hypothesis."[20] If correct and if telescoping increases with time since the event, then if the date reported in MFLS1 precedes the MFLS2 date for a migration that took place coincident with a salient life time marker event, the discrepancy in reported dates should be larger. To test this hypothesis, the models have been re-estimated including those events that were either backward or forward telescoped.[21] We focus on interactions between a control for MFLS1 being reported earlier and the three life time marker events: a job change by men, marriage and birth of a child. Results are reported in the lower panel of Table 6.

For men, there is no evidence that telescoping is associated with these lifetime markers. For females, inter-district moves that occurred at the same time as marriage are forward telescoped more as are intra-district moves that occurred at the time of a birth. In the latter case, the direct effect is negative indicating that moves that did not coincide with one of the three lifetime markers tend to be backward telescoped.

5.4. Robustness of results

It is possible that errors introduced by our matching of moves reported in the two surveys biases the results reported here. Fortunately, as discussed above, the matches are unambiguous for the vast majority of moves. Nonetheless, to assess the robustness of the results, all the regressions have been re-estimated

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[20]See Bailar (1989) who cites data from the National Crime Survey indicating forward telescoping of criminal events; see also Auriat (1993).

[21]We have already shown that time discrepancies are smaller when moves coincided with lifetime marker events. These moves are also significantly more likely to be reported as having occurred on the same date.

excluding ambiguous matches. In all instances, there is little change in the coefficient estimates and none of our substantive conclusions is altered.[22]

A related concern is that a move reported in MFLS2 might have been telescoped forward and although it occurred before MFLS1, it was not included in the list of candidate moves; alternatively, a move may have been telescoped back and erroneously included in the list of candidate moves. This possibility was taken into account when we defined the universe of moves and there are only a small number of moves that were ambiguous (and were excluded from the universe). We re-estimated all the models including all of these potential candidate moves. There are very few inter-district moves in this set and none of the results is affected. The match rate regression results for intra-district moves are also unaffected and the only effect on the time discrepancy regressions is on the covariates associated with time since the event.[23]

In sum, evidence from these surveys suggests that accuracy of recall of migration events is affected by attributes of migrations, respondents, and survey procedures. While schooling is the dominant personal characteristic improving quality of recall, a number of move aspects matter, including duration of move, time since move, salience of move and the temporal presence of other lifetime marker events. In addition, among women, more salient events appear to be forward telescoped, lending some support for accessibility theory.

6. Implications for Survey Practice

The research findings presented using data from Malaysia are, broadly speaking, consistent with the evidence from laboratory and field studies conducted in developed countries. Our results have several implications for the collection of retrospective life histories in low income and higher income settings; while

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[22]Given our matching rules, this is to be expected. If we had matched moves that should not be matched (or failed to match moves that should be), we will have induced noise into the system which will affect our estimates of variability. Regression coefficient estimates would have been affected only if the matching algorithms relied on respondent-or move-level attributes (salience of move, coincidence with other events, for example) to determine whether a pair should be matched. Since we did not draw on attributes other than date and destination in our determination of a match, excluding ambiguous cases has no substantial impact on the results.

[23]Specifically, coefficients on the controls for moves made in the 1960s and in the 1970s become larger (in absolute terms) and significant -- precisely because we have included matches of moves reported as having been made in the 1950s (in MFLS1 in 1976) with moves reported as having been made in the 1980s (in MFLS2 in 1988). The age coefficient is no longer significant reflecting the fact that only older people can report moves made in the 1950s.

these are particularly relevant for migration histories, they have more general application to the collection of socio-economic data in surveys.

First, our research confirms that less recent, shorter duration moves are the least likely to be remembered. This suggests separating migration histories into two parts. The longer term migration retrospective component should concentrate on longer duration moves, say those lasting at least six months. A shorter-term migration history should focus on recent moves in an effort to capture the short stay and often circulatory migration patterns that are common in many developing countries. To accomplish this without undue respondent burden, one could ask respondents to report all moves within the last two years which lasted at least one month.

A second recommendation flows from our finding that the coincidence of other salient life-course events -- marriage, child-birth and employment change -- is associated with improved recall and dating of migration events. This is consistent with a large literature on the links between salience and recall and suggests that integrating different life histories that are likely to be cognitively linked would yield quality improvements in all the histories. For example, not only may a coincident and possibly related job change aid in remembering a geographic move, but a simultaneous migration event could assist in the recall and dating of labor force transitions. In particular, our results indicate that linking migration and employment histories for men and linking migration with family changes for women would be a good first step. Moreover, since many people do move around the time of marriage, specific probing about moves then is likely to yield improved migration histories. Similarly, asking why a person made the move -- such as because of a job or the birth of a child -- provides a probe to jog the memory of the respondent.

A third relatively low cost innovation in survey design arises when migration histories are asked of several members of the household. Besides standard questions about the timing and destination of each move, a respondent might be asked whether he or she was accompanied by other family members and, if so, by whom. If a husband and wife both report a move with their spouse, we can be pretty certain of its accuracy. Similarly, if one spouse reports a move without the other and this move is not reported in the other's history, the accuracy of the report is likely to be high. We will be less confident if one spouse reports a move as being joint while the other does not report the move at all. This sort of cross-validation is useful when questions are asked independently of different household members and, obviously, requires

noting who is present at the interview. Combining joint reports by family members with repeated observations in a panel survey significantly expands the potential to cross-validate histories.

Fourth, there is evidence that information about the quality of the interview (such as the interviewer's assessment of the reliability of the response) predicts the completeness and accuracy of the migration history. This sort of information has the potential to serve as instruments to separate reporting effects from behaviors in analytical models.

In a panel setting, the location at the previous interview becomes an anchor by which one may start the updating of migration events. Since current and last interview locations are known with certainty, this offers valuable assistance to respondents in recalling their recent geographic mobility.

Finally, none of these recommendations is difficult to implement. They were all incorporated in the fielding of the Indonesia Family Life Survey (IFLS), a study that parallels the Malaysian surveys used here. Moreover, we found that these innovations added only a few minutes to the interview burden in IFLS.

7. Conclusion

While opinions are often strongly held, there has been little scientific evaluation of the quality of retrospective data based on fieldwork in a low income country setting. By asking the same questions twelve years apart, the two Malaysian Family Life Surveys provide an opportunity to quantitatively evaluate the quality of long-term recall data in a rapidly changing developing country.

Until recently, such long-term retrospective data had a poor reputation in the empirical social sciences with doubts cast on the ability to recall events just a few months ago, let alone a decade or even further in the past. That verdict seems premature not because retrospective data are perfect but because these questions can elicit useful information if we are able to isolate those events people remember from those they forget. Using migration life histories, our research demonstrates that respondents remember salient moves, those linked with other important life events such as the start of a marriage, the birth of a child, change in a job and moves that lasted for a long time. Migrations that dim in memory as time passes are typically short duration or local moves, often made while the respondent was young. This kind of mobility is apparently not successfully retrieved by simple retrospective interviewing. But for many purposes, these may

be less important moves as they span relatively small segments of people's lives. Dating of moves is not perfect although it is significantly improved when linked with other salient events.

We find important differences in the quality of recall data across socio-demographic groups -- particularly among education groups -- and point out the need to interpret retrospectives with this fact in mind. The study has also demonstrated that there is scope for disentangling the influence of differences in reporting from differences in behaviors by exploiting characteristics of the survey operation and interviewer evaluations of the reliability of the respondents since these are factors that do not affect behaviors but are correlated with the quality of the retrospective data.

Long-term recall data are not a panacea, and are certainly not perfect. But, until recall data have been scientifically evaluated in a wider array of settings, the current presumption against the use of long-term recall questions in field surveys ignores a potentially rich source of data. Rather, it would seem more profitable to more fully understand the nature of the information contained in retrospective data and identify field practices that enhance their usefulness in empirical research.

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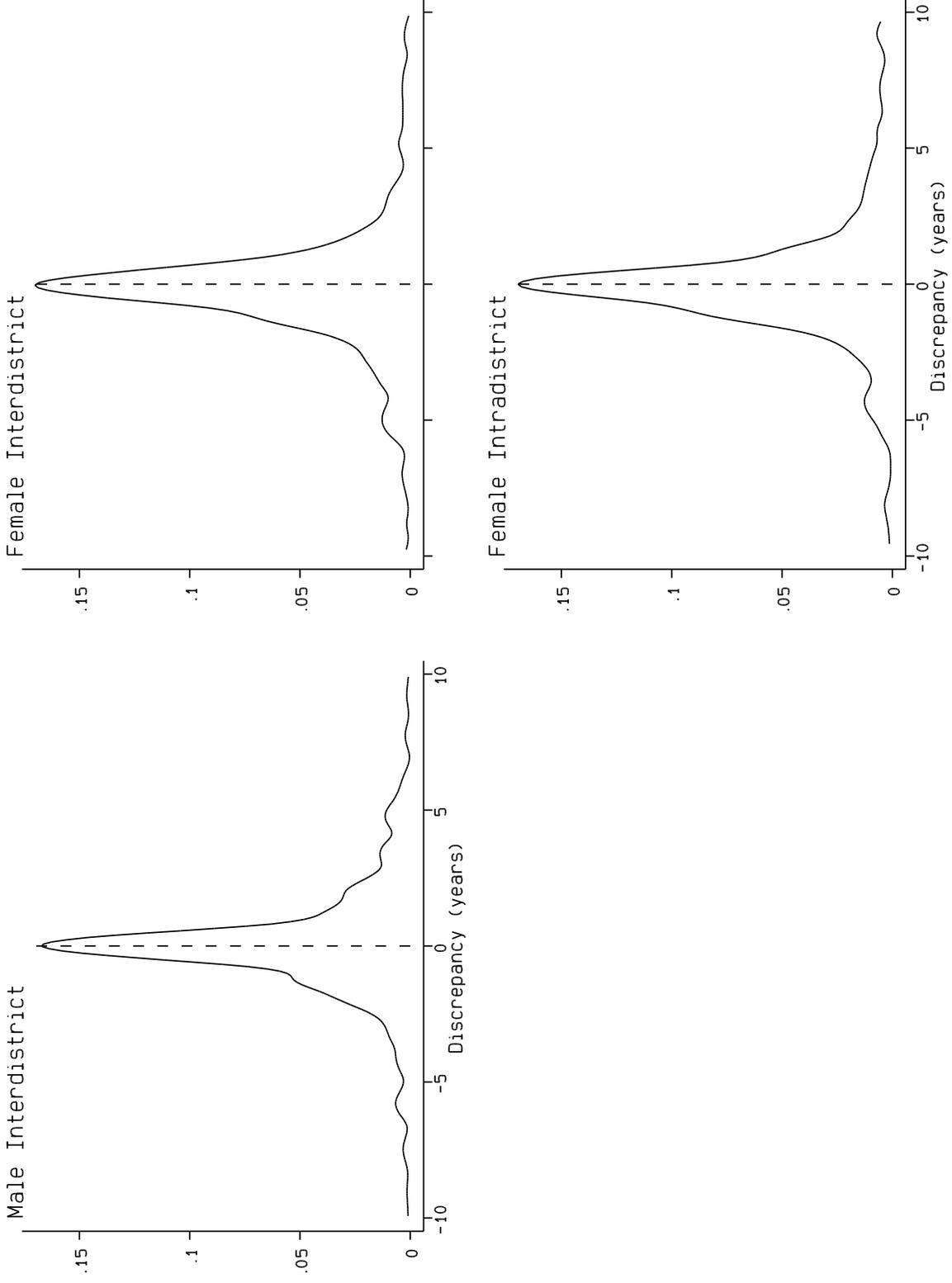
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Figure 1: Empirical distribution of time discrepancies
MFLS1 date - MFLS2 date [measured in years]

Male Interdistrict

Female Interdistrict

Female Intradistrict

Discrepancy (years)

Non parametric estimates: Epanechikov kernel

Table 1
Quality of Recall and Attrition
Percent matches of reported residence at birth and residence at age 15

	STATE		DISTRICT			
	OF BIRTH	@ AGE 15	OF BIRTH		@ AGE 15	
	SAME	SAME	SAME	ADJ.	SAME	ADJ.
	(1)	(2)	(3)	(4)	(5)	(6)
A. 4-MONTH TEST-RETEST						
Same response in Rounds 1 and 2 of MFLS1 (Females only)						
Panel respondents	97.3	97.7	95.8		94.5	
Respondents not followed up	98.0	97.0	94.8		95.1	
Difference	-0.7	0.7	1.0		-0.6	
(standard error)	(1.0)	(1.0)	(1.2)		(1.5)	
B. 12-YEAR TEST-RETEST						
Same response in MFLS1 and MFLS2						
Males	95.1	92.2	85.7	91.7	83.5	90.0
Females	95.3	94.0	84.4	91.9	83.1	92.2

Notes: Place of birth and at age 15 asked twice of females in MFLS1 (in Round 1 and Round 2, four months apart). Males are only asked in Round 3 of MFLS1. There was one MFLS2 interview per respondent who was followed-up. Twelve year test-retest for females based on response in Round 1 of MFLS1 and MFLS2. ADJ. denotes match with same district or geographically adjacent district.

Table 2
Quality of MFLS1 responses
Differences between respondents interviewed in MFLS2 and those who attrited

	Males	Females	Couples
Differential probability for respondents who attrited relative to respondents who were re-interviewed in MFLS2			
Pr(did not know)			
District of move	0.005	0.001	
	(1.59)	(0.35)	
Month of move	-0.034	-0.006	
	(1.27)	(0.32)	
Difference in reported date of event for respondents who attrited relative to respondents who were re-interviewed in MFLS2			
Difference in reported date of marriage (months)			0.122
husband's report - wife's report			(1.75)
Difference in reported date of joint move (months)			-0.051
husband's report - wifes's report			(0.22)

Notes: (t statistics) in parentheses.

Table 3
Summary Measures of Mobility in MFLS1 and MFLS2

| | MALES | F E M A L E S | |
		Inter-district	Intra-district
1. MOBILITY IN MFLS1			
1.1 Mean number of moves	1.49	0.86	1.44
1.2 % report at least 1 move	48	45	77
1.3 Mean conditional on >0 moves	3.12	1.89	1.85
1.4 Range	14	11	12
2. MOBILITY IN MFLS1 & MFLS2			
2.1 Number of moves reported in MFLS1	957	700	1171
2.2 Number of moves reported in MFLS2	888	691	935
2.3 Difference (MFLS1-MFLS2)	69	9	236
Match rates			
2.4 % moves reported in MFLS1 also reported in MFLS2	58.4	69.2	66.4
(standard error)	(1.6)	(1.8)	(1.4)
2.5 % moves reported in MFLS2 also reported in MFLS1	63.2	67.5	81.3
(standard error)	(1.6)	(1.8)	(1.3)
3. DATE DISCREPANCIES for matched moves			
(MFLS1 date - MFLS2 date in months)			
3.1 Median date discrepancy	0.00	-1.13	0.00
3.2 Median |date discrepancy|	10.41	9.97	11.43
3.3 Inter quartile range |date discrepancy|	22.47	20.47	26.28
Percentage of reported dates for matched moves			
3.4 MFLS1 precedes MFLS2	45	53	46
3.5 Same month	11	8	9
3.6 MFLS1 follows MFLS2	45	39	45
Date discrepancy and telescoping			
Mean quartic root |date discrepancy|			
3.7 MFLS1 precedes MFLS2	1.87	1.92	1.93
(standard error)	(0.04)	(0.04)	(0.03)
3.8 MFLS1 follows MFLS2	1.92	1.85	2.04
(standard error)	(0.04)	(0.05)	(0.04)
3.9 Difference (row 4.7-4.8)	-0.05	0.07	-0.11
(standard error)	(0.05)	(0.06)	(0.05)
Number of respondents	641	816	816

Table 4

Probit estimates of probability migration reported in MFLS2
conditional on migration having been reported in MFLS1

	MALES INTER-DISTRICT		FEMALES INTER-DISTRICT		FEMALES INTRA-DISTRICT	
	β	t	β	t	β	t
PERSONAL ATTRIBUTES						
Age (years)	0.030	(3.00)	-0.016	(1.14)	0.004	(0.47)
Yrs since move: 0-5	-0.083	(1.36)	-0.268	(3.31)	-0.024	(0.59)
6-15	0.027	(1.42)	0.053	(1.99)	-0.022	(1.33)
>15	-0.030	(2.32)	0.021	(0.98)	-0.003	(0.22)
Education (years)	0.059	(4.15)	0.028	(1.52)	-0.001	(0.09)
SURVEY OPERATIONS						
At interview: (1) if						
Someone helped	-0.016	(0.09)	0.189	(0.98)	-0.109	(0.94)
Spouse present	-0.266	(2.51)	-0.182	(1.22)	-0.059	(0.60)
Reliability of response: (1) if						
Very reliable	0.032	(0.09)	0.964	(3.22)	0.247	(1.31)
Average	-0.095	(0.27)	0.741	(2.65)	0.290	(1.62)
Interview time (hours)						
in MFLS1	-0.076	(0.48)	0.240	(3.15)	0.004	(0.06)
in MFLS2	0.358	(1.81)	-0.175	(0.91)	0.142	(1.18)
(1) if district boundary change	0.052	(0.48)	0.336	(2.54)	0.041	(0.46)
MIGRATION ATTRIBUTES						
Duration of move						
(1) if 2-4 years	0.460	(3.79)	0.496	(3.00)	0.231	(1.96)
5-10 years	0.616	(4.04)	0.701	(3.26)	0.583	(3.95)
>10 years	0.489	(3.01)	0.624	(2.90)	0.519	(3.08)
Distance (kms)	-0.034	(0.77)	-0.044	(0.83)	.	
(1) if Inter-state move	0.296	(2.85)	0.254	(1.92)	.	
First time in district	0.601	(4.69)	0.282	(1.80)	.	
First move	0.215	(1.75)	0.175	(1.15)	0.183	(1.71)
Circular move	-0.199	(1.68)	-0.151	(0.79)	0.022	(0.20)
Move while married	0.100	(0.72)	-0.159	(1.01)	0.042	(0.43)
Moved with spouse	0.876	(6.17)	1.297	(7.17)	.	
Origin→destination: (1) if						
Rural→urban move	0.197	(1.53)	0.101	(0.61)	.	
Urban→rural move	0.145	(1.16)	0.456	(2.78)	.	
Urban→urban move	0.253	(1.75)	0.317	(1.76)	0.257	(2.65)
# moves reported	0.019	(0.87)	-0.054	(1.67)	-0.126	(5.04)
COINCIDENT EVENTS						
(1) if Husband changed job	0.240	(2.40)	0.104	(0.49)	0.135	(0.75)
Marriage	-0.127	(0.89)	0.048	(0.32)	0.431	(3.75)
Birth of child	-0.145	(0.84)	0.024	(0.16)	0.031	(0.28)
χ^2(all covariates)	264.88		199.77		190.45	
Pseudo R^2	0.21		0.24		0.13	
Sample size	951		678		1153	

Notes: Sample is all reported moves in MFLS1. Asymptotic t statistics in parentheses. Regressions include intercept, controls for ethnicity, father's education, and mother's education. Years since move measured from MFLS1 interview.

Table 5

Time discrepancy between migration dates

OLS estimates: Dependent variable=$\sqrt[4]{}$(|MFLS1 date-MFLS2 date| measured in months)

	MALES INTER-DISTRICT		FEMALES INTER-DISTRICT		FEMALES INTRA-DISTRICT	
	β	t	β	t	β	t
PERSONAL ATTRIBUTES						
Age (years)	0.015	(2.65)	0.010	(1.38)	0.016	(3.02)
Education (years)	-0.007	(1.95)	-0.048	(4.90)	0.003	(0.43)
SURVEY OPERATIONS						
At interview: (1) if						
Someone helped	0.074	(0.57)	0.059	(0.57)	-0.002	(0.02)
Spouse present	0.063	(0.82)	0.026	(0.30)	-0.157	(2.29)
Reliability of response: (1) if						
Very reliable	-1.303	(3.84)	0.130	(0.61)	-0.110	(0.75)
Average	-1.212	(3.57)	0.244	(1.19)	0.079	(0.57)
Interview time (hours)						
in MFLS1	-0.076	(0.62)	-0.033	(0.76)	0.047	(1.20)
in MFLS2	0.208	(1.37)	-0.122	(1.00)	0.044	(0.58)
(1) if district boundary change	-0.052	(0.67)	-0.125	(1.78)	0.099	(1.65)
MIGRATION ATTRIBUTES						
(1) if moved during						
1960-1969	0.059	(0.64)	0.008	(0.08)	-0.014	(0.16)
1970-1976	0.074	(0.54)	0.018	(0.14)	-0.150	(1.38)
Distance (kms)	0.008	(0.27)	-0.022	(0.76)	.	
(1) if Inter-state move	0.065	(0.84)	0.007	(0.10)	.	
First time in district	0.146	(1.81)	0.034	(0.41)	.	
First move	0.029	(0.34)	0.015	(0.18)	-0.152	(2.09)
Circular move	0.138	(1.51)	0.058	(0.46)	0.191	(2.53)
Move while married	-0.205	(2.24)	0.150	(1.76)	0.033	(0.49)
Moved with spouse	-0.040	(0.48)	-0.127	(1.57)	.	
Origin→destination: (1) if						
Rural→urban move	0.034	(0.35)	-0.053	(0.54)	.	
Urban→rural move	-0.095	(1.03)	-0.125	(1.43)	.	
Urban→urban move	-0.090	(0.88)	-0.201	(2.05)	-0.096	(1.48)
# moves reported	-0.019	(1.37)	0.032	(1.54)	-0.089	(4.16)
COINCIDENT EVENTS						
(1) if Husband changed job	-0.383	(5.31)	0.045	(0.38)	-0.184	(1.68)
Marriage	0.016	(0.14)	-0.374	(4.27)	-0.318	(4.14)
Birth of child	0.177	(1.38)	-0.082	(0.98)	-0.224	(3.07)
F(all covariates)	3.65		4.54		9.53	
R^2	0.17		0.23		0.23	
Sample size	555		469		765	

Notes: Sample is all matched moves in MFLS1 and MFLS2. t-statistics in parentheses. Regressions include controls for ethnicity, father's education, and mother's education.

Table 6

Time discrepancy between migration dates: Telescoping and salient events

OLS Estimates: Dependent variable=$\sqrt[4]{}$(|MFLS1 date-MFLS2 date| measured in months)

	MALES INTER-DISTRICT β	t	FEMALES INTER-DISTRICT β	t	FEMALES INTRA-DISTRICT β	t
Direct effect only						
(1) if MFLS1 reported date earlier	-0.048	(0.88)	0.063	(1.09)	-0.035	(0.72)
Direct effect and interactions with coincident events						
(1) if MFLS1 reported date earlier	-0.047	(0.66)	0.017	(0.23)	-0.136	(2.23)
Interacted with coincident events: (1) if						
* Husband changed job	0.071	(0.64)	-0.163	(0.74)	0.208	(1.07)
* Marriage	-0.257	(1.44)	0.274	(2.04)	0.082	(0.68)
* Birth of child	0.032	(0.16)	-0.148	(0.99)	0.269	(2.11)

Notes: Sample is all matched moves in MFLS1 and MFLS2. Model includes all covariates in Table 5 in addition to interaction between indicator variable for MFLS1 reported earlier and the six salient events (the coincident events and the origin-destination of the move).

Appendix Table 1
Means and (standard errors) of covariates

	MALES INTER-DISTRICT		FEMALES INTER-DISTRICT		FEMALES INTRA-DISTRICT	
PERSONAL ATTRIBUTES						
Age (in years)	42.58	(0.30)	37.62	(0.28)	36.95	(0.22)
Years since move	17.12	(0.31)	14.15	(0.30)	12.25	(0.25)
Spline: 0-5	5.56	(0.03)	5.49	(0.04)	5.18	(0.04)
6-15	7.09	(0.13)	6.17	(0.16)	4.96	(0.13)
>15	4.48	(0.21)	2.50	(0.15)	2.11	(0.12)
Education (years)	6.41	(0.26)	3.82	(0.16)	3.33	(0.16)
SURVEY ATTRIBUTES						
Fraction						
Someone helped at interview	0.10	(0.01)	0.15	(0.01)	0.15	(0.01)
Spouse present at interview	0.40	(0.02)	0.25	(0.02)	0.25	(0.01)
Very reliable responses	0.42	(0.02)	0.28	(0.02)	0.30	(0.01)
Average reliability responses	0.57	(0.02)	0.66	(0.02)	0.64	(0.01)
Interview time (hours)						
in MFLS1	0.92	(0.01)	2.00	(0.03)	1.91	(0.02)
in MFLS2	0.53	(0.01)	0.88	(0.01)	0.89	(0.01)
Fraction involve district boundary chang	0.29	(0.01)	0.33	(0.02)	0.40	(0.01)
MOVE CHARACTERISTICS						
Duration of move (years)	6.41	(0.25)	8.31	(0.30)	6.94	(0.20)
Fraction move between						
1960-1969	0.21	(0.01)	0.27	(0.02)	0.25	(0.01)
1970-1976	0.10	(0.01)	0.17	(0.01)	0.23	(0.01)
Distance (kms)	1.25	(0.04)	1.44	(0.05)	0.00	(0.00)
Fraction moves involve						
Inter-state move	0.60	(0.02)	0.57	(0.02)	0.00	(0.00)
First time in district	0.32	(0.02)	0.53	(0.02)	0.00	(0.00)
First move	0.32	(0.02)	0.43	(0.02)	0.41	(0.01)
Circular move	0.24	(0.01)	0.11	(0.01)	0.34	(0.01)
Move while married	0.24	(0.01)	0.23	(0.02)	0.38	(0.01)
Moved with spouse	0.21	(0.01)	0.27	(0.02)	0.00	(0.00)
Origin-destination: Fraction						
Rural→urban move	0.24	(0.01)	0.20	(0.02)	.	
Urban→rural move	0.25	(0.01)	0.24	(0.02)	.	
Urban→urban move	0.18	(0.01)	0.21	(0.02)	0.33	(0.01)
Rural→rural move	0.33	(0.02)	0.35	(0.02)	0.66	(0.01)
# moves reported by respondent	5.01	(0.10)	4.06	(0.10)	3.27	(0.07)
COINCIDENT EVENTS: Fraction w/in						
Husband changed job	0.35	(0.02)	0.09	(0.01)	0.07	(0.01)
Marriage	0.13	(0.01)	0.37	(0.02)	0.28	(0.01)
Birth of child	0.09	(0.01)	0.22	(0.02)	0.22	(0.01)
Fraction MFLS1 reported date						
precedes MFLS2	0.45	(0.02)	0.53	(0.02)	0.46	(0.02)
* Husb. changed job	0.17	(0.02)	0.05	(0.01)	0.04	(0.01)
* Marriage	0.05	(0.01)	0.20	(0.02)	0.17	(0.01)
* Birth of child	0.04	(0.01)	0.11	(0.01)	0.11	(0.01)
Number of moves in MFLS1	951		679		1153	
Number of matched moves in MFLS1 & 2	555		470		765	