Yamamura, Eiji

Working Paper

Effects of siblings and birth order on income redistribution preferences: Evidence based on Japanese General Social Survey

EERI Research Paper Series, No. 23/2012

Provided in Cooperation with:
Economics and Econometrics Research Institute (EERI), Brussels

Suggested Citation: Yamamura, Eiji (2012) : Effects of siblings and birth order on income redistribution preferences: Evidence based on Japanese General Social Survey, EERI Research Paper Series, No. 23/2012, Economics and Econometrics Research Institute (EERI), Brussels

This Version is available at:
https://hdl.handle.net/10419/142652

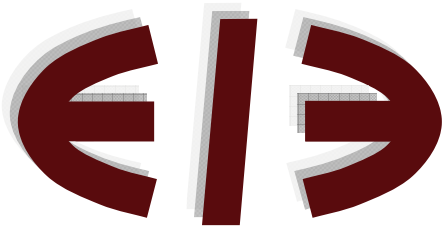
EERI
Economics and Econometrics Research Institute

Effects of siblings and birth order on income redistribution preferences: Evidence based on Japanese General Social Survey

Eiji Yamamura

EERI Research Paper Series No 23/2012

ISSN: 2031-4892



EERI
Economics and Econometrics Research Institute
Avenue de Beaulieu
1160 Brussels
Belgium

Tel: +322 298 8491
Fax: +322 298 8490
www.eeri.eu

Effects of siblings and birth order on income redistribution preferences: Evidence based on Japanese General Social Survey

Eiji Yamamura[1]

Department of Economics, Seinan Gakuin University, 6-2-92 Sawaraku, Nishijin, Fukuoka 814-8511, Japan; and Economics and Econometrics Research Institute (EERI), Brussels.

[1]E-mail address: yamaei@seinan-gu.ac.jp

Abstract

The Japanese General Social Survey was used to determine how individual preferences for income redistribution are affected by family structure, such as the number of siblings and birth order where individuals grow up. After controlling for various individual characteristics, the important findings were as follows. (1) The first-born child was less likely to prefer income redistribution when the child was male. However, such a tendency was not observed when the child was female. (2) The larger the number of elder brothers, the more likely an individual preferred income redistribution. However, the number of elder sisters did not affect the preference. (3) The number of younger siblings did not affect the preference for redistribution regardless of the sibling's sex. These findings regarding the effect of birth order are not consistent with evidence provided by another study conducted in a European country.

JEL classification: D19; D30; D63, J13.

Keywords: Inequality aversion; Redistribution; Family structure; Birth order; Siblings.

1. Introduction

The classical assumption of economics is that individuals aim to behave to increase their own utility. Furthermore, the formation of preference has not been considered in neo-classical economics. However, in modern economics, it is a major issue for economic researchers to determine how an individual's preference is formed (Fehr, E., Schmidt 1999; Akerlof and Kranton 2000; Fernandez et al., 2004, Fehr et al., 2006, Kawaguchi and Miyazaki 2009). For example, examining the determinants of preference for redistribution is one of the major issues for analyzing preference formation (e.g., Ravallian and Lokshin, 2000; Corneo and and Gruüner, 2002; Alesina and La Ferrara 2005; Rainer and Seidler, 2008). People can learn from various experiences in a social relationship. Interactions among people have been found to affect the preference for redistribution (Yamamura, 2012). The circumstances where individuals grow up appear to play a critical role on formation of an individual's preference. For example, parents play a critical role in the formation of an individuals' preference (Fernandez et al.,2004, Kawaguchi and Miyazaki 2009)[2].

Besides the characteristics of parents, family structure, such as the number of siblings and birth order, possibly affect the formation of preference.[3] As argued by Fehr et al. (2008), the relationship among siblings is the primary social relationship, and therefore, it affects the formation of preference. In an experimental analysis in Switzerland, Fehr et al (2008) showed that birth order

---

[2] The evidence provided based on data from the United States suggests that men who were raised by working mothers consider it natural for women to work outside the home (Fernandez et al.,2004). Kawaguchi and Miyazaki (2009) used data from Japan to test this argument and found that men raised by full-time working mothers are less likely to support traditional gender roles and are also less likely to believe in the negative effect of a mother working on her children's development.

[3] It is widely acknowledged that family structure, such as birth order and the number of siblings, leads to different economic outcomes; for example, accumulation of human capital (e.g., Berman and Taubman, 1986; Kessler, 1991; Hanushek 1992; Oettinger 2000; Black et al. 2005; Kantrevic and Mechoulan, 2006; Lee 2008; Dayiogru et al. 2009; Dammert, 2010; Cho 2011; Buckles and Munnich 2012), participation in the labor market (Edmonds, 2006), child mortality (Makepeace and Pal 2008; Chamarbagwala, 2011), and inequality (Mazumder 2008). This might be partly because of large birth-order differences in the amount of quality lime that children spend with their parents (Price 2008).

and the presence of siblings affect the degree of children's inequality aversion[4]. They found that children without siblings are more likely to share resources voluntarily and that the youngest child is less likely to share them. Based on these results, they argued that children without siblings tend to be altruistic, while the youngest child tends to be selfish[5]. However, a "consequence of constraints in capital and labor use is that parents must ration available funds and time to each of their children. Children thus become rivals" (Garg and Morduch 1998, 472). Competition naturally reduces the amount of resources for each child. Therefore, children with siblings become poorer than children without siblings if other variables are constant. In addition, "the relative genders and ages of siblings can be central in determining the outcomes of these rivalries" (Garg and Morduch 1998, 472). Relationships among siblings appear to be vertical rather than horizontal because differences in ages between siblings naturally lead to elder siblings having physical and knowledge advantages over younger siblings. Furthermore, investment for education is thought to be larger for elder siblings (Black et al. 2005; Kantrevic and Mechoulan, 2006). The youngest child appears to be in a disadvantageous position with regard to competition among siblings. Therefore, the youngest child inevitably becomes the poorest among siblings. Poorer people are thought to prefer income redistribution compared with richer people. This inference assuming that people are selfish is not in line with the argument of Fehr et al. (2008). Whether people are selfish or altruistic appears to depend on the features of society where people grow up. However, with the exception of Fehr et al. (2008), little is known about how the number of siblings and birth order influences an individual's preference for redistribution.

As argued by Fehr et al. (2008), "roots of human egalitarianism and parochialism do not preclude culture and socialization from playing an important part in other-regarding preference" (Fehr et al., 2008, 1082). Alesina et al. (2004) also argued that people's perception regarding inequality differs according to social and cultural backgrounds. More recently, Benjamin et al.

---

[4] Birth order and the number of siblings have an effect on an individual's perception and values, such as positional concern (Lampi and Nordblom 2010).

[5] Alger and Weibull (2010) analyzed the strategic interaction between two mutually altruistic siblings.

(2010) found that social identity leads to differences in the economic preference between Asian-Americans and other Americans. Compared with studies from Europe and the United States (e.g., Alesina et al., 2004; Alesina and La Ferrara, 2005; Alesina and Giuliano, 2009; Derin-Güre and Uler, 2010), existing studies have not fully assessed the determinants of Japanese people's preference for redistribution, with the exception of Ohtake and Tomioka (2004) and Yamamura (2012). Therefore, it is necessary to examine how and the extent to which the preference for redistribution is affected by siblings in non-European countries whose cultural roots are different from European countries. The current study attempted to examine the birth order and existence of siblings on preferences for redistribution using data from the Japanese General Social Survey (JGSS) of Japan, which includes more than 10,000 observations. Using the JGSS allowed comparison of the effect of siblings on preference for redistribution between Japan and Europe[6]. Therefore, the findings of this study will help researchers to consider how social, historical, and cultural differences influence redistribution preferences. The most important findings of this study were as follows. (1) The first-born boy is less likely to prefer income redistribution. However, there is no such tendency for the first-born girl. (2) The larger the number of elder brothers, the more likely an individual prefers income redistribution. However, the number of elder sisters does not affect the preference. Further, neither the number of younger brothers nor the number of sisters affects the preference. These findings are not consistent with Fehr et al. (2008).

The remainder of this article is organized as follows. In Section 2, the testable hypotheses are presented. Section 3 presents an explanation of data and the empirical method used. Section 4 provides the estimation results and their interpretation. The final section offers some conclusions.

2. Hypotheses

In the experiments conducted by Fehr et al (2008), it was found that children without siblings tend to share resources voluntarily and that the youngest child

[6] Kawaguchi and Miyazaki (2009) used the JGSS to examine the value of the role of sex, making their results comparable with the study of Fernandez et al. (2004) using the General Social Survey (GSS) conducted in the United States.

is less inclined to share resources. Fehr et al (2008) interpreted these findings as follows: (1) children with siblings "experienced more competition for scarce resources in their families, which could make them less generous and less willing to share resource voluntarily" (Fehr et al 2008, 19 in supplementary information) [7]; and (2) the youngest children "are least able to assert themselves during early childhood when siblings compete for resources. Therefore, they may have to grab a resource whenever it becomes available, rendering them less altruistic" (Fehr et al 2008, 19-20 in supplementary information).

Therefore, the presence of siblings causes people to be less altruistic. On the other hand, the youngest person is less inclined to be altruistic. In other words, the first-born person is more inclined to be altruistic. Furthermore, altruistic people are more likely to prefer income redistribution. Hypothesis 1 is proposed as follows:

Hypothesis 1:

People with a larger number of siblings are less likely to prefer redistribution. Further, the first-born person among siblings is more likely to prefer redistribution.

The parental resources per child decrease with the number of children (Cáceres-Delpiano 2006). From the viewpoint of standard economics, the smaller the number of siblings, the smaller the competitive pressure for an individual. In the case of a person without siblings, the situation is monopoly. Therefore, he/she can enjoy the profit resulting from monopoly. He/she is naturally richer than those who have siblings when other variables are constant. Accordingly, he/she does not support the policy to promote income redistribution if he/she is selfish. This is because the policy of income redistribution reduces his/her own net-revenue.

The first person spent the first part of their childhood not having to share resources with their siblings and hence enjoy their monopoly. However, after having siblings, they have to share with their siblings and hence resource

[7] Supplementary information of Fehr et al. (2008), which is available at the website of http://www.nature.com/nature/journal/v454/n7208/suppinfo/nature07155.html (accessed on February 10, 2012).

allocated for the first person reduced. In addition, because of his/her seniority, the first person among siblings is thought to naturally have a great advantage against siblings regarded as his/her competitors (Garg and Morduch 1998). Consequently, the first-born person can obtain a larger revenue than other siblings. In other words, the first child is richer than other siblings within a family. Based on this assumption, allocation for the first-born child is reduced and allocation for younger children is increased if parents redistribute their resources equally to children. Therefore, younger children request that their parents redistribute allocation equally to reduce the inequality among children. Furthermore, an individuals' utility appears to depend not only on their own income level, but also on the income level of surrounding people. A rise in the income of surrounding people leads people to be unhappy, while a rise in their own income leads people to be happy (Stutzer 2004; Luttmer 2005). If this is true, the lower the level an individual's utility is, the higher the revenue for his/her other siblings is. Such an effect among siblings increases the utility of the first-born child. If the first child is selfish, he/she is less likely to support the "income redistribution policy" adopted by parents. In the case that such a preference of the first child persists after he/she becomes an adult, the first-born person does not prefer income redistribution. The role of a "benevolent" government is considered as equivalent to the role of parents when children become adults. Therefore, Hypothesis 2 was postulated as follows:

Hypothesis 2:

People with a larger number of siblings are more likely to prefer redistribution. Further, the first-born person among siblings is less likely to prefer redistribution.

The effect of experiencing competition can be considered differently according to the standpoint of individuals. Assuming that those who experience competition become rich, they prefer income redistribution only when they are altruistic. On the other hand, assuming that those who experience competition become poor, they prefer income redistribution, even though they are selfish. Individuals can be considered selfish if the larger the number of elder siblings is, the more they are likely to prefer income redistribution. Individuals can be

considered altruistic if the larger the number of younger siblings is, the more they are likely to prefer income redistribution. Furthermore, the sex of siblings appears to be an important factor determining economic outcomes (Garg and Morduch 1998; Dayiogru et al. 2009). To more closely examine the effect of experiencing competition in the family, siblings need to be divided into elder and younger siblings and then this effect can be examined. Generally, parents are thought to prefer sons than daughters, and therefore, the role played by sisters appears to be different from the role played by brothers (Garg and Morduch 1998). For example, elder sisters tend to work to earn money for investing for younger brothers (Edmond 2006). Therefore, it is important to investigate how and the extent to which the presence of elder (or younger) brothers is different from that of elder (or younger) sisters.

3. Data and Methods

3.1. Data

JGSS data were used in the current study. The data were individual-level data.[8] A two-stage stratified sampling method was used for JGSS surveys. The surveys were conducted throughout Japan from 2000. The JGSS dataset used in this study covered 2000, 2001, 2002, 2003, 2005, 2006, and 2008.[9] The JGSS was purposefully designed as a Japanese counterpart to the GSS from the United States. The JGSS asks various questions concerning an individual's characteristics by face-to-face interviews. Therefore, the data contain information related to preferences regarding income redistribution policies, family structure (number of siblings, individual's birth order, and number of children), marital and demographic (age and sex) status, annual household income[10], years of schooling, size of residential area, age, prefecture of residence,

[8]Data for this secondary analysis, "Japanese General Social Survey (JGSS), Ichiro Tanioka," was provided by the Social Science Japan Data Archive, Information Center for Social Science Research on Japan, Institute of Social Science, The University of Tokyo.

[9]Surveys were not conducted in 2004 and 2007. Surveys were conducted in 2009 and 2010, but the data could not be obtained.

[10]In the original dataset, annual earnings were grouped into 19 categories, and we assumed that everyone in each category earned the midpoint value. For the top category of "23 million yen and above," it was assumed that everybody earned 23

and prefecture of residence at 15 years old. A Japanese prefecture is considered to be the equivalent to a state in the United States or a province in Canada. There are 47 prefectures in Japan. Each prefecture contains cities, towns and villages. In the JGSS, sizes of residential areas are categorized as follows: large cities, small cities, and towns (or villages).

Table 1 shows construction of the research sample. Data were collected from 22,793 adults, between 20 and 89 years old. Respondents did not answer all of the survey questions. Inevitably, data concerning some variables used in the estimation in this study were not available. Therefore, the number of samples used in the regression estimations was reduced, ranging between 10,497 to 11,136.

The use of JGSS data has certain advantages for empirical analysis. This study aimed to re-examine the evidence provided by Fehr et al. (2008). Data used by Fehr et al. (2008) were constructed by experiments on Swiss children. The JGSS provides detailed information regarding family structure and family members and individual's preferences. Furthermore, various variables, such as residential place and economic conditions during the childhood are available from JGSS. The JGSS enables attenuation of omitted variable bias. Therefore, the JGSS is useful for determining the effect of a family member on the formation of an individual's preference by controlling for various characteristics (Kawaguchi and Miyazaki 2009). In addition, evidence of the experimental analysis was based on a small sample (127 girls and 102 boys), although various biases can be controlled (Fehr et al., 2008). As explained earlier, the sample size of this study was far greater than the sample used in Fehr et al.'s study (2008). Therefore, results based on JGSS data are able to provide more general evidence than experimental analyses.

The definitions and basic statistics of variables used in the regression estimations are shown in Table 2. *EQUALITY,* the key dependent variable, was used as a proxy for preferences for income redistribution. In the JGSS, a question regarding income redistribution asks "What is your opinion of the following statement?": "It is the responsibility of the government to reduce the

---

million yen. Among observations used in the regression estimations, slightly less than 1% of observations occurred in this category. Therefore, the problem of top-coding should not be an issue.

differences in income between families with high incomes and those with low incomes." There are five response options, ranging from 1 (strongly disagree) to 5 (strongly agree). *EQUALITY* is the value that the respondents chose. In addition, respondents were asked the question: "If you consider when you were approximately 15 years old, what would you say about your family income compared with Japanese families in general?" There were five response options, ranging from 1 (far below average) to 5 (far above average). *CONDITION 15* is the value that the respondents chose.

SIBLINGS represents the number of respondent's siblings. The sample included an "only child" who does not have siblings at all. Therefore, the minimum value of *SIBLINGS* is 0. *FIRST* represents the first sibling dummy, which is 1 if the respondent was the first child, otherwise it is 0. "Only child" was regarded as *FIRST*. Respondents were more likely to be *FIRST* when the number of siblings was smaller. The effect of family size should be controlled. All of the estimation results reported in this study did not exclude "only child". However, excluding "only child" from the sample did not change the estimation results; these results were not shown in the Tables [11].

Figure 1 illustrates the relation between *EQUALITY* and *SIBLINGS* (number of siblings). *EQUALITY* was positively associated with *SIBLINGS,* implying that people with a larger number of siblings are more inclined to prefer redistributive policy (Figure 1). This is in line with *Hypothesis 2*.

Table 3 provides mean comparisons of variables, including subjective values and economic conditions between the first sibling and other siblings. With the exception of *UNEMPLOYED,* there were statistically significant differences between all the variables. *EQUALITY* of the first child was 3.68, which is 0.08 points larger on the five-point scale compared with the other siblings. In addition, this difference was statistically significant at the 1% level. This is consistent with *Hypothesis 2*, rather than *Hypothesis 1*. *SCHOOLING* was also statistically significant at the 1% level. This is in line with the assertion that children born later in the family are thought to obtain less education (Black et al., 2005; Kantarevic and Mechoulan 2006). If human capital of the first sibling is larger than that of the other younger siblings, the income level of the first

[11] The results are available from the author upon request.

sibling is higher than that in the younger ones (Black et al., 2005; Kantarevic and Mechoulan 2006). Congruent to this inference, *INCOME* of the first child was 634, while that of the others was 572. Parents are more inclined to invest for the first child than others. The larger the parents' investment for education is, the richer children perceive their household to be. In other words, the attitude of parents regarding investment for education appears to influence their children's subjective evaluation about the economic condition of their household during their school years. *CONDITION 15* of the first child was 2.73, which is 0.08 higher on the five-point scale compared with the other siblings. Families with a higher income have fewer children (Becker and Lewis 1973; Becker and Tomes 1976). Further, the first-born reflects not only the effect of birth order but also the probability of coming from a small family (Hanushek 1992; Kantarevic and Mechoulan 2006). To reduce the probability of coming from a small family, those without siblings were excluded from the sample (Table 3). However, the results using this sample are similar to those using the sample, including those without siblings. The results shown in Table 3 suggest that the first child is more likely to be in a better economic condition than the others, whereas the first child is less likely to prefer redistributive policy than the others. These results indicate that the economic advantage of the first sibling among all siblings does not cause the first sibling to be generous and altruistic.

The combined results of Table 3 and Figure 1 are consistent with *Hypothesis 2,* rather than *Hypothesis 1*. However, various factors were not controlled in these results. For closer examination of *Hypothesis1* and *Hypothesis 2*, regression estimations were conducted and are shown in the following sections.

3.2. Econometric Framework and Estimation Strategy

For the purpose of examining the previously proposed hypotheses, the estimated function of the baseline model is as follows:

$$EQUAL_i = \alpha_1 SIBLINGS_i + \alpha_2 FIRST\ BOY_i + \alpha_3 FIRST\ GIRL_i + \alpha_4 CONDIITON\ 15_i + \alpha_5 INCOME_i + \alpha_6 AGE_i + \alpha_7 MARRIED_i + \alpha_8 SCHOOLING_i + \alpha_9 UNEMPLOYED_i + \alpha_{10} MALE_i + u_i,$$

where $EQUAL_i$ represents the dependent variable in individual *i*. Regression

parameters are represented by α. As explained earlier, values for *EQUAL* range from 1 to 5, which can be regarded as an ordered response. In this case, the ordered probit model is applicable, and therefore, was used to conduct the estimations (Greene 1997). The error term is represented by u_i. During the studied period of 2000-2008, macro-economic conditions in Japan were thought to face various exogenous shocks. Macro-economic shocks appear to affect an individual's perception. Therefore, for including macro-economic shocks, this study included year dummies. In addition, characteristics of residential areas also appear to affect an individual's perception. Dummies of current residential prefectures were incorporated to control for economic conditions of residential places. Further, the degree of urbanization is thought to influence the perception. Dummies of the size of areas were included to include this effect.

It is reasonable to assume that observations may be spatially correlated within an area. This is because the preference of one agent may be well related to the preference of another in the same area. To consider such a spatial correlation in line with this assumption, the Stata cluster command was used and z-statistics were calculated using robust standard errors. The advantage of this approach is that the magnitude of spatial correlation can be unique to each area. In this study, as explained earlier, the prefecture where respondents resided was known. Therefore, spatial correlation was assumed to be unique within the prefecture.

The most important variable to determine the effect of family structure, *SIBLINGS,* which represents the number of siblings, was included to examine the degree of competition among siblings. The question can be asked: "Does the respondent's preference for redistribution depend on whether the respondent is a first-born child?" To examine this question, *FIRST* was included. The first-born represents not only the birth order effect but also the probability of coming from a small family (Hanushek 1992; Kantarevic and Mechoulan 2006). Incorporating *FIRST* and *SIBLINGS* as independent variables indentifies the effect of the respondent's birth order and number of siblings. The sex of the siblings is thought to be associated with outcomes because the role of daughters is different from the role of sons (Garg and Morduch 1998; Edmond 2006). Therefore, in an alternative model, the first-born child was divided into son (*FIRST BOY*) and daughter (*FIRST GIRL*). *FIRST BOY* and *FIRST GIRL* are

considered to reflect the effects of birth order as well as sex of the first-born child. Further, those with a larger number of siblings are likely to earn less (Kantarvic and Mechoulan 2006; Björklund et al., 2006). The first-born child is more likely to have investment for education than the other children by parents, and therefore, earnings eventually increase and the probability of unemployment decreases (Black et al. 2005; Kantrevic and Mechoulan, 2006; Lampi and Nordblom 2012). This might affect the preferences for redistribution, rather than rivalry and competition among siblings. Therefore, to control for the effect of investment for human capital by parents, *SCHOOLING*, *INCOME* and *UNEMPLOYED* were included as independent variables.

This study examined whether circumstances when an individual grows up are associated with the formation of preferences. The economic condition at 15 years old is thought to be one of the facets of these circumstances. Richer parents may have fewer children and choose to increase the average quality of children (Becker 1960; Becker and Lewis 1973; Becker and Tomes 1976). Children from richer families may consider goods less valuable (Fehr et al., 2008, 19 in supplementary information). Therefore, the number of siblings might represent the economic condition. To control for this possibility and directly examine the effect of siblings and birth order, *CONDITION 15* was incorporated as a dependent variable. If people who grow up in richer conditions are more likely to be generous and altruistic, the coefficient of *CONDITION 15* is a positive sign. Furthermore, dummies of the residential prefecture at 15 years old were incorporated to allow for economic conditions of residential areas during childhood. Controlling for economic conditions at 15 years old enables examination of the long-term effect of competition among siblings during childhood on formation of preference.

Existing literature ascertaining the determinants of preference for redistribution (e.g., Ravallian and Lokshin, 2000; Corneo and and Gruüner, 2002; Ohtake and Tomioka 2004; Alesina and La Ferrara 2005; Rainer and Seidler, 2008; Alesina and Giuliano 2009), in addition to the economic factors *age*, *marry*, and *male*, were included as independent variables to control for individual characteristics.

In the baseline model, the effect of respondent's birth order was focused on. Therefore, the feature of a respondent's siblings was not considered. To examine

the effect of the feature of a respondent's siblings, the alternative model is as follows:

$$EQUAL_I = \alpha_1 ELDER\ BROTHERS_i + \alpha_2 ELDER\ SISTERS_i + \alpha_3 YOUNGER\ BROTHERS_i + \alpha_4 YOUGNER\ SISTERS_i + \alpha_5 CONDIITON\ 15_i + \alpha_6 INCOME_i + \alpha_7 AGE_i + \alpha_8 MARRIED_i + \alpha_9 SCHOOLING_i + \alpha_{10} UNEMPLOYED_i + \alpha_{11} MALE_i + u_i.$$

Instead of *FIRST BOY* and *FIRST GIRL*, key independent variables were *ELDER BROTHERS* (number of brothers older than the respondent), *ELDER SISTERS* (number of sisters older than the respondent), *YOUNGER BROTHERS* (number of brothers younger than the respondent), and *YOUNGER SISTERS* (number of sisters younger than the respondent). Apart from these key variables, other control variables were the same as those included in the baseline model. If the presence of elder siblings leads people to prefer redistribution, coefficients of *ELDER BROTHERS* and *ELDER SISTERS* have positive signs. If the presence of younger siblings leads people to oppose redistribution, coefficients of *YOUNGER BROTHERS* and *YOUNGER SISTERS* have negative signs. Furthermore, when the effect of siblings differs between siblings' sex, the results of *ELDER (YOUNGER) BROTHERS* are different from those of *ELDER (YOUNGER) SISTERS*.

4. Estimation Results

The estimation results of the ordered probit model are presented in Tables 4-6, 7 (a), (b), (c), and 8. The results of the baseline model are reported in Table 4 where the key variable is *SIBLINGS*. In Table 5, *SIBLINGS* and *FIRST* are included at the same time. Further, to examine the differences in sex regarding the first-born child, *SIBLINGS*, *FIRST BOY,* and *FIRST GIRL* are included in Table 6. To examine the composition of siblings in more detail, the effect of the number of elder siblings and younger siblings was examined (Tables 7-8). Furthermore, to examine how of the effect of the composition of siblings differs according to the respondent's sex, the sample was divided into a male respondent sample and a female respondents' sample. Therefore, Table 7 (a), (b) and (c) shows the results of all samples, the male sample, and the female sample, respectively. In

Table 7 (a), (b) and (c), *ELDER SIBLINGS* and *YOUNGER SIBLINGS* are used. Further, for closer examination, Table 8 incorporates *ELDER BROTHERS, ELDER SISTERS, YOUNGER BROTHERS,* and *YOUNGER SISTERS* as key independent variables.

Various control variables reported in Table 4 are not shown in other tables (Tables 5-8). However, control variables included in each column of Table 4 are also included in corresponding columns of other tables. For example, control variables included in the estimation of column (2) of Table 4 are also incorporated in column (2) of other tables when estimations were conducted. In each table, the estimation results, including *CONDITION 15* and dummies of residential prefecture at 15 years old, are reported in columns (1)-(3), whereas the results excluding them are reported in columns(4)-(6).

In Table 4, in all columns, the coefficient of *SIBLINGS* had a positive sign and was statistically significant. This indicates that the larger the number of siblings, the more an individual is likely to prefer redistribution policy. The result that *SIBLINGS* does not change according to various specifications supports *Hypothesis 2,* rather than *Hypothesis 1*. With regard to economic conditions during childhood, the sign of *CONDITION 15* was negative and statistically significant at the 1% level as shown in columns (1)-(3). This suggests that people who grow up in richer condition are more likely to be selfish, rather than altruistic. Concerning control variables, the sign for *INCOME* was negative and statistically significant at the 1% level in all estimations. This indicates that a reduction in income via the policy of income redistribution leads rich people to oppose such a policy. Significant negative values for *SCHOOLING* were observed in all estimations. This finding suggests that people with a higher education are more likely to expect higher future earnings, therefore opposing redistribution policy, even if the current income is controlled. The coefficient of *UNEMPLOYED* had a positive sign in all estimations and was statistically significant as shown in columns (1)-(6). This implies that a difficult economic situation leads unemployed people to prefer redistribution policy to improve their situation. The results of control variables shown in Tables 5-8 were almost the same as those shown in Table 4. Therefore, in Tables 5-8, they were not reported and the

key variables were focused on instead[12].

When *SIBLINGS* as well as *FIRST* were included, the sign of *SIBLINGS* was positive in all columns; however, it was statistically significant only in columns (3) and (6) of Table 5. On the other hand, *FIRST* yielded a negative sign in all columns. However, *FIRST* was not statistically significant in all columns. Table 6 indicates that *FIRST BOY* had a negative sign and it was statistically significant in columns (1)-(6). On the other hand, *FIRST GIRL* had a negative sign as shown in columns (1) and (4) and a positive sign in columns (2), (3), (5) and (6). In addition, *FIRST GIRL* was not statistically significant in all columns. It is interesting that the first-born effect was significant only for males, but not for females. The results of *SIBLINGS shown* in Table 6 are almost the same as those in Table 5. The results shown in Tables 5 and 6 suggest that the fist-born male is more inclined to oppose redistribution policy than other siblings; however, such an inclination was not observed for the first-born female. The first-born male is considered as selfish, whereas the first-born female is neither selfish nor altruistic.

The effect of the composition of siblings was then examined in more detail. Table 7 (a) shows that a significant positive sign of *ELDER SIBLINGS* was observed (all columns). On the other hand, *YOUNGER SIBLINGS* had a positive sign, but this was not statistically significant in all columns. This implies that the larger the number of elder siblings is, the more an individual is likely to prefer redistribution policy. The number of younger siblings, however, had no effect on the individual's preference for redistribution. The results of Table 7 (a) were similar to those of Table 7 (b) based on the sample being restricted to male respondents. With regard to female respondents, as shown in Table7 (c), with the exception of *ELDER SIBLINGS* in column 6, the coefficients of *ELDER SIBLINGS* and *YOUNGER SIBLINGS* were not statistically significant. This finding suggests that the number of elder siblings and younger siblings are not associated with a female's preference for redistribution.

The number of elder siblings was divided into the number of elder brothers and number of elder sisters, and the number of younger siblings was divided into the number of younger brothers and number of younger sisters. As shown

[12] The results are available from the author upon request.

in Table 8, coefficients for both *ELDER BROTHERS* and *ELDER SISTERS* had a positive sign in all columns. Interestingly, in all columns, *ELDER BROTHERS* was statistically significant at the 1% level while *ELDER SISTERS* was not statistically significant. With regard to the results of younger siblings, coefficients for *YOUNGER BROTHERS* had a positive sign and *YOUNGER SISTERS* had a negative sign in all columns. However, *YOUNGER BROTHERS* and *YOUNGER SISTERS* were not statistically significant in columns (1)-(6). This indicates that the number of elder brother plays an important role in forming an individual's preference for redistribution, whereas the number of elder sisters does not play a role. It is speculated that elder brothers can take advantage of their superior age over younger siblings. Elder brothers are selfish, and therefore, exploit their senior age to their own advantage. Younger siblings inevitably obtain a smaller allocation than elder brothers. "Poorer" young siblings are also selfish and, therefore, aim to increase their allocation through redistribution. This is in line with the results of Table 7 (a)-(c). In the case of elder sisters, as pointed out by Garg and Morduch (1998), elder sisters are unlikely to be selfish and, therefore, do not exploit senior age to their own advantage. With regard to younger siblings, the number of younger brothers and number of younger sisters do not affect preference.

Overall, it can be concluded that the estimation results examined in this section are consistent with *Hypothesis 2*, and support it reasonably well, but they are not consistent with *Hypothesis 1*. Furthermore, in summary, the various estimated results presented thus far suggest that males are consistently selfish, and therefore, birth order changes their preference for redistribution. However, it is unclear whether females are selfish, and therefore, the effect of birth order on female's preference is not conclusive. Such a difference between males and females can be explained, in part, by the fact that the expected role of sons is different from that of daughters within a family (Garg and Morduch 1998; Edmond 2006)). Similarly, as asserted in the "identity theory" (Akerlof and Kranton, 2000), the self-image of daughters is different from that of sons, leading to differences in preference. The evidence provided in this study is not consistent with Fehr et al. (2008). Accordingly, social role and self-image appear to depend on the cultural and historical background of countries.

5. Conclusions

In the classical economics, an individual's preference is exogenously given and is not analyzed. However, to develop a new field, modern economists have attempted to analyze how an individual's preference is formed. The structure of families appears to play a critical role on the formation of an individual's preference during childhood. The seminal work of Fehr et al (2008) involved an experiment on Swiss children and they found that children without siblings are more likely to share resources voluntary and the youngest child is less likely to share them. Formation of preference possibly depends on the cultural and social background of a country where people grow up (Alesina et al., 2004). However, apart from the study by Fehr et al (2008), little is known regarding the effect of siblings and birth order on redistribution preference.

Therefore, based on individual data of the JGSS, the current study examined how the number of siblings and birth order are associated with the preference for redistribution in an attempt to test a hypothesis derived from the result of Fehr et al. (2008). After controlling for various individual characteristics, ordered probit estimations showed the following. (1) The first-born son is less likely to prefer income redistribution; however, such a tendency is not observed for the first-born daughter. (2) The number of younger siblings does not affect an individual's preference for redistribution. (3) The larger the number of elder brothers is, the more an individual is likely to prefer income redistribution. However, the number of elder sisters does not affect the preference. These findings are not in agreement with the evidence in a European country provided by Fehr et al (2008).

One of the reasons for the difference between findings of this study and that of Fehr et al. (2008) might be, at least in part, due to methodological differences. The current study used survey data, whereas Fehr et al. (2008) used data gathered from experiments. Apart from the difference in methodology, the cultural and social background were also different between studies, which caused a difference in value and, therefore, economic preference (e.g., Chang 2010; Eugster et al., 2011; Fehr and Hoff 2011; Luttmer. 2011). It is considered that the society of Japan is more harmonious than that in Western countries, and this plays an important role in forming the features of institutions in Japan

(Kawashima, 1963). Because of this assertion, Japanese people are thought to be more inclined to cooperate and avoid conflict. However, in contrast, Yamagishi (1988a, 1988b) suggested that Japanese people are more selfish than Americans. In line with this consideration, the findings of the current study suggest that brother's effect on preference for income redistribution can be explained by the standard economic theory, which assumes that individuals aim only to increase their own benefit. This argument is congruent to the assertion that social identity affects fundamental economic preferences (Benjamin et al., 2010; Klor and Shayo, 2010). However, sister has no influence on her sibling's preference formation, which cannot be explained by the standard economic theory. The difference of self-image between genders is thought to be important to interpret the results (Akerlof and Kranton 2000).

Because of the limitation of the survey data, estimation results of the current study appeared to suffer from various biases. Furthermore, the conditions of the present study and those in the study by Fehr et al. (2008) are different. Fehr et al. (2008) used children between 3-8 years old as subjects of the experiment to determine the process of formation of preference. On the other hand, respondents of JGSS data are between 20-89 years old. Therefore, the current study shed light on the preference regarded as the outcome of family structure, rather than the process of preference formation. For more detailed examination on comparing the preference of Japanese and European people, precisely planned experiments need to be conducted to control for various biases.

References

Akerlof, G.A., Kranton,R.E. 2000. Economics and identity. Quarterly Journal of Economics 115(3), 715-753.

Alesina, A.,Angeletos, G.M. 2005. Fairness and redistribution. American Economic Review 95 (4), 960-980.

Alesina, A., De Tella, R., MacCulloch, R. 2004. Inequality and happiness: are Europeans and Americans different? Journal of Public Economics 88, 2009-2042.

Alesina, A. Giuliano, P. 2009. Preferences for redistribution. NBER Working Papers 14825.

Alesina, A.,La Ferrara, E. 2005. Preferences for redistribution in the land of opportunities. Journal of Public Economics 89, 897-931.

Alger, I., Weibull, J.W. 2010. Kinship, incentives, and evolution. American Economic Review 100, 1725-1758.

Aristei, D., Perugini, C. 2010. Preferences for redistribution and inequality in well-being across Europe. Journal of Policy Modeling 32, 176-195.

Averett, S. L., Argys, L. M., Rees, D. I. 2011. Older siblings and adolescent risky behavior: Does parenting play a role? Journal of Population Economics 24(3), 957-978.

Becker, G. S., 1960. An economic analysis of fertility. In Demographic and Economic Change in Developed Countries. Universities-National Bureau Conference Series, No. 11. Princeton, N.J.: Princeton University Press.

Becker, G. S., Lewis, H. G. 1973. On the interaction between the quantity and quality of children. Journal of Political Economy 81(2), S279-S288.

Becker, G. S., Tomes,N. 1976. Child endowments and the quantity and quality of children. Journal of Political Economy 84(4), S143-S162.

Benjamin, D.J., Choi, J.J., Strckland, A.J. 2010. Social identity and preferences. American Economic Review 100, 1913-1928.

Berman, J., Taubman, P. 1986. Birth order schooling, and earnings. Journal of Labor Economics 4, 121-145.

Björklund, A., Ginther, D.K., Sundstöm, M. 2007. Family structure and child outcomes in the USA and Sweden. Journal of Population Economics 20,

183-201.

Black,S., Devereux, P.J., Salvanes,K.G. 2005. The more the merrier? The effect of family size and birth order on children's education. Quarterly Journal of Economics 120, 669-700.

Buckles, K.S., Mnunnich, E.L. 2012. "Birth spacing and sibling outcomes." *Journal of Human Resources* 47(3): 613-642.

Cáceres-Delpiano, J. 2006. The impact of family size on investment in child quality. Journal of Human Resources 41, 738-754.

Chamarbagwala, R. 2011. Sibling composition and selective gender-based survival bias. Journal of Population Economics 24 (3), 935-955.

Chang, W-C. 2010. Religion and preferences for redistributive policies in an East Asian country. Poverty & Public Policy, 2(4) article 5.

Cho, H. 2011. Birth order and education: evidence from a Korean cohort. Economics Letters 110, 200-202.

Corneo, G. and Grüner, H. P. 2002. Individual preferences for political distribution. Journal of Public Economics 83, 83-107.

Dammert, A. C. 2010. Siblings, child labor, and schooling in Nicaragua and Guatemala. Journal of Population Economics 23(1), 199-224.

Dayiogru, M., Kirdar, M.G., Tansel, A. 2009. Impact of sibship size, birth order and sex composition on school enrolment in Urban Turkey. Oxford Bulletin of Economics and Statistics 71(3), 399-426.

Derin-Güre, P, Uler, N. 2010. Charitable giving under inequality aversion. Economics Letters 107, 208-210.

Edmonds, E, V. 2006. Understanding sibling differences in child labor. Journal of Population Economics, 19 (4), 795-821.

Eugster, B., Lalive, R., Steinhauer, A., Zweimuller, J. 2011. The demand for social insurance: does culture matter? Economic Journal 121, F413-F448.

Fehr, E., Bernhard, H., Rockenbach, B. 2008. Egalitarianism in young children. Nature 454(28), 1079-1083.

Fehr, E., Hoff, K. 2011. Introduction: Tastes, castes and culture: The influence of society on preferences. Economic Journal 121, F396-F412.

Fehr, E., Naef, M., Schmidt,Klaus M. 2006. Inequality aversion, efficiency, and maximum preferences in simple distribution experiments: Comment. American Economic Review 96, 1912-1917.

Fehr, E., Schmidt,Klaus M. 1999. A theory of fairness, competition, and cooperation. Quarterly Journal of Economics 114(3), 817-868.

Fernandez, R., Fogli, A., and Olivetti, C. 2004. Mothersand sons: Preference formation and female labor force dynamics. Quarterly Journal of Economics 119(4), 1249–1299.

Garg, A., Morduch, J. 1998. Sibling rivalry and the gender gap: Evidence from child health outcomes in Ghana. Journal of Population Economics 11, 471-493.

Greene, W. (1997). Econometric Analysis (3 Eds.), London: Prentice-Hall.

Hanushek, E.A. 1992. The trade-off between child quantity and quality. Journal of Political Economy 100(1), 84-117.

Hayami, Y. 2001. Development economics: From poverty to the wealth of nations. (second edition). New York: Oxford University Press.

Kantrevic, J., Mechoulan, S. 2006. Birth order, educational attainment and earnings: an investigation using the PSID. Journal of Human Resources 41, 755-777.

Kawaguchi, D., Miyazaki,J. 2009. Working mothers and sons' preferences regarding female labor supply: direct evidence from stated preferences. Journal of Population Economics 22(1), 115-130.

Kawashima, T. 1963. "Dispute Resolution in Contemporary Japan," in A. von Mehren, ed. Law in Japan: The Legal Order in a Changing Society. Cambridge: Harvard Univ. Press.

Kessler, D. 1991, Birth order, family size, and achievement: family structure and wage determination. Journal of Labor Economics 9, 413-426.

Klor, E. F., Shayo, M., 2010. Social identity and preferences over redistribution. Journal of Public Economics 94, 269-278.

Lampi, E. Nordblom, K. 2010. Money and success-sibling and birth order effects on positional concerns, Journal of Economic Psychology 31, 131-142.

Lampi, E. Nordblom, K. 2012.Nature and nurture: the relation between number of siblings and earnings, Applied Economics Letters 19, 759-762.

Lee, J. 2008. Sibling size and investment in children's education: an asian instrument. Journal of Population Economics 21, 855-875.

Luttmer, E. 2005. Neighbors as negatives: relative earnings and well-being. Quarterly Journal of Economics 120 (3), 963-1002.

Luttmer, E. 2011.Culture, context, and the taste for redistribution. American Economic Journal: Economic Policy. 3 (1), 157-179.

Makepeace, G., Pal., S. 2008. Undestanding the effect of siblings on child mortality: evidence from India. Journal of Population Economics 21, 877-902.

Mazumder, B. 2008. Sibling similarity and economic inequality in the US. Journal of Population Economics 21, 685-701.

McBride, M. 2001. Relative-income effects on subjective well-being in the corss-section. Journal of Economic Behavior and Organization 45, 251-278.

Oettinger, G.S. 2000. Sibling similarity in high school graduate outcomes: causal interdependency or unobserved heterogeneity? Southern Economic Journal 66, 631-648.

Ohtake, F., Tomioka, J. 2004. Who supports redistribution? Japanese Economic Review 55(4), 333-354.

Price, J. 2008. "Parent-Child Quality Time: Does Birth Order Matter?" *Journal of Human Resources* 43(1): 240-265.

Rainer, H., S, T. 2008. Subjective income and employment expectations and preferences for redistribution. Economics Letters 99, 449-453.

Ravallion, M., Lokshin, M. 2000. Who wants to redistribute? The tunnel effect in 1990 Russia. Journal of Public Economics 76, 87-104.

Stutzer, A. 2004. The role of income aspirations in individual happiness. Journal of Economic Behavior & Organization. 54(1), 89-109.

Yamagishi, T. 1988a. The probision of sanctionning system in the United States and Japan. Social Psychology Quarterly 51(3), 265-271.

Yamagishi, T. 1988b. Exit from the group as an individualistic solution to the free rider problem in the United States and Japan. Journal of Experimental Social Psychology 24, 530-542.

Yamamura, E., 2012. Effect of social capital on income redistribution preferences: comparison of neighborhood externality between high- and low-income households. European Journal of Political Economy 28(4), 498–511.

.

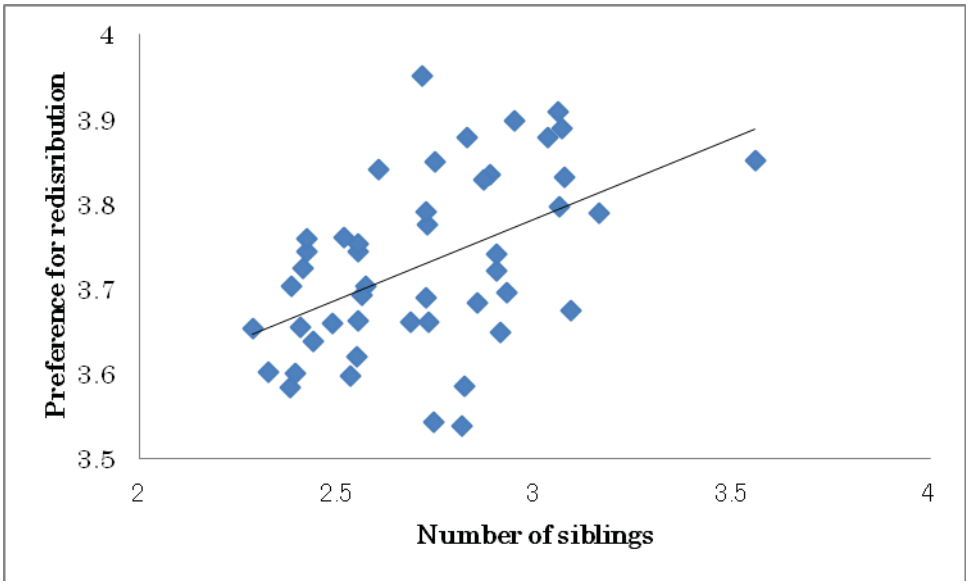


Figure 1. Relationship between the number of siblings and preference for income distribution.

Note: There are 47 points demonstrating the mean values of *EQUALITY* and *SIBLINGS* within a prefecture.

Table 1. Construction of the research sample

Year	Observations from the original sample	Observations used in the analysis
2000	2,893	1,911
2001	2,790	1,762
2002	2,953	1,913
2005	2,023	1,051
2006	4,254	1,252
2008	4,220	2,608
Total	27,793	10,497

Note: Observations were used in the analysis when all variables were available for the estimations. The number of siblings was not possible to obtain in 2003. Therefore, the sample of 2003 was not used in this study.

Table 2
Basic statistics and definition of variables used for estimations.

	Definitions	Mean	Standard deviation	Minimum	Maximum
EQUALITY	Degree of agreement with the argument that the government should reduce income inequality: 1 (strongly disagree) to 5 (strongly agree)	3.77	1.03	1	5
FIRST	The value is 1 if the respondent is the first-born child; otherwise it is 0.	0.74	----	0	1
FIRST BOY	The value is 1 if the respondent is male and the first-born child; otherwise it is 0.	0.36	----	0	1
FIRST GIRL	The value is 1 if the respondent is female and the first-born child; otherwise it is 0.	0.38	----	0	1
SIBLINGS	Number of siblings	2.74	2.01	0	15
ELDER SIBLINGS	Number of siblings older than the respondent	1.48	1.68	0	13
YOUNGER SIBLINGS	Number of siblings younger than the respondent	1.25	1.40	0	11
ELDER BROTHERS	Number of brothers older than the respondent	0.72	1.02	0	10
ELDER SISTERS	Number of sisters older than the respondent	0.75	1.06	0	9
YOUNGER BROTHERS	Number of brothers younger than the respondent	0.64	0.91	0	9
YOUNGER SISTERS	Number of sisters younger than the respondent.	0.61	0.90	0	9
CONDITION15	Question: “Considering when you were approximately 15 years old, what would you say regarding your family income compared with Japanese families in general?” 1 (well below average) to 5 (well above average)	2.70	0.93	1	5

INCOME	Individual household income (million yen)	629	421	0	2300
AGE	Age (years)	53.3	15.2	20	89
MARRIED	The value is 1 if the respondent is currently married; otherwise it is 0.	0.82	0.37	0	1
SCHOOLING	Years of schooling	12.2	2.5	6	18
UNEMPLOYED	The value is 1 if the respondent is currently unemployed; otherwise it is 0.	0.01	0.11	0	1
MALE	The value is 1 if the respondent is male; otherwise it is 0.	0.49	0.49	0	1

The total number of observations was 10,550. In this sample, all variables used in this study were obtained.

Table 3
Mean values for the first sibling and other siblings

	First siblings	*Others*	t-statistics
EQUALITY	3.68	3.76	-4.80***
CONDITION15	2.73	2.65	6.24***
CONDITION15 (excluding those who do not have siblings)	2.73	2.65	6.36***
INCOME	634	572	8.91***
SCHOOLING	12.4	11.6	23.0***
UNEMPLOYED	0.01	0.01	1.04

All observations were used. Absolute values of t-statistics are the results of a mean difference test between high- and low-income household groups. ***indicates significance at the 1% level.

Table 4 Baseline model where the dependent variable is *Equality* (ordered probit model)

	(1)	(2)	(3)	(4)	(5)	(6)
SIBLINGS	0.01**	0.01**	0.01***	0.01**	0.01**	0.01***
	(2.06)	(2.17)	(2.77)	(2.34)	(2.41)	(3.17)
CONDITION15	-0.06***	-0.06***	-0.07***			
	(-5.42)	(-5.70)	(-6.60)			
INCOME	-0.31*10^{3}***	-0.29*10^{3}***	-0.32*10^{3}***	-0.30*10^{3}***	-0.29*10^{3}***	-0.33*10^{3}***
	(-9.81)	(-9.31)	(-11.4)	(-9.58)	(-9.02)	(-11.5)
AGE	0.003***	0.003***	0.004***	0.003***	0.003***	0.005***
	(3.66)	(4.64)	(5.68)	(4.16)	(5.44)	(6.80)
MARRIED	0.01			0.03		
	(0.71)			(1.56)		
SCHOOLING	-0.02***	-0.02***		-0.02***	-0.02***	
	(-4.80)	(-4.32)		(-5.64)	(-5.09)	
UNEMPLOYED	0.26**	0.20**	0.21**	0.24**	0.19**	0.21*
	(2.29)	(2.04)	(2.24)	(2.14)	(1.97)	(2.20)
MALE	0.06***	0.05**	0.04*	0.07***	0.06***	0.04**
	(2.80)	(2.48)	(1.86)	(2.88)	(2.60)	(1.99)
Dummies to represent prefecture at 15 years old	Yes	Yes	Yes	No	No	No
Log pseudolikelihood	-13901	-14754	-14810	-14184	-15039	-15116
Observations	10497	11096	11136	10676	11281	11322

Values are coefficients. Numbers in parentheses are z-statistics calculated using robust standard errors clustered in the prefecture. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. In all estimations, prefecture dummies, size of residential place dummies, and year dummies were included as independent variables, but were not reported because of space limitations.

Table 5 Dependent variable is *Equality* (ordered probit model): examination of the first sibling effect.

	(1)	(2)	(3)	(4)	(5)	(6)
SIBLINGS	0.008	0.008	0.01**	0.008	0.009	0.01**
	(1.18)	(1.35)	(2.04)	(1.30)	(1.46)	(2.32)
FIRST	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
	(-1.40)	(-1.30)	(-1.32)	(-1.48)	(-1.41)	(-1.43)
Dummies to represent prefecture at 15 years old	Yes	Yes	Yes	No	No	No
Log pseudolikelihood	-13900	-14744	-14809	-14183	-15038	-15114
Observations	10497	11096	11136	10676	11281	11322

Values are coefficients. Numbers in parentheses are z-statistics calculated using robust standard errors clustered in the prefecture. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Each column includes a set of independent variables, which are the same as those of the corresponding column of Table 4. Further, in all estimations, prefecture dummies, size of residential place dummies, and year dummies were included as independent variables. These independent variables were not reported because of space limitations.

Table 6 Dependent variable is *Equality* (ordered probit model): examination of the effect of sex of the first sibling.

	(1)	(2)	(3)	(4)	(5)	(6)
SIBLINGS	0.008	0.008	0.01**	0.008	0.009	0.01**
	(1.17)	(1.34)	(2.02)	(1.30)	(1.46)	(2.31)
FIRST BOY	-0.08***	-0.08**	-0.08**	-0.08***	-0.08***	-0.09***
	(-2.61)	(-2.47)	(-2.52)	(-2.72)	(-2.70)	(-2.75)
FIRST GIRL	-0.003	0.001	0.002	-0.0005	0.004	0.004
	(-0.07)	(0.04)	(0.07)	(-0.01)	(0.12)	(0.12)
Dummies to represent prefecture at 15 years old	Yes	Yes	Yes	No	No	No
Log pseudolikelihood	-13899	-14743	-14807	-14181	-15035	-15112
Observations	10497	11096	11136	10676	11281	11322

Values are coefficients. Numbers in parentheses are z-statistics calculated using robust standard errors clustered in the prefecture. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Each column includes a set of independent variables, which are the same as those of the corresponding column of Table 4. Further, in all estimations, prefecture dummies, size of residential place dummies, and year dummies were included as independent variables. These independent variables were not reported because of space limitations.

Table 7 (a) Dependent variable is *Equality* (ordered probit model): examination of the presence of elder and younger siblings.

	(1)	(2)	(3)	(4)	(5)	(6)
ELDER SIBLINGS	0.01**	0.01**	0.02***	0.01***	0.01***	0.02***
	(2.41)	(2.44)	(2.83)	(2.63)	(2.61)	(3.13)
YOUNGER SIBLINGS	0.003	0.004	0.008	0.005	0.005	0.009
	(0.40)	(0.47)	(0.95)	(0.61)	(0.64)	(1.22)
Dummies to represent prefecture at 15 years old	Yes	Yes	Yes	No	No	No
Log pseudolikelihood	-13900	-14744	-14808	-14183	-15038	-15114
Observations	10497	11096	11136	10676	11281	11322

Values are coefficients. Numbers in parentheses are z-statistics calculated using robust standard errors clustered in the prefecture. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Each column includes a set of independent variables, which are the same as those of the corresponding column of Table 4. Further, in all estimations, prefecture dummies, size of residential place dummies, and year dummies were included as independent variables. These independent variables were not reported because of space limitations.

Table 7 (b) Dependent variable is *Equality (*ordered probit model): examination of the presence of elder and younger siblings (male sample).

	(1)	(2)	(3)	(4)	(5)	(6)
ELDER SIBLINGS	0.02**	0.02**	0.02***	0.02***	0.02**	0.02***
	(2.33)	(2.18)	(2.61)	(2.75)	(2.57)	(3.18)
YOUNGER SIBLINGS	0.006	0.009	0.01	0.007	0.009	0.01
	(0.49)	(0.72)	(1.16)	(0.57)	(0.74)	(1.29)
Dummies to represent prefecture at 15 years old	Yes	Yes	Yes	No	No	No
Log pseudolikelihood	-6966	-7480	-7516	-7135	-7652	-7693
Observations	5152	5506	5524	5244	5601	5620

Values are coefficients. Numbers in parentheses are z-statistics calculated using robust standard errors clustered in the prefecture. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Each column includes a set of independent variables which are the same as those of the corresponding column of Table 4. Further, in all estimations, prefecture dummies, size of residential place dummies, and year dummies were included as independent variables. These independent variables were not reported because of space limitations.

Table 7 (c) Dependent variable is *Equality* (ordered probit model): examination about presence of elder and younger siblings (female sample).

	(1)	(2)	(3)	(4)	(5)	(6)
ELDER SIBLINGS	0.01	0.01	0.01	0.01	0.01	0.01*
	(1.39)	(1.39)	(1.58)	(1.39)	(1.41)	(1.67)
YOUNGER SIBLINGS	-0.005	-0.007	-0.004	-0.001	-0.004	-0.002
	(-0.49)	(-0.75)	(-0.49)	(-0.17)	(-0.48)	(-0.25)
Dummies to represent prefecture at 15 years old	Yes	Yes	Yes	No	No	No
Log pseudolikelihood	-6810	-7135	-7164	-6944	-7273	-7309
Observations	5345	5590	5611	5432	5680	5702

Values are coefficients. Numbers in parentheses are z-statistics calculated using robust standard errors clustered in the prefecture. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Each column includes a set of independent variables, which are the same as those of the corresponding column of Table 4. Further, in all estimations, prefecture dummies, size of residential place dummies, and year dummies were included as independent variables. These independent variables were not reported because of space limitations.

Table 8. Dependent variable is *Equality* (ordered probit model): examination of the presence of elder and younger siblings and their number.

	(1)	(2)	(3)	(4)	(5)	(6)
ELDER BROTHERS	0.03***	0.03***	0.03***	0.03***	0.03***	0.03***
	(2.84)	(3.04)	(3.31)	(2.90)	(3.05)	(3.41)
ELDER SISTERS	0.005	0.006	0.01	0.006	0.006	0.01
	(0.64)	(0.72)	(1.18)	(0.74)	(0.80)	(1.38)
YOUNGER BROTHERS	0.01	0.01	0.01	0.01	0.01	0.02
	(0.78)	(0.98)	(1.28)	(1.14)	(1.30)	(1.61)
YOUNGER SISTERS	-0.004	-0.005	-0.001	-0.006	-0.007	-0.002
	(-0.40)	(-0.54)	(-0.16)	(-0.62)	(-0.79)	(-0.27)
Dummies to represent prefecture at 15 years old	Yes	Yes	Yes	No	No	No
Log pseudolikelihood	-13898	-14742	-14807	-14181	-15035	-15112
Observations	10497	11096	11136	10676	11281	11322

Values are coefficients. Numbers in parentheses are z-statistics calculated using robust standard errors clustered in the prefecture. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Each column includes a set of independent variables, which are the same as those of the corresponding column of Table 4. Further, in all estimations, prefecture dummies, size of residential place dummies, and year dummies were included as independent variables. These independent variables were not reported because of space limitations.