AUSTRALIAN
SCHOOL OF BUSINESS™

THE UNIVERSITY OF NEW SOUTH WALES

The University of New South Wales
Australian School of Business

School of Economics Discussion Paper: 2010/07

Intergenerational Cohabitation in Modern Indonesia: Filial Support and Dependence

Meliyanni Johar and Shiko Maruyama

School of Economics
Australian School of Business
UNSW Sydney NSW 2052 Australia
http://www.economics.unsw.edu.au

ISSN 1837-1035
ISBN 978-0-7334-2906-4

Intergenerational Cohabitation in Modern Indonesia: Filial Support and Dependence

Meliyanni Johar, University of Technology Sydney

Shiko Maruyama, University of New South Wales

February 11, 2010

JEL Code: C25, D10

Key words: informal care, living arrangements, intergenerational transfer, cohabitation, Indonesia, finite mixture logit.

ABSTRACT

Intergenerational cohabitation is becoming less common in modern societies. The opportunity costs of caring for parents are increasing, and the notion of filial piety is weakening. Meanwhile, in most developing Asian countries, a public old-age support system has yet to be developed. This paper delineates the positions of parents and children in the family decision of living arrangements, which have important policy implications on the reliability of filial support as a form of old-age security. We use panel data from Indonesia to study factors that initiate cohabitation by elderly parents and their adult children. Transition analysis provides a clearer interpretation of causality than cross-sectional analysis. We find that while cohabitation is motivated by parental needs, especially those of mothers, the family decision is influenced to a larger extent by the private gains and costs of the children. Cohabitation tends to occur when the child is unmarried or has a low level of education. However, parents who cohabitate tend to be healthy and wealthy, and they also generally live with a spouse. We also find that elderly parents who are poor and recent migrants are most at risk of not receiving filial support. The development of public support programs would result in potential welfare gains, particularly for those vulnerable to not receiving filial support.

INTRODUCTION

Filial piety assumes the duty of informal filial care for elderly parents. Particularly in developing countries where public support systems for the elderly are absent or underdeveloped, the elderly typically expect to rely on filial piety. Indeed most elderly parents in these countries live with children (Frankenberg, Chan and Ofstedal 2002). Cohabitation is the most comprehensive form of informal care by a child, offering immediate and continuous interactions with a long-term commitment. In modern aging societies today, however, the prevalence of intergenerational cohabitation is declining, even in developing Asian countries, which are traditionally known for the strength of their family ties and adherence to filial responsibility. The costs and benefits of cohabitation for both parents and children seem to have changed significantly over time.

This paper aims to delineate the positions of parents and children in the family decision of living arrangements, which have important policy implications, in particular, whether elderly parents can rely on children when in need and how to protect the wellbeing of senior citizens in developing countries. We investigate factors that influence the initiation of cohabitation by elderly Indonesian parents and their adult children using the longitudinal Indonesian Family Life Survey (IFLS) in the years 1993, 1997, 2000, and 2007. The population of interest is elderly parents aged 60 and over who have at least one surviving adult child but have not started cohabitating with a child.

We advance the literature by intensive use of the panel data. Most previous studies relied on static analyses with cross-section data (e.g., Aquilino 1990). Interpretation from these kinds of studies is difficult, as their results are often plagued with reverse causality. For example, if living with children improves health, such studies may wrongly conclude that healthier parents are more likely to live with their children. With panel data, on the other hand, we can circumvent the reverse causality issue by focusing on the transition to cohabitation conditional on pre-determined covariates and by utilizing exogenous time-varying variables and exogenous shocks, such as the loss of a spouse, the development of a chronic disease, and economic loss due to natural disaster. Furthermore, by focusing on the transition to cohabitation, we can distinguish between life-long cohabitation in which a child has never left the parents' home and new cohabitation in which a parent who lives independently starts cohabitation with an adult child. Takagi, Silverstein, and Crimmins (2007) pointed out that these two types of cohabitation are distinct in nature. The latter type tends to be primarily "need-driven" (i.e., responsive to the heightened need of elderly parents), whereas life-long cohabitation tends to be "value-driven," governed by cultural norms, customs, and social structures. In a developing country setting, such "traditions" may be a dominating aspect hence removing this aspect will help us highlight the role of parental care needs in the living arrangement decision in this modern era.

In addition to the focus on transition, we use the availability of timing information of cohabitation where the dependent variable is a family's transition to cohabitation in a given year. We expand the data set from four IFLS waves to fifteen-year pseudo-annual panel data to avoid bias due to the positive correlation between the length of the survey interval and the chance for cohabitation. Meanwhile, unobserved family-specific heterogeneity may cause a self-selection bias as families repeatedly appear in the sample unless they start cohabitation. To address this bias, we estimate a Heckman and Singer (1984)-type two-component mixture logit model that accounts for unobserved time-invariant family-specific heterogeneity non-parametrically.

Another gap in the literature we aim to fill is the limited extent of covariates used in previous analyses. This shortcoming restricts their ability to explore various reasons behind cohabitation. The family decision of living arrangements is a joint decision by all family members, and each family member has different motives. Children may strategically agree to cohabitate with their elderly parents considering inheritance or free childcare for their children (Bernheim, Shleifer and Summers 1985; Altonji, Hayashi and Kotlikoff 1992; Horioka 2002). Children may also remain as “children” in the shared household and take advantage of the free rent while their elderly parents remain the breadwinners (Beard and Kunhariwibowo 2001; Frankenberg et al. 2002). The richness of the IFLS serves the purpose of exploring various motives of both parents and children family members since it contains detailed information not only on elderly parents but also on their children, regardless of cohabitation status. In addition, the IFLS contains community-level information about how an elderly parent should live according to the traditional laws. The belief of the local community may then create social pressure for elderly parents and adult children to behave in a certain manner.

We find that while parental needs motivate children to cohabitate with their elderly parents, especially mothers, as filial piety and altruism would predict, the cohabitation decision is influenced to a larger extent by the private gains and costs incurred by the children. Cohabitation tends to occur with an unmarried child, especially a son, and a child with a lower education level. Meanwhile, parents who start cohabitation with their children tend to be healthy and wealthy, and they also tend to live with a spouse, implying a reduced need for care. The direction of this finding is consistent with that of previous studies (Aquilino 1990; Schroder-Butterfill 2003, 2005; Frankenberg et al. 2002; Arifin 2006). Indeed, our findings provide additional support for these previous studies because our identification strategy is more convincing due to use of panel data and because children who have never left their parents’ home and still rely on them are not included in our sample. In addition, the use of mixture model reveals considerable heterogeneity in Indonesian families with the majority of families that prefer cohabitation.

Furthermore, this study identifies elderly parents who are at great risk of not receiving support from their children. Elderly fathers at risk include those who are disabled, have fewer children, live without a spouse, receive no pension, have no income, and are recent migrants. Meanwhile, elderly mothers at risk tend to be poor and are often recent migrants. For policymakers, these results highlight a potential gain from the development of public programs to support elderly individuals who are less likely to receive familial support.

REASONS FOR COHABITATION AND RELATED LITERATURE

Traditionally, elderly parents and their children lived together because outside opportunities were limited and family businesses, such as farming and fishing, required family-specific skills and assets. In this environment, whether children adhere to tradition, are altruistic, or selfish, they have incentives to live with their parents, and these social and family structures are nurtured by filial piety. In modern societies, providing informal care for elderly parents is much more costly. Those of the younger generation have more outside opportunities, and their incentives to follow traditional family norms and customs are weaker. In addition, an aging society exacerbates the burden of informal care because the ratio of older to younger individuals is higher, the disabled elderly live longer, and caregivers are older. The high cost of family informal care and cohabitation may result in conflicts of interest among family members and affect the family decision regarding filial support.

Indonesia is no exception to these general trends. The aggregate statistics of intergenerational cohabitation as a "crude" indicator of old age support have shown a declining trend. According to the IFLS, the proportion of elderly parents living with a child has dropped from approximately 65% in the 1990s to slightly above 50% in 2007. Despite this trend, the country's social security system is underdeveloped, and most elderly individuals await material support from their children. Without significant social reform to safeguard the welfare of the elderly, the concern over their livelihood is likely to escalate in the future as Indonesia faces an aging society. The population of individuals who are 65 years old and older is predicted to quadruple in four decades due to an improvement in life expectancy (Adioetomo 2004; Ananta, Evi and Bakhtiar 2005). Meanwhile, the national fertility rate has declined sharply from 5.6 children in the 1950s to 2.3 children in 2005 and is predicted to continue to decline to fewer than two children by 2025 (Adioetomo 2004).

Models of family bargaining suggest that elderly parents and adult children can negotiate a living arrangement to optimize their objectives. The observed living arrangements are an outcome of these unobserved interactions between parents and children. Elderly parents may prefer cohabitation with children to obtain physical, mental, and economic support. Studies on the elderly in Japan and the U.S. have found that increased parental needs for care that result from factors such as poor health or widowhood are positively correlated with the probability of parent-child cohabitation (Johar, Maruyama and Nakamura 2010; Brown et al. 2002; Dostie and Léger 2005; Silverstein 1995). The Javanese, the largest ethnic group in Indonesia, has been found to have preferences for family members to live close together (Beard and Kunhariwibowo 2001). The gender preferences of parents could also affect their living arrangements. Keasburry (2001) found that the Indonesian elderly prefer to live with daughters. This pattern differs greatly from the strongly patriarchal and primogenital cultures in other Asian countries, such as Japan, India, and China (Wakabayashi and Horioka 2006; Ngin and DaVanzo 1999). It is hypothesized that this is because household chores like cooking and cleaning are female tasks, and increased kinship distance, as in the case of in-laws, may induce awkwardness and inefficiency in the event of dependence (Schrorder-Butterfill 2005; Rosenzweig and Wolpin 1985).

Children may also benefit from cohabitating with their parents. In a case study on families with elderly cohabitants in rural Indonesia, Schroder-Butterfill (2003, 2005) found that nearly fifty percent of elderly individuals who cohabitated with an adult child remained the economic backbone of the household. They either remained employed or used their pension income or savings to finance the entire household. This finding suggests that cohabitation can be motivated by the vulnerability of the younger generation rather than by the ability of the younger generation to support the older generation. Arifin (2006) reached the same conclusion finding that although Indonesian elders in rural areas were more likely to live without a child relative to those living in urban areas, the elderly in urban areas were more likely to retain their head-of-household status. This trend suggests that many adult children in urban areas are still financially dependent on their elderly parents.

Using the first wave of the IFLS, Cameron (2000) examined the characteristics of children who cohabitated with their parents and paid particular attention to the earning power of the children. She found that a child’s earning potential and cohabitation were negatively related. Meanwhile, parental earning power had no effect on their living arrangements. These results suggest that living arrangements depend more heavily on the circumstances of children than on those of the parents, and that affluent children did not necessarily provide more support to their elderly parent in the form of non-monetary services or time transfers.

Inheritance behavior and customs also affect children’s incentives and influence intergenerational cohabitation. Modern economics literature has identified the strategic bequest motive (Bernheim et al. 1985; Cox 1987) predicting that cohabitation and attentive care is more likely for wealthy parents, as they are likely to bequeath considerable wealth as a reward. Substantial empirical support for this hypothesis has been found in Japan (Yamada 2006; Kim 2004; Takagi et al. 2007). Traditional inheritance rules and family structures can also be rationalized by family optimization behavior (Botticini and Siow 2003). Indonesia has many family systems, each with its own set of rights and inheritance rules. The property of family lines (or the clan) is typically passed on within the clan, whereas the property of individuals can be passed on to the children or spouse of the departed. There are also societies that embrace a more flexible bilateral system in which daughters may play an equally or more important role than sons (Ofstedal, Knodel and Chayovan 1999). In these kinds of societies, gender preferences with regard to inheritance are unclear (Schroder-Butterfill 2005). Inheritance disputes are typically resolved domestically or by customary practices in the community, although they can also be settled in court (either civil or Islamic). The stance of the legal system on this issue is rather weak.

Other benefits that a child may derive from cohabitating with elderly parent include grandparenting (Kim 2004) and economies of scale. It has been suggested that a higher incidence of parent-child cohabitation in urban areas is due to higher living costs or more severe housing shortages compared to rural areas (Arifin 2006; Chaudhuri and Roy 2009).

Children's incentives to cohabitate decrease with the expected costs of cohabitation, including monetary, time and psychological costs and the availability of alternative caregivers. Frankenberg et al. (2002) analyzed the stability of living arrangements of elderly Taiwanese, Singaporeans, and Indonesians. For Indonesia, they used IFLS1 and IFLS2 and found strong evidence that parents in poor health were more likely to cohabitate with their children, but there was little evidence that a parent's poor health resulted in a transition to cohabitation. This study, however, assumes a quite restrictive substitution pattern in its multinomial logit framework, and the covariates included in the analysis are limited.

With regard to alternative caregivers, although formal care institutions exist in Asian countries, their use is still rare and often considered taboo (Chan 2005; Arifin 2006). Instead, siblings are the alternative caregivers. Extant literature also discusses the theory of a free-rider problem in families with multiple children, and several empirical studies from developed countries found support for this theory (Konrad et al. 2002; Pezzin, Pollak and Schone 2005). An elderly parent's wellbeing is a public good that is enjoyed by all children.

The cost of care, however, will be incurred only by the cohabitating child, leading to a free-riding problem among siblings. Aside from the number of children, other individual factors, such as each child's economic state and availability of non-market time, are also relevant as they determine the feasibility of providing care to the elderly parent. Arifin (2006), for example, pointed out that increased female labor force participation might have a negative effect on the provision of care to elderly parents by daughters.

DATA

The data are derived from the Indonesian Family Life Survey (IFLS) in 1993 (IFLS1), 1997 (IFLS2), 2000 (IFLS3), and 2007 (IFLS4) collected by RAND in collaboration with several local universities. The IFLS is a nationally representative longitudinal study of Indonesian households covering 13 of the 27 Indonesian provinces where 83% of the country's population resides. This offers a better scope than previous Indonesian studies that were based on selected geographical areas or small case studies (Arifin 2006; Keasburry 2001; Beard and Kunhariwibowo 2001). In its first wave, the IFLS sampled 7,224 households consisting of 22,000 individuals.[1] The subsequent waves consist of the origin households (IFLS1) and their split-offs, which are new households consisting of members of the origin households. There is no re-sampling of new households in the later waves.[2] Re-contact rates

---

[1] The IFLS1 surveyed the household head, his or her spouse, two randomly selected children between the ages of 0 and 14, and an individual 50 years of age or older who was randomly selected from the remaining household members. For a quarter of the original IFLS1 households, the survey was also administered to an individual aged 15 to 49 years who was randomly selected from the remaining members.

[2] Newborns were included in the next survey, and individuals found in IFLS1 but not interviewed had a chance of being interviewed in the subsequent waves.

are high (over 90%). In the latest wave, the study involved 13,535 households and over 45,000 individuals. The reliability of the IFLS data is documented in Thomas, Frankenberg, and Smith (2001).

The population of interest in this study is elderly individuals 60 years of age and older ("elderly parents") with at least one surviving adult child (defined in the IFLS as 15 years of age and older). The life expectancy in Indonesia is around 65 years old, but lowering the age threshold in defining an elderly parent may obfuscate the analysis as the relatively younger parents are likely to be healthier, be economically well-off, and still have parenting obligations. This age threshold was also used by previous Indonesian studies (Arifin 2006; Schroder-Butterfill 2005). We focus on adult children because they are the ones expected to provide care for their elderly parents in need. Further, we limit our population of interest to elderly parents without a surviving parent in any sample period to avoid the complication that elderly individuals are in the position of caring for their parents, though this situation is rare.

Table 1 provides some background information on the prevalence of different types of living arrangements of elderly parents in Indonesia. "Living with a child" includes living with a child-in-law or an adopted child; only a few households have only a child-in-law and no biological child. Overall, living arrangements appear stable through 2000, but in 2007, there is a noticeable increase in the proportion share of elderly parents living alone or living only with a spouse and a corresponding decline in the share of parents living with a child. This declining trend of traditional living arrangements with extended families is consistent with the general modernization of Indonesia.

[Insert Table 1: Living Arrangements Across Socio-demographic Groups]

In any observation year, the gender difference is evident with elderly mothers being more likely to live alone and be single. This trend in Indonesia is documented in Arifin (2006) and Keasberry (2001). Single mothers tend to live with others, whereas single fathers typically live alone. Employed elderly parents tend to live with a child or a spouse who could be a dependent. Interestingly, among the employed elderly parents, the share of single parents who live with a child is higher than that of single parents who live with others.

Table 2 shows the trend in living arrangements between two consecutive observation periods. In the diagonal entries, the large proportions reflect the stability of living arrangements. From “living alone” and “spouse only,” the most common transitional change is to live with a child in the next observation period. Meanwhile, among the different types of living arrangements, living with others is relatively unstable, and the transition to living with a child is less likely. This pattern may reflect the differing nature of parent-child interactions and parent-others interactions, with the latter being relatively provisional and unstructured. Consistent with the trend in Table 1, the national trends in the transition of living arrangements changed in the last observation year, with relatively larger shares of elderly parents moving from various living arrangements to living alone. The table also shows that single elderly parents have a higher risk of death.

[Insert Table 2: Changes in Living Arrangements of Elderly Parents]

As our focus is on the transition to cohabitation, our sample consists of only elderly parents who did not live with a child in the base period. The base period is the first observation year of any two consecutive survey years (i.e., 1993 in 1993/1997, 1997 in 1997/2000, and 2000 in 2000/2007). This sample restriction effectively removes parents and children in life-long cohabitation situations, leaving us with cohabitation that occurred only after the child lived on his/her own for a period of time. Our final sample consists of 371 elderly parents in IFLS1, 282 new elderly parents in IFLS2, and 235 new elderly parents in IFLS3 after excluding those whose responses were rated as "unreliable" by interviewers.

Dependent variable

The dependent variable is a binary variable for the transition to cohabitation with an adult child in a particular year.[3] Between 1993 and 2007, 212 elderly parents (24%) in the sample began to cohabitate with 58% of them being mothers. Out of these parents, 94% accommodated a child moving in while the remainder relocated geographically.[4] When children were asked about the main reasons for their moves, 90% provided specific reasons. Approximately 29% of these reasons were "followed spouse/parent" and 10% were to "help family". We also observed more selfish reasons in some children, such as "need place to stay" (22%) and "to find work" (4%). Milagros et al. (1995) found these selfish motives in children in Thailand and the Philippines and concluded that one of the most important advantages of cohabitation to children is the use of their parent's house as a domicile.

---

[3] Our sample excludes elderly parents who migrated to child's house as they were not survey respondents in the base year. One may suspect that this creates a bias towards the observation of adult children who are in need of their parent's support and migrated to their parent's house. However, we argue that we can identify the elderly parents with an immediate need for care through the presence of parents who experienced exogenous, adverse events. If cohabitation occurs when parental need for care increases, we expect the odds of transitioning to cohabitation to be greater for parents who experienced these shocks.

[4] This figure may be high because those who moved too far away may no longer be covered by the IFLS.

Explanatory variables

The IFLS contains information at both the parent level and the child level. Parental information includes basic personal characteristics, family structure, health conditions, and economic status. To control for the influence of religion and ethnicity on family decisions, we included a dummy variable for Islam, which is the major religion (90%) in Indonesia, and a series of dummy variables for ethnic groups. Other personal characteristics of particular interests are the presence of a spouse and migration history. Approximately 12% of the elderly parents in the sample lost their spouse during the study period, almost entirely due to death.

For health measures, we consider the ability to perform a series of activities of daily life (ADL) [5] and the development of chronic diseases. We create an index to indicate limitations on the ability to perform these tasks, assigning zero to activities that can be performed with no difficulty, one to activities that are performed with some difficulty, and two to activities that cannot be performed by the elderly parent. Cameron (2000) suggested that only ADLs that reflect serious disabilities (e.g., sitting and standing, unassisted dressing, or unassisted use of the bathroom) are relevant to living arrangements. In this study, we follow her definition of disability but also include the score for the other types of ADL limitations. These other ADLs are more demanding but are typically not performed on a daily basis (e.g., carrying a heavy load or walking five kilometers). For chronic conditions, we use the number of chronic conditions that started in a given year.

[5] These activities are: (1) to carry a heavy load (e.g., pail of water) for 20 meters; (2) to sweep the house floor yard; (3) to walk five kilometers; (4) to draw a pail of water from a well; (5) to bow, squat, or kneel; (6) to dress without help; (7) to stand up from a sitting position in a chair without help; (8) to stand up from sitting on the floor without help; (9) to go to the bathroom without help.

Parental economic status is a relevant factor as it indicates parents' degree of economic independence, availability of a non-family network from the workplace, and availability of non-market time. Low availability of non-market time could imply a negative effect of employment on cohabitation with children if, in the cohabitation arrangement, an elderly parent is expected to contribute to domestic tasks or grandparenting. To measure income, we construct deciles of annual wage income (or net profit for the self-employed) from the individual's primary job in a given survey year. In addition, we control for different types of employment and include a dummy variable for pension status. Wealth is another economic measure. The difference between income and wealth may be more pronounced for the elderly population because they often live on wealth without much income. Similar to the treatment of income, we construct deciles of asset values, which include real estate, vehicles, jewelry, household appliances, livestock, receivables, and savings.[6] In addition, we consider two other asset variables defined at the household level: full house ownership (i.e., no share owned by non-household members) and other real estate assets. The last economic variable for the parents is a shock variable: the presence of a major loss due to natural disasters, such as floods and earthquakes, in a given year.

Regarding child information, we use the number of sons and daughters and an "only child" dummy variable to test for the effect of the availability of children and the gender effect. With regard to the economic characteristics of children, we include the share of children with post-school qualifications and the share of married children. Higher education in a child may indicate the family's openness to more modern ways of living, such as

[6] Share information is available only for the head of household, his or her spouse, and household members who are the sole owners of these assets. For the other household members, we divided the value by the number of household members who owned the assets.

acceptance toward the use of formal care, familiarity with financial institutions, affordability of external care providers, and devotion to healthier lifestyle, all of which could lower the need for cohabitation. To control for the parent-child interaction prior to cohabitation, we considered the presence of money or food transfers from children to their parents and whether parents meet with at least one of their children once a month.

The last set of variables relates to community characteristics and geographical locations. The IFLS household survey is accompanied by a complementary survey at the community level (*kelurahan*) on traditional laws (*adat*); this complementary survey was conducted in IFLS2 and IFLS4. We use the IFLS2 *adat* survey to cover the period between 1993 and 2000 and the IFLS4 *adat* survey to cover the remaining years. Two customary practices that are relevant to us are elderly parents' living arrangements and inheritance distribution. The influence of these norms on the community is declining. In the 1990s, approximately 30% of communities indicated that traditional laws were almost never broken. In 2000, only 20% of communities indicated that this was the case. We, therefore, consider the role of these traditional rules only when they are still upheld by the community. Finally, to control for geographical variation, we include region dummy variables and a dummy variable for rural areas. Table 3 provides definitions of the variables used in the analysis.

[Insert Table 3. Definitions of Dependent Variable and Key Explanatory Variables]

EMPIRICAL STRATEGY

Cohabitation is assumed to occur when a family reaches the decision as a consequence of a latent family decision-making process. When we observe the cohabitation decision of randomly sampled families, we can analyze various factors that affect cohabitation initiation by the standard binary choice framework such as logit and probit. We observe y_i, $i = 1,...,N$, which is an indicator variable of the transition to cohabitation for family i. The variable y_i is assumed to be generated by the latent construct, y_i^*, specified as

$$y_i^* = X_i \beta + \varepsilon_i , \tag{1}$$

where X_i is a vector of covariates, including the constant term. The logit model arises when ε_i, conditional on X_i, is assumed to independently follow a logistic distribution. The transition probability of family i's cohabitation is given by:

$$\Pr(y_i = 1 \mid X_i) = \Lambda(X_i \beta) = \frac{e^{X_i \beta}}{1 + e^{X_i \beta}} , \tag{2}$$

where $\Lambda(\cdot)$ is a cumulative distribution function of logistic distribution. We can estimate this model by maximizing the following log-likelihood function:

$$\ln L = \sum_{i=1}^{N} \ln l(\beta \mid y_i , X_i), \tag{3}$$

where

$$l(\beta \mid y_i , X_i) = \Lambda(X_i \beta)^{\, y_i} \cdot [1 - \Lambda(X_i \beta)]^{\, 1 - y_i} . \tag{4}$$

This standard framework provides consistent estimates for single cross-section data provided that other standard assumptions are met. For a panel data set, we can still legitimately apply the same framework by regarding it as a repeated cross-section. This framework is sometimes called stacked logit and is a discrete representation of a duration model with a constant hazard.[7]

---

[7] An exponential duration model imposes a constant hazard. A more flexible option is a Weibull model, which allows certain duration dependence and can be easily incorporated in the stacked logit framework. We will not investigate this direction because most of the elderly individuals in our sample have been separated from their children for many years, and duration dependence is neither sharply identified nor of much interest. Furthermore, we do not have information on when children left their parents if it occurred before the first wave.

Constructing an annual panel

We exploit the exact timing of cohabitation for its informational gain by inflating the four waves of the IFLS in 1993, 1997, 2000, and 2007 to an annual panel from 1993 to 2007. Annualizing the data has two further advantages. First, using an annual panel and redefining the dependent variable at the annual level resolves the bias due to the very irregular intervals between IFLS survey waves (i.e., the four-year gap between IFLS1 and IFLS2, the three-year gap between IFLS2 and IFLS3, and the seven-year gap between IFLS3 and IFLS4).[8] Second, we can also redefine the shock variables, such as the loss of a spouse, utilizing the information on the exact timing of these events. In the end, we have a 15-year panel from 1993 to 2007.[9]

Missing timing information

The use of the timing information, however, comes at a cost. A significant portion of children or parents (20%) does not recall the exact starting year of cohabitation. Excluding these observations will cause a censoring problem because this missing value problem occurs only for parents who began to cohabitate.

---

[8] Applying wave-specific dummy variables does not resolve this problem because the effects of right-hand side variables are also likely to differ across waves. This is essentially a problem of the definition of the dependent variable varying across waves.

[9] Although the cohabitation transition is defined as a change between two consecutive years, we have fifteen points in time, not fourteen, because we can use the timing information to identify the beginning of cohabitation in the first and last years (1993 and 2007).

We retain these observations and resolve the problem by modifying the likelihood function. Although the information on the exact year of movement is unknown for such observations, we know that cohabitation started sometime between the two consecutive survey waves. Let y_{it} , $i = 1,..., N$, $t = 1,...,T_i$, be an indicator variable for the cohabitation decision of family i, with T_i being the year family i started cohabitation. For the families that did not begin cohabitation between any two consecutive IFLS waves, y_{it} takes a value of zero for all the years until the last observation year. The associated latent variable is now modeled as:

$$y_{it}^{*} = X_{it}\beta + \varepsilon_{it}\,, \tag{5}$$

where $\mathbf{x}_{it}$ is a vector of covariates including a constant term. Some covariates such as age and shock variables are annually time-varying while others vary only across IFLS waves.

Now consider the likelihood contribution of a family that starts cohabitation between two consecutive IFLS waves. Suppose there are T years between the two waves. The likelihood contribution of observation i that starts cohabitation within a year after the first wave is:

$$\Pr(y_{i1} = 1|X_{i1}) = \Lambda(X_{i1}\beta)\,. \tag{6}$$

Note that this is the only likelihood contribution of observation i because such an observation does not appear again once cohabitation has started (i.e., $T_i = 1)$. If observation i started cohabitation in the second year, the likelihood contribution is:

$$\Pr(y_{i2} = 1 \,|\, X_{i2}) \cdot \Pr(y_{i1} = 0|X_{i1}) = \Lambda(X_{i2}\beta) \cdot [1 - \Lambda(X_{i1}\beta)], \tag{7}$$

and so on. If observation i started cohabitation between two survey years but the exact year is unknown, the likelihood contribution can be written as:

$$1 - \prod\nolimits_{t=1}^{T}\left(1 - \Lambda(X_{it}\beta)\right), \tag{8}$$

where $\prod_{t=1}^{T}\left(1-\Lambda(X_{it}\beta)\right)$ is the probability that observation i does not begin cohabitation through the years between the two waves. We substitute (8) for the likelihood function for such observations.

Unobserved heterogeneity

The above method treats the data as pooled cross-sections and does not utilize the panel structure across waves. However, the fact that the IFLS is a panel raises a concern about the consistency of estimates when there is unobserved heterogeneity. In particular, even when we assume that unobserved heterogeneity is uncorrelated with any of the regressors and there is no substantial omitted variable, our estimates may be biased, unlike in a usual cross-sectional linear model setting, due to non-linearity and sample selection arising from the stopping-problem nature of our framework. To see the latter point, consider families with unobserved lower tendency of cohabitation. In our framework, these families appear in the data more often in later periods because the families with this higher tendency are more likely to start cohabitation and drop out of the sample as time elapses. In fairly general setting, the neglect of unobserved heterogeneity may lead to underestimation of the coefficients even if the unobserved heterogeneity term is uncorrelated with the included covariates (Cameron and Trivedi, 2005: chap. 18).

To overcome the bias due to unobserved heterogeneity, the use of random effects and fixed effects models is the most standard approach. This approach, however, is problematic in our setup because it requires us to remove a large share of observations that appear only once, and, more importantly, the vast majority of such observations are the ones that started cohabitation. This creates another source of selection bias. Using one cross-section is another solution but results in a great loss of information.

The solution we take is a finite mixture model, following Heckman and Singer (1984). We model unobserved individual-specific time-invariant heterogeneity non-parametrically. Specifically, we introduce a small number of unobserved "types," or latent classes, that affect the intercept term in (5). Suppose that there are k latent "types" of families and that these types affect the probability of cohabitation transition as an additive random shock, $(\nu_1, \nu_2, ..., \nu_k) \in \Re^k$. For simplicity of exposition, suppose there is no missing value issue on the timing of cohabitation. The individual likelihood contribution of a k component finite mixture model is

$$l(y_{i1}, y_{i2}, ..., y_{iT_i} \mid X_{i1}, X_{i2}, ..., X_{iT_i}; \beta, \nu_1, \nu_2, ..., \nu_k, \pi_1, \pi_2, ..., \pi_k) \tag{9}$$

$$= \sum_{j=1}^{k} \pi_j \prod_{t=1}^{T} \left\{ \Lambda(X_{it}\beta + \nu_j)^{y_{it}} \cdot \left[1 - \Lambda(X_{it}\beta + \nu_j)\right]^{1-y_{it}} \right\},$$

where the ν_j s are the additive unobservable heterogeneity and the π_j s are the *mixing probabilities* satisfying $0 < \pi_j < 1$ and $\sum_{j=1}^{k} \pi_j = 1$. In this formulation, the constant term in $X_{it}\beta$ is not identified, so it is normalized to zero. This model can be estimated by solving a maximum likelihood problem:

$$\max_{\{\beta, \nu, \pi\}} \ln L = \sum_{i=1}^{N} \ln l_i \ . \tag{10}$$

This finite mixture model suits our framework, allowing us to exploit the panel structure of the data and thus reduce the potential bias. We do not need to discard observations that appear only once, and we can estimate the impact of time-constant variables on transition. Meanwhile, the non-parametric nature of the random component gives the model greater flexibility. In the following analysis, we introduce not only additively separable heterogeneity but also heterogeneity in slope parameters, which is a straightforward extension.

After the expansion, the unit of observation is an elderly parent-year. The sample consists of 5,868 elderly-years. The descriptive statistics are provided in the Appendix. In summary, when comparing mothers and fathers, mothers tend to have lower income and no pension income as most of them are not in paid employment or in the paid labor force. Mothers report more physical limitations than fathers do Mothers also have a greater tendency to be widowed, have a lower level of education, and tend to live with others at the base year relative to fathers. Comparing across cohabitation status, parents who started cohabitation tend to be wealthier but are more likely to experience adverse shock. Mothers who started cohabitation tend to have more daughters, fewer children with post-school education, fewer married sons, and more married daughters. Meanwhile, fathers who started cohabitation tend to have more sons and daughters, but fewer of them are married.

RESULTS

We estimate the model separately for fathers and mothers, observing that they have very different circumstances. Table 4 reports selected results in terms of odds ratios so that the variable effects can be directly compared across subsamples. Columns [1] and [2] report the results for fathers and mothers, respectively. Columns [3] and [4] report results for subsamples of fathers and mothers, respectively, who had not migrated since they were 12 years old. Long-term residents may have high mobility costs for various reasons (e.g., cultural, economic), and the nature of the cohabitation agreement of these parents may be different from that of parents with higher mobility. In addition, demographers have stressed the role of local social networks in informal support provisions. Migrants tend to have weaker networks than longer-term residents and thus have more limited external support in the event of need (Schroder-Butterfill 2005).

Based on the full sample, losing a spouse has a particularly large positive effect on the odds of cohabitation of fathers. This is not surprising since men tend to rely heavily on their spouses to manage domestic tasks regardless of their health status (Schroder-Butterfill 2005). In such a situation, children may replace the role of departed mothers. Economic shocks also have positive effects on the odds of cohabitation initiation, but they are only significant for mothers. A health shock, as measured by new chronic conditions, has no significant effect on fathers or mothers.

With regard to parental characteristics, age has a negative effect on the odds of cohabitation initiation. This trend is generally observed in Indonesian studies and explained by the arrangement of the nuclear family, an increase in life expectancy, migration of the younger generation, and celibacy (Schroder-Butterfill 2005; Cameron 2000; Frankenberg et al. 2002; Keasberry 2001). From a policy perspective, this is a concern, as a social security system for the elderly has yet to be developed in Indonesia. Overall, the effect of religion and ethnicity are insignificant. This result is interesting and might suggest that family decisions regarding living arrangements and informal care arrangements are a common family problem regardless of religion and ethnicity.

Physical limitations of fathers tend to lower the odds of cohabitation with a child. This result is consistent with previous studies that find that elderly parents, particularly fathers, tend to continue providing economic support for their spouse and children, even when these children live with them (Schroder-Butterfill 2003, 2005; Beard and Kunharibowo 2001; Chaudhuri and Roy 2009; Yi and George 2000; Liang, Gu and Krause 1992). As basic physical ability is required for income-generating activities, this finding raises a concern about disabled fathers who have low employability. On the other hand, the disability of mothers tends to initiate cohabitation. This disparity may be explained by the expected role of fathers and mothers in the household. We also find that a child and a father are more likely to start cohabitation if the father's spouse is in the household. Such an effect is insignificant for mothers.

[Insert Table 4: Selected Results from Extended Logit Model]

Wealth and income have varying effects on cohabitation. For both mothers and fathers, any kind of parental employment reduces the likelihood of cohabitation with a child, especially non-paying work in family businesses and self-employment. Oppositely, wealth has a positive effect on cohabitation although the form of wealth seems irrelevant.[10] As income mandates labor hours while wealth does not, it seems that parents' non-market time is an important factor in a parent-child cohabitation decision.

Fathers receiving a pension are significantly less likely to start cohabitation. This is the opposite of the wealth effect. On one hand, the presence of pension support may give parents the option to live independently. However, pension beneficiaries may also be individuals whose characteristics generally discourage cohabitation. For example, long-serving government workers or veterans may receive pensions but could still be income and wealth poor as salaries for public servants are typically low. Another interpretation may be that there is no direct nepotism in government jobs, so children are more likely to leave their parent's home to better invest their human capital and look for a better job opportunity. For mothers, pension has a negative coefficient but is not significant, perhaps because very few females are veterans or were employed in civil jobs.

[10] We find that the coefficient for *Saving* is never significant. As *House* and *Land* are household-level variables, we re-estimate the model on a sample without parents who live with someone other than a spouse. In these regressions, *House* and *Land* are never significant.

The availability of children increases the chance of cohabitation, especially for fathers. Controlling for the number of children, married sons and highly educated children are less likely to cohabitate with their elderly parents. The unavailability of married sons may be explained by migration or the practice that married children set up independent households. Meanwhile, well-off children (as measured by high education) may find other means to care for their parents,[11] and given their education, their parents may also value privacy more highly. Interpreting this result the other way suggests younger generation dependency because the adult children who cohabitate with their parents are those who are not currently married and tend to live on parental resources.[12]

The community variables have signs as expected. Cohabitation is more likely when society expects it and when society believes that children should be rewarded when they stay with their parents until death. Elderly parents outside Java are more likely to cohabitate with a child. The residents of major Javanese cities, including Jakarta, are more exposed to modern ideas and lifestyle than those on other islands of Indonesia.

Before discussing the subsample results, we explore several interaction terms between shocks and *Wealth* and *Onechild* to test whether wealthier parents and parents with one child receive greater attention from their children in the event of increased needs. We find that wealth makes no difference on the impact of adverse shocks for mothers, but it makes a difference for disabled fathers and how fathers cope with spousal departure. The interaction term between *Wealth* and *Disability* is positive and significant for fathers, suggesting that

[11] We cannot estimate the effect of the presence of domestic helpers (e.g., maid) as almost all parents who started cohabitation have no maid.

[12] Children who migrate for educational reasons may return to cohabitation once they finish their education. However, this is inconsistent with the result that a parent is less likely to cohabitate with a child with post-school qualifications.

wealthier fathers can compensate for the reduced income due to disability and maintain their position (i.e., bargaining power) in the family decision-making. The interaction term between *Wealth* and *Lostspouse* is negative and significant for fathers, suggesting that wealthier fathers can survive such an adverse event by remarrying. The interaction term between *Onechild* and *Disability* is not significant for both fathers and mothers.

Looking at long-term residents in Columns [3] and [4], we find that spousal conditions (*Lostspouse* and *Wspouse*) and existing health conditions no longer have a significant effect on cohabitation; this result may reflect some form of buffer provided in the local network. This, in turn, suggests a possible lack of support for elderly migrants, though economic shock to mothers is still significant. This is perhaps due to the nature of the shock (i.e., natural disaster), which is likely to affect the entire local community. With regard to children's characteristics, the results are largely similar to the full sample results except that long-term resident mothers who have a large number of daughters are less likely to cohabitate. This result is consistent with the observations that daughters are married away.

The results for the mixture model are reported in Table 5. The upper panel of the table reports the estimates of results where we introduce the two component family-specific heterogeneity (in the intercept and in some slope parameters). The lower panel of the table, entitled "Common Components," reports the effect of other covariates that are assumed to be constant across mixture types. The selection of variables to have slope heterogeneity is based on interest and estimation feasibility. We find that dummy variables tend to exhibit poor convergence behavior, while continuous variables with large variance tend to aid in convergence.[13]

The probability shares of Type 1 fathers and mothers are 52% and 79%, respectively, and Type 2 has the remaining share. Minority Type 2 families have a greater aversion toward

[13] Some three-component specifications are also tested but rarely converge.

cohabitation when compared to Type 1 families. Based on this result, we may call Type 1 the "traditional" families and Type 2 the "modern" families. These significantly distinctive types of families indicate meaningful heterogeneity in the cohabitation decision of Indonesian families.

The mixture model results show that traditional parents are more likely to start cohabitation when they are wealthy. This is consistent with the conventional practice and the increased tendency for a child to receive an inheritance from the traditional parent. On the other hand, the living arrangement of modern parents, especially mothers, is greatly influenced by the availability of their children. Elderly parents with a large number of children have a higher likelihood of cohabitation. Among the children, cohabitation is likely to be found with married daughters. This result may show the preference of elderly parents to live with their own daughters than with daughter-in-laws (Schroder-Butterfill 2003).

Compared to the logit model, the common component of the mixture model conveys largely similar story. As a result, we conclude that both models are overall reliable. The mixture model, however, is theoretically preferred since the logit results might suffer from a downward bias. Further, the mixed model enriches the analysis by revealing the different types of parents.

[Insert Table 5: Mixture Model Results]

CONCLUSION

This study examines factors that influence the initiation of cohabitation by elderly parents and their adult children. It advances the existing literature by (1) focusing on the transition to cohabitation to identify causal effects; (2) employing a wide range of variables that represent the costs and gains of cohabitation for both parents and children; (3) fully utilizing the panel nature of the data set and using the information on the timing of transition; and (4) incorporating family heterogeneity, which has been overlooked in previous studies.

We find robust evidence that spousal departure motivates cohabitation, particularly for elderly fathers, but weak evidence that adverse economic and health shocks trigger cohabitation. Other results suggest that it is often the children's circumstances that drive the family decision. Cohabitation tends to occur with a child who is unmarried or has a low education level. Meanwhile, parents who start cohabitation tend to be healthy and wealthy, and they also tend to live with a spouse. These findings challenge the conventional assumption that parents can fall back on their children in their old age.

The weakening of filial piety and evidence of continuing parental support to adult children raise concerns regarding the welfare of the elderly population. Some elderly groups are at higher risk of not receiving filial support than others, suggesting a potential scope for a targeted program.

APPENDIX Summary Statistics

	Father						Mother					
	y=0		*y=1*[a]		*y=1*[b]		*y=0*		*y=1*[a]		*y=1*[b]	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Shocks												
Lostspouse	0.008	0.087	0.027	0.163	0.055	0.229	0.024	0.153	0.059	0.236	0.027	0.163
Econshock	0.028	0.166	0.054	0.228	0.000	0.000	0.017	0.130	0.049	0.217	0.014	0.116
Healthshock	0.045	0.238	0.027	0.163	0.110	0.458	0.054	0.270	0.059	0.275	0.068	0.323
Personal												
Age	70.206	7.053	68.541	7.079	71.397	8.268	68.708	7.180	67.951	6.151	68.365	4.903
Muslim	0.831	0.375	0.851	0.358	1.000	0.000	0.842	0.365	0.912	0.285	0.899	0.303
Eth_java	0.472	0.499	0.392	0.492	0.603	0.493	0.475	0.499	0.539	0.501	0.581	0.495
Eth_sunda	0.255	0.436	0.216	0.414	0.068	0.254	0.242	0.428	0.206	0.406	0.318	0.467
Eth_bali	0.108	0.310	0.149	0.358	0.000	0.000	0.090	0.286	0.039	0.195	0.000	0.000
Eth_batak	0.030	0.171	0.041	0.199	0.000	0.000	0.041	0.199	0.059	0.236	0.000	0.000
Eth_minang	0.035	0.184	0.014	0.116	0.000	0.000	0.040	0.197	0.049	0.217	0.000	0.000
Disability	0.268	0.722	0.138	0.394	0.125	0.394	0.361	0.830	0.436	0.988	0.377	0.657
ADL	1.641	1.971	1.642	1.793	1.741	2.290	2.493	2.124	2.454	2.185	2.220	1.851
Wspouse	0.900	0.301	0.878	0.329	0.726	0.449	0.448	0.497	0.402	0.493	0.128	0.336
Income	2.389	2.269	2.518	2.687	1.647	1.734	0.970	1.560	0.811	1.517	0.702	1.121
Employee	0.136	0.343	0.203	0.405	0.288	0.456	0.104	0.306	0.078	0.270	0.034	0.181
Selfemp	0.057	0.232	0.027	0.163	0.000	0.000	0.176	0.381	0.108	0.312	0.169	0.376
Famwork	0.653	0.476	0.500	0.503	0.452	0.501	0.335	0.472	0.284	0.453	0.419	0.495
Pension	0.106	0.307	0.095	0.295	0.096	0.296	0.043	0.202	0.049	0.217	0.095	0.294
Wealth	4.936	2.563	6.197	2.382	4.277	2.829	4.466	2.727	5.370	2.695	4.395	2.266
House	0.920	0.272	0.946	0.228	0.671	0.473	0.895	0.307	0.863	0.346	0.804	0.398
Land	0.332	0.471	0.297	0.460	0.397	0.493	0.269	0.444	0.373	0.486	0.108	0.312
Nevermig	0.321	0.467	0.324	0.471	0.425	0.498	0.257	0.437	0.255	0.438	0.338	0.475
Migration	1.018	1.559	1.046	1.583	1.039	1.460	0.847	1.500	0.804	1.471	0.998	1.504
Head	0.989	0.102	1.000	0.000	0.822	0.385	0.436	0.496	0.471	0.502	0.595	0.493
Nm_sib	2.195	1.777	2.257	2.054	1.630	1.612	2.296	1.957	2.392	2.045	2.351	2.070
Educ1	0.551	0.498	0.527	0.503	0.562	0.500	0.276	0.447	0.265	0.443	0.149	0.357
Educ2	0.113	0.317	0.122	0.329	0.164	0.373	0.051	0.220	0.118	0.324	0.047	0.213

APPENDIX (continued) Summary Statistics

	Father						Mother					
	y=0		*y=1*[a]		*y=1*[b]		*y=0*		*y=1*[a]		*y=1*[b]	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Children												
Cson	1.953	1.405	2.514	1.455	3.096	2.237	2.017	1.523	2.412	1.518	1.372	1.208
Cdtr	1.773	1.303	2.446	1.435	2.342	1.227	1.816	1.372	2.108	1.371	2.378	1.491
Cmarson	0.790	0.371	0.710	0.380	0.710	0.403	0.814	0.357	0.775	0.357	0.534	0.487
Cmardtr	0.839	0.349	0.876	0.280	0.767	0.383	0.826	0.367	0.891	0.292	0.868	0.315
Ceduc	0.079	0.209	0.093	0.222	0.000	0.000	0.074	0.216	0.076	0.235	0.024	0.106
Onechild	0.118	0.322	0.041	0.199	0.123	0.331	0.146	0.353	0.059	0.236	0.182	0.388
Cnear	0.862	0.345	0.851	0.358	0.726	0.449	0.881	0.324	0.863	0.346	0.824	0.382
Cmoney_to	0.438	0.496	0.486	0.503	0.603	0.493	0.389	0.488	0.529	0.502	0.236	0.426
Cmoney_fr	0.671	0.470	0.703	0.460	0.712	0.456	0.738	0.440	0.833	0.375	0.703	0.459
Cfood	0.484	0.500	0.459	0.502	0.548	0.501	0.517	0.500	0.451	0.500	0.426	0.496
Cmeet	0.678	0.467	0.770	0.424	0.438	0.500	0.625	0.484	0.637	0.483	0.493	0.502
Community												
Trad_phome	0.025	0.156	0.027	0.163	0.205	0.407	0.045	0.207	0.069	0.254	0.054	0.227
Trad_chome	0.162	0.368	0.095	0.295	0.000	0.000	0.145	0.353	0.167	0.375	0.000	0.000
Trad_house	0.103	0.304	0.095	0.295	0.000	0.000	0.093	0.290	0.137	0.346	0.034	0.181
Trad_carer	0.107	0.309	0.081	0.275	0.000	0.000	0.076	0.266	0.078	0.270	0.176	0.382
N	2083		74		73		3378		102		148	

Note: S.D. denotes standard deviation. *y=0* denotes the elderly who did not start cohabitation during the study period, *y=1*[a] denotes the elderly who started cohabitation at a known year during the study period, and *y=1*[b] denotes the elderly who started cohabitation at an unknown year during the study period. *N* denotes sample size.

REFERENCES

Adioetomo, S.M. 2004. "Age Structural Transitions and its Implication: The case of Indonesia over a Century, 1950-2050." Demographic Institute, Faculty of Economics, University of Indonesia. Available online at http://www.cicred.org/Eng/Seminars/Details/Seminars/Popwaves/PopwavesAdioetomo.pdf

Altonji, J., F. Hayashi and L. Kotlikoff. 1992. "Is the Extended Family Altruistically Linked? Direct Tests Using Micro Data." *American Economic Review* 82(5):1177-1198.

Ananta, A., N.A. Evi and Bakhtiar. 2005. "Ethnicity and ageing in Indonesia: 2000-2050." *Asian Population Studies*, 1(2).

Aquilino, W.S. 1990. "The Likelihood of Parent-Adult Child Coresidence: Effects of Family Structure and Parental Characteristics." *Journal of Marriage and the Family* 52(2):405-419.

Arifin, E.N. 2006. "Living Arrangements of Older Persons in East Java, Indonesia." *Asia Pacific Population Journal* 21(3):93-112.

Beard, V.A. and Y. Kunharibowo. 2001. "Living arrangements and support relationships among elderly Indonesians: Case studies from Java and Sumatra." *International Journal of Population Geography* 7:17-33.

Bernheim, D., A. Shleifer and L. Summers. 1985. "The Strategic Bequest Motive." *Journal of Political Economy* 93(6):1045-1076.

Botticini, M. and A. Siow. 2003. "Why Dowries?" *American Economic Review* 93(4):1385-1398.

Brown, J.W., J. Lianga, K. Neal. et al. 2002. "Transitions in Living Arrangements Among Elders in. Japan Does Health Make a Difference?" *Journals of Gerontology Series B: Psychological. Sciences and Social Sciences* 57(4):209-220.

Cameron, L. 2000. “The residence decision of elderly Indonesians: A nested logic analysis.” *Demography* 37:17-27.

Cameron, A.C. and P.K. Trivedi. 2005. *Microeconometrics: Methods and Applications.* New York: Cambridge University Press.

Chan, A. 2005. “Aging in Southeast and East Asia: Issues and Policy Directions.” *Journal of Cross Cultural Gerontology* 20:269–284.

Chaudhuri, A. and K. Roy. 2009. “Gender Differences in Living Arrangements Among Older Persons in India.” *Journal of Asian and African Studies* 44(3):259-277.

Cox, D. 1987. “Motives for Private Income Transfers.” *Journal of Political Economy* 95(3):508-546.

Dostie, B. and P.T. Léger. 2005. “The Living Arrangement Dynamics of Sick, Elderly Individuals.” *Journal of Human Resources* 40(4):989-1014.

Frankenberg, E., A. Chan and M.B. Ofstedal. 2002. “Stability and Change in Living Arrangement in Indonesia, Singapore and Taiwan, 1993-99.” *Population Studies* 56(2):202-213.

Heckman, J. and B. Singer. 1984. “A Method for Minimizing the Impact of Distributional Assumptions in Econometric Models for Duration Data.” *Econometrica* 52(2):271-320.

Horioka, C.Y. 2002. “Are the Japanese Selfish, Altruistic or Dynastic?” *Japanese Economic Review* 53(1):26-54.

Keasberry, I.N. 2001. “Elder Care and Intergenerational Relationships in Rural Yogyakarta, Indonesia.” *Ageing and Society* 21(5):641-665.

Kim, Y.S. 2004. “What Makes Family Members Live Apart or Together?: An Empirical Study with Japanese Panel Study of Consumers.” *Kyoto Economic Review* 73:121-139.

Konrad, K.A., K. Harald, E.L. Kjell et al. 2002. "Geography of the Family." *American Economic Review* 92(4):981-998.

Liang, J., S. Gu and N. Krause. 1992. "Social Support Among the Aged in Wuhan, China." *Asia-Pacific Population Journal* 7:33-62.

Milagros, A., L. Domingo, J. Knodel et al. 1995. "Living Arrangements in Four Asian Countries: A Comparative Perspective." *Journal of Cross-Cultural Gerontology* 10(1):145-162.

Ngin, C.S. and J. DaVanzo. 1999. "Parent–child Coresidence and Quasi Co-residence in Peninsular Malaysia." *Southeast Asian Journal of Social Science* 27(2):43– 64.

Noveria, M. 2006. "Challenges of Population Ageing in Indonesia." Research Center for Population, Indonesian Institute of Sciences. Available online at http://www.univie.ac.at/impactofageing/pdf/noveria.pdf

Ofstedal, M.B., J. Knodel and N. Chayovan. 1999. "Intergenerational Support and Gender: A Comparison of Four Asian Countries." *Journal of Southeast Asian Studies* 27(2):21–42.

Pezzin, L.E., R.A. Pollak and B.S. Schone. 2005. "Bargaining Power and Intergenerational Coresidence: Adult Children and their Disabled Elderly Parents." mimeo, Health Policy Institute and Department of Medicine, Medical College of Wisconsin.

Rosenzweig, M.R. and K.I. Wolpin. 1985. "Specific Experience, Household Structure, and Intergenerational Transfers: Farm Family Land and Labor Arrangements in Developing Countries." *Quarterly Journal of Economics* 100:961-987.

Schroder-Butterfill, E. 2003. "Pillars of the Family Support Provided by the Elderly in Indonesia." Oxford Institute of Ageing Working Papers, No.303.

Schroder-Butterfill, E. 2005. "The Impact of Kinship Networks on Old-age Vulnerability in Indonesia." *Annales De Demograhie Historique* 2:139-163.

Silverstein, M. 1995. “Stability and Change in Temporal Distance Between the Elderly and Their Children.” *Demography* 32:29-45.

Takagi, E., M. Silverstein and E. Crimmins. 2007. “Intergenerational Coresidence of Older Adults in Japan: Conditions for Cultural Plasticity.” *Journals of Gerontology Series B: Psychological Sciences and Social Sciences* 62(5):330-339.

Thomas, D., E. Frankenberg and J.P. Smith. 2001. “Lost but not Forgotten: Attrition and Follow-up in the Indonesia Family Life Survey.” *Journal of Human Resources* 36(3):556–592.

Wakabayashi, C. and Y. Horioka. 2006. “Is the Eldest Son Different? The Residential Choice of Siblings in Japan.” NBER Working Paper No. 12655.

Yamada, K. 2006. “Intra-family Transfers in Japan: Intergenerational Co-residence, Distance, and Contact.” *Applied Economics* 38(16):1839–1861.

Yi, Z. and L. George. 2000. “Family Dynamics of 63 million (in 1990) to More Than 330 Million (in 2050) Elders in China.” *Demographics Research* 2(5).

Table 1. Living Arrangements Across Socio-demographic Groups

IFLS1 (1993)	All	Fathers	Mothers	Married	Widowed	Employed
Living alone	7.12%	2.95%	10.95%	0.58%	17.75%	6.43%
Spouse only	14.20%	19.99%	8.87%	22.92%	0%	19.22%
Spouse & child	37.77%	55.69%	21.29%	60.93%	0%	45.39%
Spouse & others	8.67%	14.02%	3.76%	14.01%	0%	12.52%
Single & child	25.65%	6.27%	43.48%	1.35%	66.80%	12.17%
Single & others	6.59%	1.08%	11.66%	0.21%	15.45%	4.26%
Total	100%	100%	100%	100%	100%	100%
IFLS2 (1997)	All	Fathers	Mothers	Married	Widowed	Employed
Living alone	6.54%	1.88%	10.92%	0.17%	15.34%	7.42%
Spouse only	14.77%	20.21%	9.65%	24.47%	0%	19.35%
Spouse & child	36.80%	55.20%	19.51%	60.99%	0%	45.63%
Spouse & others	7.94%	12.12%	4.01%	13.16%	0%	11.08%
Single & child	27.55%	8.77%	45.21%	1.06%	70.08%	12.62%
Single & others	6.39%	1.81%	10.70%	0.15%	14.58%	3.90%
Total	100%	100%	100%	100%	100%	100%
IFLS3 (2000)	All	Fathers	Mothers	Married	Widowed	Employed
Living alone	6.46%	2.67%	9.71%	0.56%	14.42%	6.43%
Spouse only	13.46%	18.14%	9.47%	22.86%	0%	18.37%
Spouse & child	37.22%	55.83%	21.30%	63.19%	0%	44.14%
Spouse & others	7.03%	10.75%	3.84%	11.93%	0%	9.17%
Single & child	28.57%	10.62%	43.94%	1.22%	70.80%	16.05%
Single & others	7.25%	1.99%	11.75%	0.24%	14.78%	5.84%
Total	100%	100%	100%	100%	100%	100%
IFLS4 (2007)	All	Fathers	Mothers	Married	Widowed	Employed
Living alone	11.72%	4.80%	17.09%	1.10%	24.43%	12.34%
Spouse only	19.24%	26.18%	13.86%	34.38%	0%	24.85%
Spouse & child	26.69%	46.84%	16.40%	53.06%	0%	38.65%
Spouse & others	5.86%	9.25%	3.23%	10.47%	0%	7.52%
Single & child	27.13%	11.15%	39.52%	0.70%	62.80%	13.44%
Single & others	6.36%	1.78%	9.90%	0.29%	12.97%	3.20%
Total	100%	100%	100%	100%	100%	100%

Note: Figures in the table are weighted sample proportions from the four waves of the IFLS data, with each wave treated as independent cross-section data. "Others" include siblings, other kin, or unrelated household members such as friends or servants.

Table 2. Changes in Living Arrangements of Elderly Parents

1993 / 1997	Living alone	Spouse only	Spouse & child	Spouse & others	Single & child	Single & others
Living alone	73.34%	8.94%	1.03%	1.19%	3.59%	17.65%
Spouse only	2.73%	67.17%	9.32%	13.32%	0.33%	4.28%
Spouse & child	2.42%	7.72%	73.71%	36.99%	1.76%	0.00%
Spouse & others	0.00%	8.91%	5.06%	38.48%	0.00%	0.00%
Single & child	11.08%	5.16%	8.32%	4.66%	88.54%	25.32%
Single & others	5.52%	0.49%	0.42%	3.89%	3.42%	47.09%
Death	4.91%	1.61%	2.15%	1.47%	2.35%	5.66%
Total	100%	100%	100%	100%	100%	100%
1997 / 2000	Living alone	Spouse only	Spouse & child	Spouse & others	Single & child	Single & others
Living alone	68.74%	7.09%	0.98%	0.00%	3.85%	9.84%
Spouse only	0.00%	63.33%	8.55%	20.70%	0.15%	0.00%
Spouse & child	0.00%	18.85%	72.43%	29.88%	3.81%	4.23%
Spouse & others	0.48%	4.28%	5.30%	44.28%	0.83%	0.00%
Single & child	19.16%	4.97%	10.45%	1.97%	84.58%	30.38%
Single & others	9.99%	0.61%	0.56%	1.49%	4.21%	50.46%
Death	1.62%	0.86%	1.73%	1.67%	2.57%	5.09%
Total	100%	100%	100%	100%	100%	100%
2000 / 2007	Living alone	Spouse only	Spouse & child	Spouse & others	Single & child	Single & others
Living alone	42.26%	12.08%	3.48%	8.56%	8.32%	33.69%
Spouse only	2.99%	56.63%	14.70%	26.67%	0.87%	0.00%
Spouse & child	1.24%	11.37%	52.44%	19.15%	0.49%	5.08%
Spouse & others	0.00%	1.63%	7.78%	20.38%	0.00%	0.00%
Single & child	35.94%	11.58%	13.91%	15.26%	76.88%	32.57%
Single & others	6.39%	2.97%	2.17%	6.50%	4.51%	22.73%
Death	11.19%	3.74%	5.53%	3.48%	8.93%	5.93%
Total	100%	100%	100%	100%	100%	100%

Note: Figures in the table are weighted sample proportions from the four waves of the IFLS data, with each wave treated as independent cross-section data. "Others" include siblings, other kin, or unrelated household members such as friends or servants. The death risk increases with the gap between surveys.

Table 3. Definitions of Dependent Variables and Key Explanatory Variables

Dependent variable	
y	=1 in starting year of cohabitation with child
Explanatory variables: shock	
Lostspouse	=1 in year of spouse departure; 0 otherwise
Healthshock	The number of new chronic condition(s) developed that year
Econshock	=1 in year of major loss; 0 otherwise
Explanatory variables: characteristics of the elderly parent	
Age[a]	Age
Wspouse[a]	=1 if live with spouse; 0 otherwise
Lastspouse[a]	Log of years since spouse departure from the house
Disability[a]	Index 0-8 of 4 ADL indicating disability
ADL[a]	Index 0-10 of 5 ADL other than the above
Income[a]	Decile of income
Wealth [a]	Decile of personal wealth
Migration[a]	Log of years since last migration
Nevermig	=1 if had not migrated since 12 years old; 0 otherwise
Employee	=1 if employed in public or private job; 0 otherwise
Selfemp	=1 if self-employed; 0 otherwise
Pension	=1 if receive any pension payment (from work); 0 otherwise
House	=1 if house is owned by only household members; 0 otherwise
Land	=1 if any household member owned non-business land; 0 otherwise
Head	=1 if household head (primary income earner); 0 otherwise
Educ1	=1 if education is primary school; 0 otherwise
Educ2	=1 if education is higher than primary school; 0 otherwise
Muslim	=1 if Muslim; 0 otherwise
Eth_[…]	=1 if ethnicity is […]; 0 otherwise
Nm_sibling	The number of living siblings
Explanatory variables: characteristics of children	
Cmoney_fr	=1 if parent provides money to at least one child; 0 otherwise
Cmoney_to	=1 if at least one child provides money to parent; 0 otherwise
Cnear	=1 if at least one child lives in the same province; 0 otherwise
Cfood	=1 if at least one child provides food to parent; 0 otherwise
Cmeet	=1 if at least one child pays monthly visit to parent; 0 otherwise
Cson, *Cdtr*	The number of surviving son(s), daughter(s)
Cmarson, *Cmardtr*	The proportion of surviving married son, daughter
Ceduc	The proportion of surviving children with post-school education
Onechild	=1 if parent only has 1 surviving child; 0 otherwise
Explanatory variables: community characteristics	
Trad_phome	=1 if traditionally parent lives at parent's home with child; 0 otherwise
Trad_chome	=1 if traditionally parent lives at child's home; 0 otherwise
Trad_house	=1 if traditionally last caring child (at death) gets parent's house; 0 otherwise
Trad_carer	=1 if traditionally last caring child (at death) gets largest bequest; 0 otherwise
Rural	=1 if rural area; 0 otherwise

Note: Variables marked with [a] are annually time-varying. Values of the variables without [a] are constant between IFLS waves. For *income*, *wealth*, *disability*, and *ADL score*, we use linear interpolation between two consecutive survey waves to make them annually time-varying, like age. For income, parents who were working in the first period but were then out of employment are assumed to have had a steady decline in income to zero. Conversely, parents who were not working in the first period but were employed in the second period are assumed to have had a steady growth in income.

Table 4. Selected Results from Extended Logit Model

	[1] Father		[2] Mother		[3] Father		[4] Mother	
	OR	***t***	**OR**	***t***	**OR**	***t***	**OR**	***t***
Shocks								
Lostspouse	21.577	2.23	3.764	2.16	12.582	1.32	1.524	0.47
Econshock	1.323	0.47	2.662	1.92	1.397	0.51	3.187	2.16
Healthshock	0.791	-0.32	0.985	-0.04	0.825	-0.20	1.153	0.44
Parent characteristics								
Age	0.968	-1.51	0.983	-1.08	0.979	-0.81	0.986	-0.77
Muslim	2.056	1.60	1.697	1.41	3.102	1.62	1.622	1.05
Eth_java	0.577	-1.58	1.689	1.79	0.632	-0.94	2.235	2.34
Eth_sunda	0.878	-0.31	1.516	1.21	0.511	-1.04	1.735	1.35
Eth_bali	2.390	1.83	0.432	-1.43	4.779	2.29	0.522	-1.05
Eth_batak	1.388	0.36	2.757	1.62	5.485	1.12	2.825	1.34
Eth_minang	0.289	-1.07	0.882	-0.20	0.000	-0.02	0.590	-0.74
Disability	0.463	-2.39	1.248	1.60	0.753	-0.73	1.140	0.78
ADL	1.114	1.22	0.915	-1.30	0.863	-1.16	0.902	-1.31
Wspouse	7.413	1.83	1.255	0.46	5.924	1.23	1.607	0.81
Income	0.958	-0.64	0.909	-1.06	0.985	-0.16	0.845	-1.59
Employee	0.735	-0.67	0.905	-0.28	0.187	-2.50	0.842	-0.40
Selfemp	0.343	-1.31	0.565	-1.75	0.353	-1.12	0.449	-2.06
Famwork	0.395	-2.62	0.962	-0.14	0.222	-3.21	1.280	0.80
Pension	0.244	-2.60	0.844	-0.36	0.222	-2.03	0.737	-0.48
Wealth	1.389	3.33	1.105	2.37	1.339	3.42	1.149	2.77
House	1.267	0.47	0.493	-2.38	0.655	-0.63	0.512	-1.90
Land	0.597	-1.75	1.149	0.62	0.892	-0.30	1.156	0.54
Children characteristics								
Cson	1.421	3.79	1.168	2.30	1.322	2.16	1.191	2.06
Cdtr	1.389	3.33	0.979	-0.26	1.460	2.56	0.747	-2.60
Cmarson	0.253	-3.43	0.257	-4.59	0.159	-3.33	0.215	-4.25
Cmardtr	0.943	-0.13	1.166	0.43	0.632	-0.79	2.098	1.70
Ceduc	0.437	-1.04	0.175	-2.72	0.839	-0.14	0.161	-2.15
Onechild	0.595	-0.81	0.341	-2.65	0.401	-1.08	0.232	-2.94
Community variables								
Trad_phome	1.975	0.99	1.547	0.96	3.010	1.28	1.521	0.79
Trad_chome	0.335	-1.95	1.278	0.71	0.412	-1.35	1.454	0.92
Trad_house	1.011	0.02	1.248	0.59	1.104	0.14	1.241	0.44
Trad_carer	1.108	0.19	0.969	-0.08	1.057	0.09	0.594	-1.00
Log-L	-280		-450		-184		-329	
N	2230		3628		1498		2679	
Chi-sq stat	100.18		97.76		73.64		84.82	
P-value	0.00		0.00		0.03		0.00	

Note: OR indicates the odds ratio, and *t* indicates the test statistic of the coefficient under the null hypothesis that it is zero. The variables are defined in Table 3. Also included in estimation: dummy variables for base living arrangement, spouse characteristics (age, income, wealth, ADL), history of money and food transfer, migration history, education, number of siblings, availability of child living nearby, time dummy variables, and regional dummy variables.

Table 5. Mixture Model Results

	Father			**Mother**		
	OR	**Coeff.**	***t***	**OR**	**Coeff.**	***t***
Type 1 (%)	52.3%			79.2%		
Wealth	1.416	0.348	3.94	1.156	0.145	2.80
Income	1.089	0.085	1.01	0.695	-0.364	-2.34
Cson	1.172	0.159	0.91	1.000	0.000	0.00
Cdtr	1.252	0.225	1.19	1.043	0.042	0.39
Cmarson	0.457	-0.783	-1.19	0.351	-1.047	-2.92
Cmardtr	1.008	0.008	0.01	1.021	0.020	0.05
Constant	2.599	0.955	0.31	0.093	-2.378	-1.66
Type 2 (%)	47.7%			20.8%		
Wealth	1.331	0.286	1.41	0.653	-0.426	-1.88
Income	0.182	-1.702	-2.34	1.735	0.551	2.05
Cson	3.189	1.160	3.29	14.047	2.642	3.55
Cdtr	2.304	0.835	2.32	0.497	-0.700	-1.56
Cmarson	0.006	-5.169	-2.98	0.001	-7.374	-3.01
Cmardtr	3.904	1.362	0.76	6.749	1.909	0.88
Constant	0.452	-0.795	-0.24	0.023	-3.777	-1.42
Common						
Shocks						
Lostspouse	33.315	3.506	2.14	3.943	1.372	2.06
Econshock	1.385	0.326	0.47	1.933	0.659	1.08
Healthshock	1.251	0.224	0.36	1.058	0.056	0.16
Parent						
Age	0.970	-0.030	-1.16	0.994	-0.006	-0.32
Muslim	2.192	0.785	1.39	2.326	0.844	2.09
Disability	0.354	-1.038	-2.6	1.234	0.210	1.43
ADL	1.105	0.100	0.93	0.915	-0.089	-1.24
Wspouse	3.487	1.249	0.98	1.461	0.379	0.72
Employee	1.079	0.076	0.13	0.628	-0.466	-1.03
Selfemp	0.363	-1.012	-1.17	0.648	-0.434	-1.25
Famwork	0.548	-0.602	-1.44	1.320	0.278	0.91
Pension	0.313	-1.163	-1.93	1.026	0.026	0.05
Child						
Ceduc	0.958	-0.043	-0.49	1.003	0.003	0.05
Onechild	0.516	-0.661	-0.65	0.205	-1.584	-2.33
Log-L		-279.5		-453.5		
N		2230		3628		
Chi-sq stat (41)		63		73.9		
P-value		0.025		0.00		

Note: OR indicates the odds ratio, and *t* indicates the test statistic of the coefficient under the null hypothesis that it is zero. The variables are defined in Table 3. The numbers of variables are reduced to achieve convergence.