Why do First-born Children Live with Parents? — Geography of the Family in Japan — *

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Abstract

In this paper, we analyze the strategic interaction between siblings who choose their residential locations in order to receive childcare assistance from their parents. Our three-stage game yields a theoretical result that a first-born child lives closer to his/her parents than a second-born child, which is supported by our estimation results using Japanese micro data. We also show that the childcare assistance from parents is one of the main determinants of the residential location choice of siblings. This paper is the first to succeed in explaining the residential location choice of siblings in Japan using economic incentives. (97 words)

JEL Classification: D13, J12, J13, R20

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1 Introduction

One of the typical characteristics of families in Japan is the geographical relationship between multiple siblings and their parents: a first-born child typically lives with or closer to his/her parents than second- or later- born children. This relationship has been explained using non-economic factors: for example, many authors argue that there exist social norms in Japan whereby a first-born child, especially a first-born son, is expected to live with and take care of his/her parents or that a first-born child (a first-born son) is expected to take over the parents' 'dynasty,' whereas the rest of the children live away from home (see Koyano, et al. (1994), Horioka (2002), and Takagi and Silverstein (2006) for details on social norms in Japan).[1]

Konrad, et al. (2002) is the first economic study of the residential location choice of multiple siblings. They pay attention to the strategic interaction between siblings who are altruistic towards their parents. They model the residential location choices of a first-born child and a second-born child who provide care to their elderly parents and show that the first-born child lives farther away from his/her parents than the second-born child in order to shift the burden of caring for his/her parents to the second-born child. They confirm that their model is consistent with German data, but, as they themselves point out in their paper, it does not apply to families in Japan.[2] They state that this discrepancy between Germany and Japan is largely due to the existence of social norms that are peculiar to Japan.

In Japan, the possibility of being able to receive childcare assistance from their parents plays an important role when individuals choose their residential locations. According to the 2002 "Survey of the Children in the 21st Century," which was conducted by the Ministry of Health, Labor and Welfare, 25% of grandmothers and 10% of grandfathers are the main childcare providers (multiple response). Moreover, in Japan, most children choose their residential location in their early lives when they get married as well as enter high school or university, or start

[1] Wakabayashi and Horioka (2006) find that the proportion of first-born sons living with their parents is much higher than that of other children even if the first-born sons are not the first-born children.

[2] The cohabitance rate in Japan is much higher than that in Germany. According to the 2000 "International Comparison of Old-Age Persons' Attitude about Life Finance" which is conducted by the Cabinet Office, Government of Japan, 25% (8.1%) of parents who are 60 years old or older live with their married male (female) children. On the other hand, in Germany 2.6% (3.4%) of those parents live with married male (female) children.

working. In fact, according to the 1998 "National Family Survey," (a previous wave of the survey used in our analysis) the average age at which children live away from their parents for over a year for the first time is 20.7 years, and 97% of all children have left their parents' homes by the age of 30. In addition, the timing of whether individuals live with or closer to their parents is also early. For example, from the 2001 "Trails of Families in Post-War Japan," which was conducted by the same provider as the survey we use, the ratio of respondents who live with their parents soon after their marriage or before their marriage to those who have lived with their parents is about 50%.[3]

In this paper, we introduce the parental assistance to children into the residential location choice model of Konrad, et al. (2002). In our theoretical model, if a child locates closer to his/her parents, then the parents can save on transportation costs to visit the child, and thus the parents give their assistance only to the closer located child and no assistance to the farther located child. Therefore, the first-born child (that is, the Stackelberg leader) has an incentive to live closer to his/her parents, which enables him/her to receive childcare assistance from his/her parents, while the second-born child (that is, the Stackelberg follower) leaves home in order to earn income outside. Thus, our theoretical model yields the result that a first-born child locates closer to his/her parents than a second-born child, and that the only first-born child receives childcare assistance from his/her parents.

We test our theoretical model using Japanese micro data, the 2003 "National Family Survey," and our estimation results generally support our model: first, the first-born child generally lives with or closer to his/her parents than the second-born child, a result which is consistent with both our theoretical model and Japanese social norms. Second, there is one exception. If a first-born child is a female and she has at least one younger brother, then she locates farther away from her parents than her younger brother even though she is a first-born child. This exception cannot be explained using our theoretical model, thus we cannot deny the existence of social norms. Another finding is that respondent's necessity of childcare assistance from his/her

[3]Once respondents decide to live with or closer to their parents, most of them continue to live with their parents until parents have passed away. The percentage of respondents who are now living with their parents or have lived with them until they have passed away is about 70% in Japan.

parents on his/her childcare have a negative and significant effect on the residential distance between the respondent and parents. These results suggest that an economic factor, that is, the possibility of receiving childcare assistance from parents is one of the main determinants of the residential location choice of siblings in Japan. This paper is the first to succeed in explaining the residential location choice of siblings in Japan using economic incentives as well as social norms.

This paper is organized as follows. In section 2, we discuss our theoretical model, in section 3 we describe the data source and sample selection, in section 4 we describe the residential locations of siblings and parents in Japan using descriptive statistics, in section 5 we describe the estimation model and estimation method, in section 6, we present our estimation results, and section 7 concludes.

2 Theoretical Model

We consider a family consisting of parents P and two children, first-born A and second-born B, all of whom at first live at the same place, which is normalized to 0. They play a three-stage game: in stage 1, the first-born child decides his/her location $\delta_A \in [0, 1]$. In stage 2, the second-born child B decides his/her location $\delta_B \in [0, 1]$. In stage 3, parents P give assistance to each of their children as parents like. The amounts of assistance which parents P give to children A and B are denoted as $g_A \geq 0$ and $g_B \geq 0$, respectively.

The utility of parents P is given by,

$$U_P(x_P, g_A + g_B) = x_P + u(g_A + g_B),$$

where u represents parental altruism toward children. Their initial endowment m is spent on their own consumption x_P and assistances to their children as,

$$m = x_P + (1 + \delta_A)g_A + (1 + \delta_B)g_B.$$

Each unit of assistance to child i involves a transportation cost according to the distance to the child, δ_i.

The utility of child i is given by,

$$U_i(g_i, \delta_i) = w(g_i) + \iota(\delta_i),$$

where $w(\cdot)$ is a monotonically increasing function, and $\iota(\cdot)$ represents the income which child i earns as,

$$\iota = \begin{cases} 0 & \text{if } \delta_i = 0, \\ I & \text{otherwise.} \end{cases}$$

Each child earns income only when he/she leaves home ($\delta_i > 0$).

2.1 3rd Stage

In the last stage of the game, the residential locations of children δ_A and δ_B have been determined. Then, parents choose the amounts of assistance to children, $g_A \geq 0$ and $g_B \geq 0$. The utility maximization problem of parents is,

$$\max_{g_A, g_B \geq 0} \; m - (1 + \delta_A)g_A - (1 + \delta_B)g_B + u(g_A + g_B).$$

Then, we have the first order condition as,

$$1 + \delta_i \geq u'(g_A^* + g_B^*), \text{ with equality if } g_i > 0 \text{ for all } i. \tag{1}$$

The left-hand side represents the marginal cost of assistance, while the right-hand side represents the marginal benefit thereof. First order condition (1) shows that if one child located closer to parents than the other child, then parents give positive amount of assistance to the closer child and nothing to the other (suppose the contrary: the farther child also obtains positive amount. Then, it must be $1+\delta_i = u' = 1+\delta_j$, which is a contradiction to $\delta_i \neq \delta_j$). If both children locate at the same place ($\delta_i = \delta_j$), then any combination of g_i and g_j satisfying $1+\delta_i = 1+\delta_j = u'(g_i+g_j)$ is a solution. However, for simplicity, we assume that parents give equal amounts to the children who locate at the same place.

Then, the lemma for the parental assistance to each of children in the 3rd stage is as follows:

Lemma 1. *Parents give assistance to each of their children according to the location of their children as,*

$$(g_i^*(\delta_i, \delta_j), g_j^*(\delta_i, \delta_j)) = \begin{cases} (g(\delta_i), 0) & \text{if } \delta_i < \delta_j, \\ (\frac{1}{2}g(\delta_i), \frac{1}{2}g(\delta_j)) & \text{if } \delta_i = \delta_j. \end{cases}$$

where $g(\delta) = {u'}^{-1}(1+\delta)$.

Note that if the closer located child moves closer, then parents give more assistance to him/her, $g' < 0$, since $u'' < 0$. Hence, $g(0)$ is the maximum of $g(\delta)$.

Since we want to consider the substitution between parental assistance and $(g(\cdot))$ income earned outside (I), we first consider the case,

$$w(g(0)) - w(0) > I \geq w(\tfrac{1}{2}g(0)) - w(0), \tag{2}$$

where income I is preferable for each child to the equal share of the maximum assistance from parents, but it is not preferable to full amount of the maximum assistance. We consider the other cases $I \geq w(g(0)) - w(0)$ and $w(\frac{1}{2}g(0)) - w(0) > I$ later.

2.2 2nd stage

The residential location decision of the second-born child occurs in this stage. Knowing that the residential location of the first-born child (δ_A) was already determined, the second-born child decides where to locate, seeing that his/her location decision bears on the amounts of assistance given by parents as Lemma 1. We consider the following two subgames: one in which the first-born child stayed home $(\delta_A = 0)$, and the other in which the first-born child left home $(\delta_A > 1)$.

First, let us consider the subgame which starts at $\delta_A = 0$. If the second-born child also stays home $(\delta_B = 0)$, then the second-born child obtains $\frac{1}{2}g(0)$ from his/her parents from Lemma 1 but earns no income outside home. Hence, his/her utility is,

$$U_B = w\left(\tfrac{1}{2}g(\delta_A)\right). \tag{3}$$

On the other hand, if the second-born child leaves home $(\delta_B > 0)$, then the second-born child obtains no assistance from his/her parents from Lemma 1 but earns income I. Hence, his/her utility is,

$$U_B = w(0) + I. \tag{4}$$

Then, from equation (2), the utility of the second-born child located at $\delta_B = 0$ (equation (3)) is strictly larger than that at $\delta_B > 0$ (equation (4)), which makes the second-born child choose to leave home when first-born child stayed home, $\delta_B^*(0) > 0$.

Next, let us consider the subgame which starts at $\delta_A > 0$, in which the second-born child has four alternatives: (a-1) $\delta_B = 0$, (a-2) $\delta_B \in (0, \delta_A)$, (a-3) $\delta_B = \delta_A$, and (a-4) $\delta_B > \delta_A$.

(a-1) If the second-born child stays home ($\delta_B = 0$), then the second-born child obtains the maximum assistance $g(0)$ from his/her parents from Lemma 1 but earns no income outside home. Hence, his/her utility is,

$$U_B = w(g(0)). \tag{5}$$

(a-2) If the second-born child leaves home but locates closer to their parents than the first-born child ($\delta_B \in (0, \delta_A)$), then the second-born child obtains $g(\delta_B)$ from his/her parents from Lemma 1 and earns income I. Hence, his/her utility is,

$$U_B = w(g(\delta_B)) + I. \tag{6}$$

(a-3) If the second-born child locates at the same distance as the first-born child ($\delta_B = \delta_A$), then the second-born child obtains $\frac{1}{2}g(\delta_A)$ from his/her parents from Lemma 1 and earns income I. Hence, his/her utility is,

$$U_B = w\left(\tfrac{1}{2}g(\delta_A)\right) + I. \tag{7}$$

(a-4) Finally, if the second-born child locates farther away from their parents than the first-born child ($\delta_B > \delta_A$), then the second-born child obtains no assistance from his/her parents from Lemma 1 but earns income I. Hence, his/her utility is,

$$U_B = w(0) + I. \tag{8}$$

Then, we have to compare the utilities of the second-born child among his/her locations from equations (5) to (8). Among locations (a-2)-(a-4), that is $\delta_B > 0$, the second-born child prefers to locate closer to his/her parents than the first-born child because we have the following

relationship,

$$w(g(\delta_B)) > w\left(\tfrac{1}{2}g(\delta_A)\right) > w(0) \text{ for all } \delta_B \in (0, \delta_A),$$

since $w(\cdot)$ is increasing, and $g(\cdot)$ is decreasing. Hence, the second-born child never locates equal to or farther away from his/her parents than the first-born child, $\delta_B^*(\delta_A) < \delta_A$ for any $\delta_A > 0$.[4]

Summarizing this subsection gives us Lemma 2 on the best location of the second-born child who responds to the location of the first-born child as:

Lemma 2. *When $w(g(0)) - w(0) > I \geq w(\frac{1}{2}g(0)) - w(0)$, according to the location of the first-born child δ_A, the second-born child locates as follows:*

$$\delta_B^*(\delta_A) \begin{cases} > 0 & \text{if } \delta_A = 0, \\ < \delta_A & \text{otherwise.} \end{cases}$$

Best response function $\delta_B^*(\delta_A)$ shows that when the first-born child stayed home, the second-born child leaves home, while when the first-born child left home, the second-born child locates strictly closer to their parents than the first-born child. In other words, the locations of the first-born child and the second-born child are strategic substitutes.

2.3 1st Stage

In the first stage, the first-born child decides where to locate, seeing that his/her location decision bears on that of the second-born child as Lemma 2 and the assistance given by parents as Lemma 1.

If the first-born child stays home ($\delta_A = 0$), then the second-born child will leave home ($\delta_B^*(0) > 0$) from Lemma 2. Hence, the first-born child obtains all of the maximum parental assistance ($g_A^*(0, \delta_B^*(0)) = g(0)$) from Lemma 1 but earns no income. Therefore, the utility of the first-born child is,

$$U_A = w(g(0)). \tag{9}$$

On the other hand, if the first-born child leaves home ($\delta_A > 0$), then the second-born child will locate strictly closer to their parents than the first-born child ($\delta_B^*(\delta_A) < \delta_A$ for any

[4] More precisely, the second-born child prefers to leave home and locate as close as possible to his/her parents (we denote the location as $\varepsilon > 0$) since we have $w(g(\varepsilon)) + I > w(g(0))$ from $w(g(\varepsilon)) = w(g(0))$ as $\varepsilon \to 0$ under the assumption that $w(\cdot)$ and $g(\cdot)$ are continuous.

$\delta_A > 0$) from Lemma 2. Hence, the first-born child obtains no assistance from his/her parents ($g_A^*(\delta_A, \delta_B^*(\delta_A)) = 0$ if $\delta_A > \delta_B^*(\delta_A)$) from Lemma 1 but earns income I. Therefore, the utility of the first-born child is,

$$U_A = w(0) + I. \tag{10}$$

Then, from equation (2), the utility of the first-born child located at $\delta_A = 0$ (equation (9)) is strictly larger than that at $\delta_A > 0$ (equation (10)), which makes the first-born child choose to stay home and cohabits with parents, $\delta_A^* = 0$. This constructs our theoretical result as follows:

Theoretical Result 1. The subgame perfect equilibrium of our three-stage game when $w(g(0)) - w(0) > I \geq w(\frac{1}{2}g(0)) - w(0)$ is as follows: we have,

$$\delta_A^* = 0, \delta_B^*(0) > 0, \text{ and } (g_A^*(0, \delta_B^*(0)), g_B^*(\delta_B^*(0), 0)) = (g(0), 0).$$

At this subgame perfect equilibrium, first-born child stays home, the second-born child leaves home, and their parents give maximum assistance only to the first-born child.

Next, we consider cases $I \geq w(g(0)) - w(0)$ and $w(\frac{1}{2}g(0)) - w(0) > I$. In the former case, in which income I is preferable to the maximum assistance form their parents, each child earns income I if he/she leave home, while he/she receives at most the maximum assistance from his/her parents when he/she stays home. Hence, each child prefers to leave home rather than to stay home regardless of the other child's decision, $\delta_A^*, \delta_B^* > 0$. On the other hand, in the latter case, in which the half of the maximum assistance from their parents is preferable to income I, the second-born child becomes not leaving home when the first-born child stayed home, though he/she would do so in the previous cases. For the first-born child, staying home (together with the second-born child in this case) is still preferable to leaving home since the half of the maximum assistance is also preferable for him/her rather than income I. Hence, both children stay home, $\delta_A^* = \delta_B^* = 0$. Combining these results and Theoretical Result 1 gives us a prediction that the children locate far away from parents as income earned outside increase.

In the rest of the paper, we empirically explore whether the geographical relationship, such that a first-born child locates closer to his/her parents than a second-born child, is determined

by siblings' motivation to receive childcare assistance from their parents. We also explore the effect of income on their location decisions.

3 The Data Source and Sample Selection

We use micro data from the 2003 "National Family Survey" which was conducted in January 2004 and provided by the National Family Research of Japan and the Information Center for Social Science Research on Japan, Institute of Social Science, University of Tokyo (SSJ Data Archive). In this survey, a stratified multistage random sample of 10,000 households with respondents aged from 28 to 77 (born between 1926 and 1975), from throughout Japan was surveyed by the drop-off, pick-up method, resulting in 6,302 responses (a response rate of 63%).

The samples we use in our analysis are as follows: first, we use only the respondents whose ages are from 28 to 48. The survey for these respondents is subtitled the "National Survey on Child Rearing and Family Relationship" which focuses on the role of families and that of people around respondents in child rearing. Second, we restrict the sample to respondents who have been married at least once because we want to drop the respondents who are dependent to their parents before their marriage temporarily. By the same reason, we use the respondents whose all of siblings have been married at least once.[5] Third, we restrict the sample further to respondents at least one of those whose parents are still alive. Fourth, we dropped all observations for which all of the necessary information is not available, which reduces the number of respondents to 1,052.[6] In addition, we use only the respondents who have at least one child since these respondents may have the needs for childcare assistance from their parents.[7] This restriction reduces the number of observations further to 979. Furthermore, in order to discuss the strategic interaction between siblings, we focus on the respondents who have siblings. This restriction reduces the number of observations further to 880, which is called as sample (i). Nevertheless,

[5]Respondents who have four or more siblings provide information only to the three oldest siblings (not including respondents themselves). Hence, we are forced to drop them.

[6]Restricting the sample to respondents who are aged 28 to 48 reduces the number of observations from 6,302 to 2,524. Restricting the sample to respondents who are married reduces the number of observations from 2,524 to 2,095, restricting the sample to respondents whose siblings are all married reduces the number of observations further to 1,476, restricting the sample to respondents at least one of those whose parents are still alive reduces the number of observations further to 1,389, and restricting the sample to respondents for whom all of the necessary information is available reduces the number of observations further to 1,052.

[7]The survey does not collect the information whether respondent's siblings have children or not.

we also analyze the sample which includes the respondents who have no sibling, which is called as sample (ii). Moreover, we analyze the female subsample of sample (i) since the motivation behind the residential location choice might be different by their gender, which is called as sample (iii).

4 Fact Findings

In this section, we discuss the validity of assumption of our theoretical model and the consistency between our theoretical model and our empirical analysis. Figure 1 shows which respondents live closer to their parents.

First, residential locations differ by whether siblings have their own children or not. Only about 23.3% of the respondents with no child live within walking distance of their parents (the sum of distance categories (0)-(2)), which is much lower than those of the respondents with one or more children (from 25.1% to 41.4%). This justifies the supposition of our theoretical model in which sibling's motives to choose residential locations are to receive childcare assistance from their parents as well as the restriction of our sample to respondents who have at least one child in our empirical analysis.

Second, residential locations differ by the birth order of siblings: 31.0% of the respondents who are first-born children live within walking distance of their parents, whereas only 25.1% of those who are second- or later- born children do so, which is consistent with our theoretical model as well as Japanese social norms. In addition, 41.4% of the respondents who are only children live within walking distance of their parents, which is the highest of all.

Third, residential locations also differ by the gender of siblings: 33.3% of the male respondents live within walking distance of their parents, whereas only 23.2% of females do so. Under such circumstance, we consider the gender of siblings in our estimation models in spite we do not incorporate the gender thereof into our theoretical model.

5 The estimation model

We test whether first-born children live closer to their parents than second- or later- born children, and if so, whether such geographical relationship is motivated by receiving childcare assistance from parents.

The estimating equations we use are as follows:

$$\begin{aligned} distance^* &= a_1 sibling + a_2 workingmother + a_3 x + \epsilon_1, \\ distance &= 0 \text{ if } distance^* \leq \lambda_1, \\ &= 1 \text{ if } \lambda_1 < distance^* \leq \lambda_2, \\ &\vdots \\ &= 5 \text{ if } \lambda_5 < distance^*, \end{aligned} \tag{11}$$

and,

$$\begin{aligned} distance^* &= b_1 sibling + b_2 sibling \times workingmother + b_3 x + \epsilon_2, \\ distance &= 0 \text{ if } distance^* \leq \mu_1, \\ &= 1 \text{ if } \mu_1 < distance^* \leq \mu_2, \\ &\vdots \\ &= 5 \text{ if } \mu_5 < distance^*. \end{aligned} \tag{12}$$

We call the estimation model with equation (11) as Model 1, and that with equation (12) as Model 2.

5.1 Variable definitions

The dependent variable *distance* is an ordered variable that equals 0 if the respondent lives in the same house as parents or in a separate house on the same property as parents (hereafter, we call the closest distance), 1 if the respondent lives next door to his/her parents, 2 if the respondent lives within walking distance of the residence of his/her parents, 3 if the respondent takes no more than one hour to the residence of his/her parents, 4 if the respondent takes no

more than three hours to the residence of his/her parents, and 5 if the respondent takes more than three hours to the residence of his/her parents (hereafter, we call the farthest distance).[8]

We use the following explanatory variables: first, *sibling* represents the birth order and composition of respondent's siblings, and we use the following four dummy variables as *sibling*: *AdamofAdamB* (first-born son who has only younger sibling(s)), *AliceofAliceBetty* (first-born daughter who has only younger sister(s)), *AliceofAliceBen* (first-born daughter who has at least one younger brother) and *BenofAliceBen* (first-born son who has at least one elder sister). Former three are the dummy variables for first-born children, whereas the last one is the dummy variable for not first-born children but first-born son. Only when we analyze the estimation models using sample contains the respondents who have no sibling, that is sample (ii), we add the following two dummy variables, *Adam* (only son) and *Alice* (only daughter). The base category is respondents who are neither first-born children nor first-born sons. Our theoretical results state that a first-born child lives closer to his/her parents than a second-born child, and thus we expect that the coefficients of the dummy variables *AdamofAdamB*, *AliceofAliceBen*, and *AliceofAliceBetty* are negative and significant, and the coefficient of variable *BenofAliceBen* is not significant. The significances and the signs of coefficients of the dummy variables *Adam* and *Alice* are ambiguous from our theoretical results. We also add *knumber* (the number of respondent's siblings) to the equations.

The explanatory variable *workingmother* is a dummy variable which represents the respondent's necessity for the childcare assistance from his/her parents. It equals one if the respondent is working when the respondent is a female (when the respondent is male, his spouse is working), and he/she has one or more pre-school children, and zero otherwise.[9] Working females who have one or more pre-school children will presumably need more childcare assistance from his/her parents than other respondents, and thus we expect the coefficient of the variable *workingmother* to be negative and significant.

The interactive term *sibling* $\times$ *workingmother* is used in Model 2 instead of using *sibling* in

[8] If father and mother live separately, then we use the distance to the parent who lives closer to the respondent.
[9] If respondent is a divorced or widowed male, the working status of himself is used.

Model 1. In this case, the base category is respondents who are neither the first-born children nor first-born sons and who do not need the childcare assistance from their parents. We expect that the coefficients of variables *AdamofAdamB* × *workingmother*, *AliceofAliceBetty* × *workingmother*, *AliceofAliceBen* × *workingmother* are negative and significant. Moreover, the coefficients of *BenofAliceBen* × *workingmother* and *workingmother* are ambiguous, whereas if the coefficients are negative and significant, then the absolute values of the coefficients thereof are expected to be strictly smaller than those of the coefficients of *AdamofAdamB* × *workingmother*, *AliceofAliceBetty* × *workingmother*, and *AliceofAliceBen* × *workingmother* since our theoretical models describe the behaviors of siblings who are in need of assistance from their parents. However, those of *BenofAliceBen* × *workingmother* and *workingmother* are ambiguous from our theoretical results.

The variable x is the vector of characteristics describing the preference and economic and parental background of respondents. Some of the most important variables in the vector x are the variable *educ* (respondent's educational attainment (in years)) and the variable *reduc* that equals 1 if respondent's educational attainment is the highest of all siblings, -1 if it is the lowest of all, and zero otherwise. We regard *educ* and *reduc* as proxy variables which capture the effect of income I in our theoretical model since they represent opportunity costs for living closer to their parents. Our theoretical model predicts that the higher children earns outside, the farther they locate away from their parents. Hence, we expect the coefficients of *educ* and *reduc* are positive and significant. The variable *reduc* is not included in the model with sample (ii) because we cannot define it for the respondents with no siblings.

The variable *norm* (a dummy variable that equals one for those who think that they should live with their parents when their parents become old and zero otherwise) captures the attitude of respondents on Japanese social norms, and the following three city-size dummy variables also partly capture thereof: *largecity* (non ordinance-designated city with a population of ten thousands or more), *smallcity* (city with a population of under ten thousands), and *rural* (towns or villages). The base category is respondents who live in the ordinance-designated city or not.[10]

[10] 14 major cities are Sapporo, Sendai, Chiba, Saitama, Tokyo metropolitan area, Yokohama, Kawasaki, Nagoya,

It is often said that people who live in rural area are more likely to behave according to Japanese social norms than those who live in urban area, though the broader living space in rural areas enables respondents easier to live with their parents. In this case, the coefficients of these three dummy variables are negative and significant.

The variable *pnursing* (a dummy variable that equals one for those at least one of whose parents need nursing care on a daily basis and zero otherwise) is included in order to control whether parents need the nursing care from their children. We also include *age* (respondent's age), *divorce* (a dummy variable that equals one if the respondent is divorced or widowed), *house* (a dummy variable that equals one if the respondent lives in his/her owner-occupied house), *page* (the average age of parents), *peduc* (the average educational attainment of parents (in years)), *pdivorce* (a dummy variable that equals one if the parents are divorced or widowed), and *pnowork* (a dummy variable that equals one if both parents are not working). The abbreviations and descriptive statistics of the variables we use in our analysis are in Table 1.

5.2 Estimation method

It is difficult to discuss the impact of *workingmother* on *distance* because of the simultaneity problem. A respondent who needs to receive childcare assistance from his/her parents may receive it simply because he/she lives with or close to his/her parents.

To resolve this problem, we employ the variable *nursery* (a prefectural-level measure of the ease of access to licensed daycare centers) as an instrument for the residential location choice of respondents and their parents. The variable *nursery* is the ratio of the capacity of licensed daycare centers to the pre-school population (which is defined as the sum of the population aged from 0 to 5 and one-half of the population aged 6) in each prefecture. Data on the 2003 prefectural capacity of daycare centers is provided by the Equal Employment, Children and Families Bureau, the Ministry of Health, Labor and Welfare, and that on the number of pre-school population in the prefecture is taken from the 2000 Census of Population conducted by the Ministry of Health, Labor and Welfare.

Kyoto, Osaka, Kobe, Hiroshima, Kitakyushu, and Fukuoka.

In order to be valid as an instrument, the variable *nursery* (1) should not be correlated with the unobservable determinants of the residential location choice of respondents and their parents, but (2) should be partially correlated with *workingmother* once the impact of the other exogenous variables has been netted out. We first consider the first condition. In Japan, there is considerable interprefectural variation in the ratio of the capacity of licensed daycare centers to the pre-school population. This ratio is higher in rural areas than in urban areas (for example, it is highest in Kouchi prefecture (0.52), and lowest in Kanagawa prefecture (0.14)). Thus the capacity of licensed daycare centers is more limited in urban areas than in rural areas. Licensed daycare centers must meet the minimum standards set by the Ministry of Health, Labor and Welfare, for example, standards concerning the child-staff ratio and the amount of space per child. In exchange for being regulated by the central and local governments, a large share of the running costs of licensed daycare centers is subsidized by the central and local governments (see Zhou and Oishi (2005) for more details). That is, the capacity of licensed daycare center is determined by supply factors and is not affected by demand factors. Thus, interprefectural variation in the ratio of the capacity of daycare centers to the pre-school population are unlikely to be correlated with the unobservable determinants of the residential location choice of siblings.

We next consider the second condition. We regress *workingmother* on *nursery* and the other exogenous variables using a probit model and find that the coefficient of the variable *nursery* is positive and significant, which is necessary for the instrument to be valid (see Table 2).

We employ the two-stage estimation procedure: first, we estimate a probit model for *workingmother* with *nursery* and aforementioned covariates (the estimation results are in Table 2). Second, we estimate an ordered probit model by using the predicted probability in the first-stage as an instrumental variable (Models 1 and 2 with samples (i), (ii), and (iii), respectively). The asymptotic standard errors are adjusted as in Murphy and Topel (1985) (see also Hardin (2002) and Hole (2006) for the information on Stata programming).

6 Estimation results

In this section, we present our estimation results concerning the determinants of the residential location choice.[11] The results for Model 1 are presented in Table 3, while those for Model 2 are presented in Table 4. At first, we discuss the results for the estimations using samples (i) and (ii), and the results for only females (sample (iii)) are discussed later.

First, we discuss the variable *sibling* (see columns (i) and (ii) in Table 3). The coefficients of *AdamofAdamB* and *AliceofAliceBetty* are negative and significant in both cases, suggesting that the first-born child is more likely to live closer to his parents than other siblings. These results are consistent with our theoretical results as well as social norms in Japan. On the other hand, the coefficient of *BenofAliceBen* is negative and significant, whereas that of *AliceofAliceBen* is not significant in both cases, suggesting that if a first-born child is a female and she has at least one younger brother, she locates farther away from her parents than her younger brother even though she is a first-born child. These results are not consistent with our theoretical model but consistent with social norms in Japan, which might be because there exists parental preference for sons over daughters. Column (ii) represents the results for the estimation using the sample which includes the respondents who have no sibling. We find that the coefficient of *Adam* is negative and significant, whereas that of *Alice* is not significant.

The marginal effects of *sibling* are as follows. Using sample (i), the proportions of living in the closest distance are 11.4% and 9.8% points higher when a respondent is a first-born child and first-born son, and a first-born child and first-born daughter who do not have male siblings, respectively, compared to the respondent who is neither a first-born child nor first-born son, and those of living in the farthest distance are 8.5% and 7.3% points lower likewise. However, as long as a respondent is a first-born son, even though he is not a first-born child, the proportion of living in the closest distance is 19.6% higher, and that of living in the farthest distance is 11.5% lower likewise.

[11] There are some cases in which a first-born child is not a first mover. For example, a first-born child has a college degree and a second-born child has a high-school degree. Thus, we conduct our analysis dropping observations for which the education attainment of the first-born child is higher than that of the second-born child, but they were not significantly different from Tables 3 and 4. We should note that this restriction may cause sample selection bias.

Next, we discuss the variables which relate to *workingmother*. We find that the coefficients of *workingmother* in Model 1 using samples (i) and (ii) are negative and significant (see Table 3). Using sample (i), the estimated proportion of living in the closest distance is 30.0% points higher when respondents need childcare assistance from their parents, compared to respondents who do not need it (similarly, 29.1% points higher using sample (ii)), and that of living in the farthest distance is 29.6% (26.1% for sample (ii)) points lower likewise, which implies that siblings who need to receive childcare assistance from their parents are far more likely to live with or closer to their parents. The interactive term *sibling* × *workingmother* is examined in Model 2, and the results thereof are given in Table 4. We find that the coefficients of *AdamofAdamB* × *workingmother* are negative and significant in both cases, and that of *AliceofAliceBetty* × *workingmother* is negative and marginally significant in column (ii), as we expected. However, those of *BenofAliceBen* × *workingmother* are also negative and significant in both cases. Moreover, the absolute value of the coefficient of *BenofAliceBen* × *workingmother* is the largest of all the absolute values of the coefficients of *sibling* × *workingmother*, which is contrary to our expectation. These results suggest that not only first-born children but also first-born sons live closer to their parents when they need to receive childcare assistance from their parents, compared to those who are neither first-born children nor first-born sons and who do not need it. Nevertheless, these results on *workingmother* indicate that the possibility of siblings being able to receive childcare assistance from their parents, is one of the main determinants of the residential location choice of siblings.

The coefficients of x are not sensitive to the inclusion of the interactive terms instead of using the composition of siblings. Hence, we look at x both in Models 1 and 2 together. First, the coefficients of *educ* are positive and significant in all cases, as we expected, suggesting that educated respondents are more likely to live farther away from their parents. An extra one year educational attainment lowers the proportion of respondents in the closest category by approximately 4% points, whereas it raises the proportion in the farthest category by approximately 4% points. The coefficients of *reduc* are not significant in any cases. Next, we discuss the Japanese social norms. In any cases, the coefficients of *norm* are not significant, but those

of *smallcity* and *rural* are negative and significant, which may imply social norms remaining in rural areas is the motivation of respondents to live with or closer to their parents. Third, the coefficients of *divorce* and *house* are negative and significant in all cases, which suggests that respondents who are divorced or widowed or live in an owner-occupied house are more likely to live closer to their parents than those who do not. The former is because divorced or widowed respondents do not have a spouse who can help to take care of his/her children. In addition, the coefficients of *pdivorce* and *pnowork* are negative and significant in almost all cases.[12] The coefficients of *pnursing* are not significant in both columns (i) and (ii), and thus, we cannot find that the providing nursing care for parents is the determinants of the residential location choice of respondents.

Finally, we discuss the estimation results using the sample which is restricted to female respondents (sample (iii) in Tables 3 and 4). As in the case of the estimation results using samples (i) and (ii), the coefficients of *AliceofAliceBen* are not significant, whereas that of *AliceofAliceBetty* is negative and significant. This implies that a first-born daughter is more likely to live closer to her parents if she has only female siblings. In Japan, the social norm is for parents to live with, or close to, their sons (and for them to take care of their sons' children), and the fact that first-born daughters live with, or close to, their parents (and receive childcare assistance from their parents) only if they have only female siblings suggests that this social norm is still alive and well in Japan. As for the necessity of childcare assistance, only the coefficient of *AliceofAliceBetty* $\times$ *workingmother* is negative and marginally significant (its p-value is 13.8%. See Table 4), whereas none of the other variables relating to *workingmother* are significant. These results suggest that the residential location choices of female siblings may not be motivated by childcare assistance. One possible explanation for this deviation from our theoretical results is the existence of parents-in-law: females in Japan tend to live closer not to her own parents but to her parents-in-law. In fact, as can be seen from the descriptive statistics, the percentage of female respondents who live within walking distance of their parents-in-law is

[12]The ratio of respondents who live with their divorced or widowed mother is not different to that with their divorced or widowed father.

higher than that of those who live within walking distance of their parents (38.6% vs. 23.2%).[13]

7 Conclusion

In this paper, we analyze both theoretically and empirically the residential location choice of siblings who want to receive childcare assistance from their parents. Our results suggest that the first-born child locates closer to his/her parents than the second-born child, and the possibility that siblings receive childcare assistance from parents is one of the main determinants of the residential location choice of children. However, we should note that there is one exception: if a first-born child is a female and she has a younger brother, she locates farther away from her parents than her younger brother even though she is a first-born child, which suggests that residential location choice of siblings is also affected by the existence of Japanese social norms or that of parents-in-law. Thus we cannot deny the importance thereof.

Our findings are contrast to those of Konrad, et al. (2002), in which the geographic relationship between multiple siblings and their parents are determined by siblings' motive to provide care to their parents, which make it possible to explain cross-country differences in siblings' preferences regarding residential location: our model is applicable to countries where children receive childcare assistance from their parents — for example, Asian countries in which working parents leave their children with their grandparents. On the other hand, Konrad, et al. (2002)'s model is applicable to the countries in which there is little tendency for mothers to leave children with their grandparents, such as France and Germany, according to the "Family Life Survey in France and Germany," which is conducted by the Institute for Research on Household Economics in Japan.[14]

[13]Since the survey we use does not collect the information on the sibling composition of respondent's spouse, we do not incorporate the existence of parents-in-law into both our theoretical model and empirical analysis though the survey collects both the distance to the parents-in-law and childcare assistance from their parents-in-law.

[14]There are many studies on the parental cohabitation with children in Japan. Iwamoto and Fukui (2001) find that the higher the parents' income is, the more parents are likely to live independently, whereas Ohtake (1991) and Ohtake and Horioka (1994) find that parents influence the decision of their children by holding wealth in bequeathable forms and by conditioning the division of bequests on children 's cohabitation, suggesting that parents want to live with their children, whereas children do not want to live with parents, which is consistent with the strategic bequest model (the seminal study is Bernheim et al. (1985)).

References

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

[2] Hardin J. W. (2002), The Robust Variance Estimator for Two-stage Models, *Stata Journal*, 2(3): 253–266.

[3] Hole A. R. (2002), Calculating Murphy-Toplel variance estimates in Stata: A simplified procedure, *mimeo*.

[4] Horioka C. Y. (2002), Are the Japanese Selfish, Altruistic or Dynastic? *Japanese Economic Review*, 53(1): 26–54.

[5] Iwamoto Y. and M. Fukui (2001), Doukyo Sentaku ni okeru Shotoku no Eikyou (The Effect of Incomes on Living Arrangements), (in Japanese), *Nihon Keizai Kenkyu*, 51, 21–43.

[6] Konrad K. A., H. Kunemund, K. E. Lommerud and J. R. Robledo (2002), Geography of the Family, *American Economic Review*, 92(4): 981–998.

[7] Koyano W., M. Hashimoto, T. Fukawa, H. Shibata and A. Gunji (1994), The Social Support System of the Japanese Elderly, *Journal of Cross-Cultural Gerontology*, 9(3): 323–333.

[8] Murphy K. M. and R. H. Topel (1985), Estimation and Inference in 'Two-Step' Econometric Models, *Journal of Business and Economic Statistics*, 3(4): 370–80.

[9] Ohtake F. (1991), Bequest Motives of Aged Households in Japan, *Ricerche Economche*, 45(2-3), 283–306.

[10] Ohtake F. and C. Y. Horioka (1994), Chochiku Douki (Savings Motives), in T. Ishikawa (ed.), Nihon no Shotoku to Tomi no Bunpai (The Distribution of Income and Wealth in Japan) (in Japanese), Tokyo: University of Tokyo Press, 211–244.

[11] Takagi E. and M. Silverstein (2006), Intergenerational Coresidence of the Japanese Elderly Are Cultural Norms Proactive or Reactive? *Research on Aging*, 28 (4): 473–492.

[12] Wakabayashi M. and C. Y. Horioka (2006), Is the Eldest Son Different? The Residential Choice of Siblings in Japan, *NBER Working Paper Series*, No. 12655.

[13] Zhou Y. and A.Oishi (2005), Underlying Demand for Licensed Childcare Services in Urban Japan, *Asian Economic Journal*, 19(1): 102–119.

Table 1: Abbreviations and Descriptive Statistics

Sample		(i) one or more siblings	(ii)-(i) no sibling	(iii) females
distance	0 if respondent lives in the same house as parents or in a separate house on the same property as parents,	157 (17.84)	32 (32.32)	58(11.31)
	1 if respondent lives next door to parents,	9 (1.02)	0 (0.00)	6(1.17)
	2 if respondent lives within walking distance of the residence of parents,	77 (8.75)	9 (9.09)	44(8.58)
	3 if respondent takes no more than one hour to the residence of parents,	358 (40.08)	38 (38.38)	234(45.61)
	4 if respondent takes no more than three hour to the residence of parents,	123 (13.98)	10 (10.10)	77(15.01)
	5 if respondent takes more than three hour to the residence of parents.	156 (17.73)	10 (10.10)	94(18.32)
AdamofAdamB	1 if respondent is first-born son who has only younger sibling(s), 0 otherwise.	160 (18.18)	———	———
AliceofAliceBetty	1 if respondent is first-born daughter who has only younger sister(s), 0 otherwise.	107 (12.16)	———	107(20.86)
AliceofAliceBen	1 if respondent is first-born daughter who has at least one brother, 0 otherwise.	111 (12.61)	———	111(21.64)
BenofAliceBen	1 if respondent is first-born son who has at least one elder sister, 0 otherwise.	100 (11.36)	———	———
Adam	1 if respondent is only son, 0 otherwise.	———	36 (36.36)	———
Alice	1 if respondent is only daughter, 0 otherwise.	———	63 (63.64)	———
number†	number of siblings of respondent	2.43 (0.60)	1.00 (0.00)	2.45(0.61)
workingmother	*preschool* × *mwork*	137 (15.57)	19 (19.19)	72(14.04)
preschool	1 if respondent has at least one pre-school child, 0 otherwise.	390 (44.32)	47(47.47)	211(41.13)
mwork	1 if respondent's wife is a full-time worker, 0 otherwise.	495 (56.25)	59(59.60)	290(56.53)
educ†	respondent's educational attainment (in years)	13.69 (1.52)	13.82(1.53)	13.73(1.50)
reduc	1 if respondent's educational attainment is the highest of all siblings,	220 (25.00)	———	110(21.14)
	-1 if respondent's educational attainment is the lowest of all siblings, 0 otherwise.	154 (17.50)	———	108(21.05)
norm	1 if respondent thinks he/she should live with their parents if parents become old, 0 otherwise.	489 (55.57)	71(71.72)	271(52.83)
largecity	1 if respondent lives in a city with a population of ten thousands or more, but not the ordinance-designated city, 0 otherwise.	353 (40.11)	40(40.40)	213(41.52)
smallcity	1 if respondent lives in a city with a population of under ten thousands, 0 otherwise.	154 (17.50)	13(13.13)	93(18.13)
rural	1 if respondent lives in a town or a village, 0 otherwise.	179 (20.34)	14(14.14)	106(20.66)
age†	respondent's age	39.41 (5.29)	38.45(5.45)	39.83(5.57)
divorce	1 if respondent is divorced or widowed, 0 otherwise.	40 (4.55)	6(6.06)	31(6.04)
house	1 if respondent lives in his/her owner-occupied house, 0 otherwise.	622 (70.68)	65(65.66)	356(69.40)
page†	Average age of parents	67.47 (5.98)	66.80(6.77)	67.29(6.03)
peduc†	Average educational attainment of parents (in years)	12.60 (1.43)	12.61(1.44)	12.64(1.44)
pdivorce	1 if parents are divorced or widowed, 0 otherwise.	287 (32.61)	40(40.40)	166(32.36)
pnowork	1 if both parents do not work, 0 otherwise.	551 (62.61)	69(69.70)	317(61.79)
pnursing	1 if parent needs nursing care on daily basis, 0 otherwise.	56 (6.36)	9(9.09)	35(6.82)
nursery†	prefectural-level measure of the ease of access to licensed daycare centers.	0.26 (0.09)	0.26(0.08)	0.26(0.09)
# of observations		880	99	513

The 2003 "National Family Survey." The numbers of respondents are shown. Percentages are in parentheses. †: Means and Standard Deviations are shown.

Table 2: First Stage Estimation

Dependent Variable	*workingmother*		
	(i)	(ii)	(iii)
Sample	one or more siblings	including no siblings	only females
nursery	1.174*	1.121*	1.831*
	(0.670)	(0.634)	(0.964)
number of observations	880	979	513

Source: The 2003 "National Family Survey." Probit model is used. Standard errors are in parentheses. The level of significance at 1% is ***, 5% is **, and 10% is *. *sibling* and x are included in all the specifications, but suppressed.

Table 3: Model 1

Dependent variable	*distance*					
	(i)		(ii)		(iii)	
Sample	one or more siblings		including no siblings		only females	
AdamofAdamB	-0.432***	(0.129)	-0.455***	(0.123)	———	
AliceofAliceBetty	-0.369***	(0.141)	-0.406***	(0.137)	-0.428***	(0.138)
AliceofAliceBen	0.055	(0.136)	0.015	(0.132)	0.003	(0.136)
BenofAliceBen	-0.674***	(0.1411	-0.665***	(0.138)	———	
Adam	———		-0.680***	(0.240)	———	
Alice	———		-0.236	(0.185)	———	
number	0.189***	(0.072)	0.198***	(0.070)	0.294***	(0.086)
workingmother	-1.291*	(0.773)	-1.186*	(0.720)	-0.079	(0.674)
educ	0.165***	(0.032)	0.168***	(0.029)	0.211***	(0.037)
reduc	0.020	(0.065)	———		0.056	(0.078)
age	-0.021	(0.022)	-0.015	(0.020)	-0.000	(0.023)
divorce	-1.064***	(0.196)	-0.962***	(0.181)	———	
house	-0.477***	(0.107)	-0.487***	(0.094)	-0.319***	(0.121)
norm	-0.007	(0.085)	-0.042	(0.081)	-0.009	(0.099)
largecity	-0.132	(0.111)	-0.139	(0.103)	-0.096	(0.135)
smallcity	-0.330**	(0.132)	-0.321***	(0.124)	-0.155	(0.162)
rural	-0.291*	(0.166)	-0.293**	(0.144)	-0.166	(0.161)
page	-0.000	(0.012)	-0.008	(0.011)	0.001	(0.014)
peduc	0.021	(0.034)	0.015	(0.030)	-0.010	(0.037)
pdivorce	-0.138	(0.104)	-0.175*	(0.094)	-0.116	(0.116)
pnowork	0.227**	(0.104)	0.229**	(0.096)	0.226*	(0.122)
pnursing	0.048	(0.164)	0.051	(0.152)	-0.339*	(0.196)
cons_1	0.196	(1.032)	-0.120	(0.943)	1.915*	(1.074)
cons_2	0.243	(1.032)	-0.080	(0.943)	1.979*	(1.074)
cons_3	0.580	(1.033)	0.247	(0.943)	2.360**	(1.073)
cons_4	1.787*	(1.035)	1.449	(0.945)	3.719***	(1.078)
cons_5	2.293**	(1.034)	1.953**	(0.945)	4.242***	(1.081)
number of observations	880		979		513	

Source: The 2003 "National Family Survey." Ordered probit model with the predicted probability of *workingmother* in the first stage is used. *divorce* is dropped in group 3. The level of significance at 1% is ***, 5% is **, and 10% is *. Murphy and Topel standard errors are in parentheses.

Table 4: Model 2

Dependent variable	*distance*					
	(i)		(ii)		(iii)	
Sample	one or more siblings		including no siblings		only females	
AdamofAdamB × *workingmother*	-1.473***	(0.506)	-1.673***	(0.497)	———	
AliceofAliceBetty × *workingmother*	-0.568	(0.561)	-0.820†	(0.566)	-0.838‡	(0.566)
AliceofAliceBen × *workingmother*	0.737	(0.660)	0.612	(0.659)	0.666	(0.650)
BenofAliceBen × *workingmother*	-2.849***	(0.622)	-2.949***	(0.623)	———	
Adam × *workingmother*	———		-0.998	(0.733)	———	
Alice × *workingmother*	———		0.322	(0.737)	———	
number	0.247***	(0.065)	0.304***	(0.057)	0.334***	(0.084)
workingmother	-0.498	(0.728)	-0.418	(0.728)	0.016	(0.725)
educ	0.166***	(0.029)	0.164***	(0.027)	0.212***	(0.037)
reduc	-0.059	(0.061)	———		0.024	(0.077)
age	-0.018	(0.020)	-0.013	(0.019)	-0.007	(0.022)
divorce	-0.991***	(0.195)	-0.901***	(0.179)	———	
house	-0.498***	(0.102)	-0.496***	(0.090)	-0.309***	(0.121)
norm	-0.009	(0.079)	-0.056	(0.076)	-0.006	(0.099)
largecity	-0.116	(0.102)	-0.129	(0.096)	-0.113	(0.135)
smallcity	-0.327***	(0.123)	-0.309***	(0.116)	-0.189	(0.161)
rural	-0.289**	(0.130)	-0.296**	(0.119)	-0.182	(0.160)
page	0.004	(0.010)	-0.006	(0.009)	0.010	(0.013)
peduc	0.008	(0.029)	0.007	(0.027)	-0.017	(0.037)
pdivorce	-0.148	(0.096)	-0.196**	(0.089)	-0.119	(0.116)
pnowork	0.225**	(0.097)	0.235***	(0.091)	0.207*	(0.122)
pnursing	0.075	(0.161)	0.066	(0.151)	-0.308	(0.197)
cons_1	0.774	(0.943)	0.471	(0.885)	2.300**	(1.066)
cons_2	0.820	(0.943)	0.510	(0.885)	2.363**	(1.066)
cons_3	1.153	(0.942)	0.834	(0.885)	2.739***	(1.065)
cons_4	2.352**	(0.945)	2.028**	(0.887)	4.089***	(1.071)
cons_5	2.856***	(0.946)	2.531***	(0.888)	4.608***	(1.074)
number of observations	880		979		513	

Source: The 2003 "National Family Survey." Ordered probit model with the predicted probability of *workingmother* in the first stage is used. *divorce* is dropped in group 3. The level of significance at 1% is ***, 5% is **, and 10% is *. Murphy and Topel standard errors are in parentheses. †: p-value is 14.7%. ‡: p-value is 13.8%.

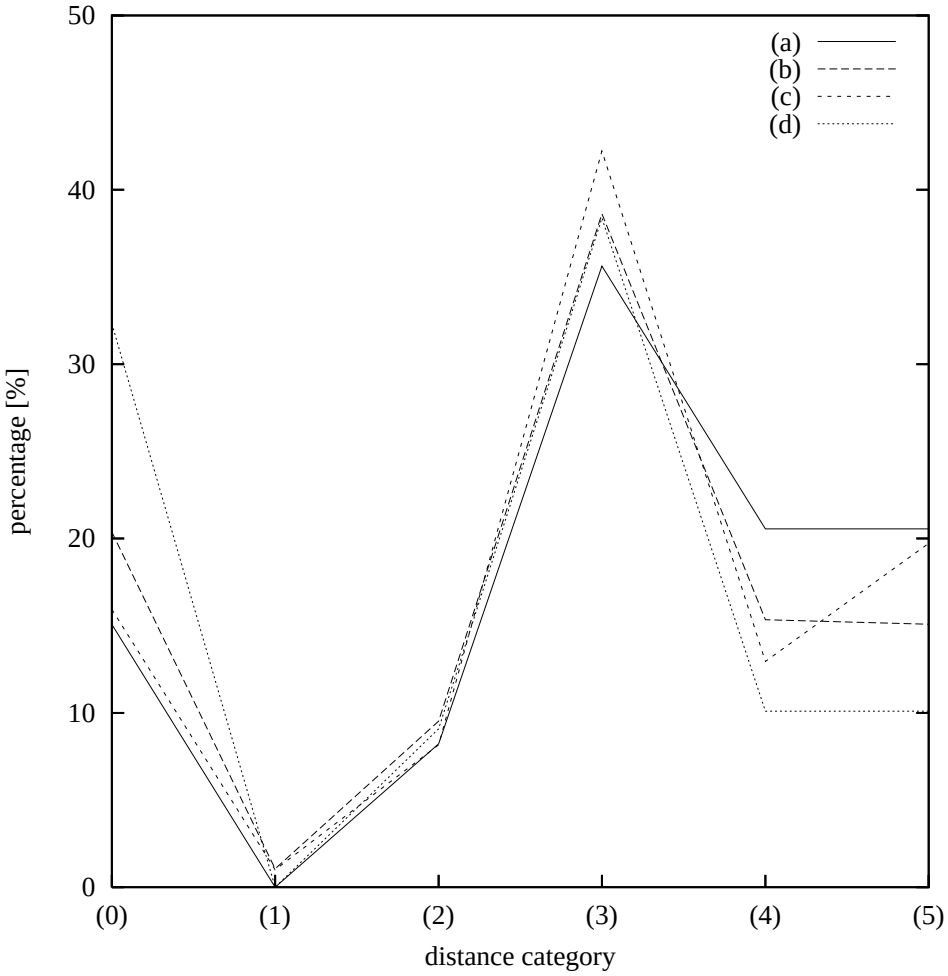

Figure 1: Distance between Siblings and Parents

Label:
- (a) Respondent who have no child
- (b) Respondent who have at least one child and who are 1st-born children
- (c) Respondent who have at least one child and who are 2nd- or later- born children
- (d) Respondent who have at least one child and who are only children

Distance category:
- (0) Respondent who lives in the same house as parents or in a separate house on the same property as parents
- (1) Respondents who live next door to parents
- (2) Respondents who live within walking distance of the residence of parents
- (3) Respondents who take no more than one hour to the residence of parents
- (4) Respondents who take no more than three hour to the residence of parents
- (5) Respondents who take more than three hour to the residence of parents

Source: The 2003 "National Family Survey"