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【Abstract】
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Birth Order, Gender, and the Parental Investment Gap among Children[1]

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Abstract

Using panel data from the Japanese *Longitudinal Survey of Newborns in the 21st Century*, the purpose of this paper is to examine whether birth order and gender causally matter when parents make financial investments in their children. This paper focuses on the actual investment in the children in the form of financial resources. It is found that in Japan, parents spend more money on: their first born child; their male children when they are young; and their female children when they are old. In contrast, parents spending on educational related activities outside regular schools is higher for boys, but there is no difference between first born and later born children. Spending on extra-curricular activities is higher for girls and for first born children. Interestingly, girls receive more pocket money than boys, whereas a first born child receives less pocket money compared to a higher order child of the same age.

Keywords: birth order; gender; parental investment on child; random effect instrumental variable method.

JEL classification codes: J08, J13, J22

Research Highlights

- We estimate the causal relationship between birth order and gender, and parental investments in their children.
- Japanese parents spend more money on their first born children.
- Japanese parents spend more on extra-curricular activites for girls.
- Japanese parents spend more on extra-educational activities for boys.
- Daughters receive more pocket money, whereas the first born receives less.

Declarations

The authors declare they do not have any actual or potential conflict of interest in relation to this research. No ethic approval was required for this study.

1. Introduction

The purpose of this paper is to examine how birth order and gender causally matter for parental financial investments (total expenditure and some of its components including pocket money) in their children in Japan. Parent's investments in their children are crucial for their children's development and the future outcomes of their children. Parents must make various choices about their investment in their children given their intertemporal budget constraint and their current budget constraint if they face liquidity constraints. A number of studies suggest that parents make different distributions of their resources across siblings (for example, Price (2008)). As theory suggests a trade-off between child quality and quantity, a larger family size can potentially reduce parental resources, and have negative effects on child outcomes. Much of the existing research concentrates on identifying pure birth order effects after taking account of family size effects. For instance, by using twin births as an instrument for family size, Black et al. (2005) examine the effect of family size and birth order on the educational attainment of children, and find that birth order has a significant and negative effect on children's education. They also find that there is strong evidence for birth order effects for adult earnings, employment and teenage childbearing, especially for women. Heiland (2009) examines birth order and early scholastic ability (verbal ability), and presents empirical evidence suggesting that verbal ability of the first born is higher than middle of the birth order children.

Overall, most studies indicate that there are *positive* birth order effects even after controlling for family size effects, that is, a first born child performs better (see Bjorklun and Salvanes 2011). However, due to data availability, most of the previous studies examine the outcomes for children such as educational attainment, academic achievement, and health status rather than the actual investments in the children. Studies that examine "outputs" are unable to directly answer the question of whether or not parents in fact change the levels of their inputs, that is, their investment in children, based on their children's birth order and gender.

When research has been conducted on parental investments in their children, it has typically focused on how much time parents spend with their children. Using the *American Time Use Survey*, Price (2008) provides evidence that a first born child receives 20 minutes more parental time than a second born child of the same age in a similar family. Sakata et al. (2018) provides evidence that Japanese parents also spend more time with their first born child. Research on the effects of

birth order on the levels of financial inputs for example, expenditure on children and pocket money is quite rare. In the case of expenditure, one of the key problems is obtaining expenditure spending on each child rather than the total expenditure on all children lumped together. For example, using data from the *US Consumer Expenditure Survey*, Kornrich and Furstenberg (2013) first identify categories of expenditure that are child related, and then analyse the factors that determine the spending on all children. In contrast, the survey data used in this paper contains a parental estimate of their overall expenditure on *the* child that is the subject of the survey, as well as expenditures on extra-educational activities, extra-curricular activities, and pocket money for the child in question. These expenditures will enable us to estimate the impact of gender and birth order effects for these four expenditure variables.

Gender may matter because parents have gender preferences in relation to children and they may differ across the parents, or there may be something more fundamental differences. There is recent evidence for the United States that suggests young boys (boys aged 5 or less) face "unique risks as a result of neurobiological and environmental factors" (Golding and Fitzgerald 2017, p. 5; McKinney et al. 2017). Garcia et al. (2017) suggest that boys in the United States benefit from high level childcare whereas girls do not. Both these factors may lead to parents altering their investments in their children based on gender. Many previous studies for countries other than Japan also show that fathers spend more time with and are more involved with sons than daughters (Harris and Morgan 1991; Lundberg et al 2007; Mammen 2011; Yeung et al. 2001). In contrast, Japanese fathers spread their time evenly between their sons and daughters (Sakata et al. (2018)). However, previous studies in Japan suggest that recently, there exist either mixed preference or daughter preference (Kureishi and Wakabayashi 2011; Fuse 2013). According to National Institute of Population and Social Security Research (2011, Table 3-5), 68.7 percent of married couples prefer a daughter if they could have only one child. This may be reflected in different patterns of investments by Japanese parents.

The recent economics literature on pocket money focuses on how it might affect: a child's performance at school (Barnet-Verzat and Wolff 2008); the child's supply of labour (Wolff 2006); and teaching a child to save (Brown and Taylor 2016), rather than what determines the amount of pocket money. The annual Halifax (2016) pocket money survey conducted for children in the UK provides evidence that a gender 'pay gap' exists even for child pocket

money in that sons receive an average of £6.93 per week in pocket money, almost 12 per cent higher than the average £6.16 parents given to daughters. The Halifax (2016) survey is not concerned with birth order effects. The Financial Central Committee (2016) reports details of a Bank of Japan survey of pocket money, but it contains no information related to gender or birth order. Here, we analyse the determinants of the amount of pocket money focusing on both birth order and gender.

Using panel data from the *Longitudinal Survey of Newborns in the 21st Century (21 seiki shusshoji judan chosa*) that is collected by the Japanese Ministry of Health, Labour and Welfare, this paper examines whether birth order and gender matter for parental financial investments in their children. In order to account for the endogeneity of family size, we estimate models for parental investment in their children using a random effect instrumental variable estimator. A key finding is that in the allocation of financial resources within the family, it is not always the case that boys are favored. It is found that in Japan, parents spend more money in total on their first born child and female children. In contrast, parents' spending on extra-educational is higher for boys, but there is no difference between the first born and later born children. Spending on extra-curricular activities is higher for girls and for the first born child. Although we cannot know whether the gender differences in parental investments come from the supply side (parents make a conscious choice in gender-specific investment in their children because of their gender preferences) or the demand side (boys and girls prefer different activities), we observe gender-specific human capital formation resulting from parental investments at early stages in their children's development. This may partly explain why men and women differ in the types of courses they take at college, and the type of occupation or industry they work in. Put simply, this paper suggests that siblings are unlikely to receive equal shares of parental investment, that is, we observe a parental investment gap among their children relating to both gender and birth order. Interestingly, girls receive more pocket money than boys, whereas the first born child receives less compared to a later born child at the same age. Some evidence is presented to suggest that part of the first child effect may be attributed to the impact of gender-specific hand-me-downs.

The rest of this paper is organized as follows. Section 2 provides details of model used to analyse the determinants of parent's investments in their children, while the data used in this paper are discussed in Section 3. Section 4 discusses the

empirical results, and Section 5 contains the conclusions of the paper.

2. Model

Following previous studies such as Black et al. (2005), the following model for parental investment in a child will be estimated.

$$logy_{it} = \beta_0 + \beta_1 1st\ child_i + \beta_2 Boy_i + \beta_3 No\ of\ siblings_{it} + \gamma X_{it} + w_i + u_{it} \quad (1)$$

where y_{it} refers to the investment by parents in the *i*'th household at time t in the child that is the subject of the survey. There are four investment outcomes analysed in this paper: the total expenditure on the child surveyed; the expenditure on extra-curricular activities of the child surveyed; the expenditure on the extra-educational activities of the child surveyed; and the pocket money given to the child surveyed. Turning to the explanatory variables in equation (1), $1st\ child_i$ is a 0-1 dummy variable which takes the value 1 if the child is the first born[3], Boy_i is a 0-1 dummy variable which takes the value 1 if the child is a boy; $No\ of\ siblings_{it}$ is the number of siblings of child *i* at time *t*, *X* contains the following control variables: the log of the household's income; the mother's age; a 0-1 dummy variable taking the value 1 if the mother has a university or higher degree; the father's age; a 0-1 dummy variable taking the value 1 if the father has a university or higher degree; a 0-1 dummy variables which takes the value 1 if the child co-resides with at least one grandparent; the job-offers-seekers ratio for the prefecture where the child resides in time *t*; city size dummies; and year dummies; w_i is an individual-specific random effect which is assumed to be uncorrelated with the explanatory variables in equation (1), and u_{it} is a standard disturbance term. Since the children observed in the data used here are born either in January or July, we also include as a control variable a 0-1 dummy variable which takes the value of 1 if the child is born in July. Since all the children surveyed are born in the same year, the year dummies essentially control for the age of the children. The key coefficients of interest in equation (1) are β_1 and β_2, which measure the effect of birth order of the child in question and impact of the child's gender on the parent's allocation of their financial resources, respectively.

One of the hurdles in estimating the effects of birth order is that birth order is related to family size. Children who are born

[3] Since this is one of the key variables of interest and it is not time dependent, we do not consider a fixed effects approach.

later are more likely to be in a bigger family as opposed to first born children. Thus, children who are born later may receive reduced amount of resources due to family size rather than birth order per se. As a result, it is essential to control for the endogeneity of $nosib_{it}$. We follow previous studies, for example, Angrist and Evans (1998), Black et al. (2005), and Angrist and Pischke (2009), and use twins at the second birth as an instrument for family size[4], so our model for the number of sibling is:

$$No\ of\ siblings_{it} = \alpha_0 + \alpha_1 2nd\_twin_{it} + \alpha_2 1st\ child_i + \alpha_3 Boy_i + \delta X_{it} + x_i + v_{it} \quad (2)$$

where $2nd\_twin_{it}$ is a 0-1 dummy variable which takes the value 1 if the second born child (and the third child) is a twin, x_i is an individual-specific random effect which is assumed to be uncorrelated with the explanatory variables in equation (2), and v_{it} is a standard disturbance term.

When family size is assumed to be exogenously determined, equation (1) is estimated using a random effects (RE) estimator (see Baltagi (2008, pp. 17-21)), and when we take into account the potential endogeneity of family size, equations (1) and (2) are estimated using a random effects instrumental variable (REIV) estimator which is also known as the error component two stage least squares estimator (see Baltagi (2008, p. 122)).

3. Data

The data used in this paper are taken from the *Longitudinal Survey of Newborns in the 21st Century*, which is the first longitudinal survey conducted by the Japanese Ministry of Health, Labour, and Welfare.[5] This survey is a mail-in

[4] As an alternative/additional instrument for family size, Angrist et al. (2010) and de Haan (2010) use variables related to the sex composition of the children. We do not use this type of instrument since the gender of the child under investigation appears as an explanatory variable in our equation of interest.

[5] The questionnaires for the first 15 waves of the survey are available in Japanese at the following URL: http://www.mhlw.go.jp/toukei/chousahyo/index.html#00450043 (Accessed 28 August 2017).

The Japanese Ministry of Health, Labour and Welfare has provided some information in English relating to simple analyses of the data contained in the first fourteen waves at the following URL:

http://www.mhlw.go.jp/english/database/db-hw/vs03.html (Accessed 28 August 2017).

longitudinal census survey which has tracked all newborn babies born in Japan in the periods of 10-17 January 2001, and 10-17 July 2001 which we refer to as January babies and July babies, respectively. These new born babies were sampled from the *Live Birth Form of Vital Statistics (Jinko dotai chosa shusseihyo)*. The first survey which we refer to as the '2001 survey' was conducted when the babies were 6 month old, namely, on 1 August 2001 for January babies and on 1 February 2002 for July babies. The number of questionnaires delivered and responses received for the 2001 survey are 26,620 and 23,423 for January babies (a response rate 88.0%), and 26,955 and 23,592 for July babies (a response rate of 87.5%), respectively. With the exception of 2007, this survey has been conducted every year since 2001. For the 2002 to 2006 surveys, the annual survey months continued to be August for January births and February for July babies. Since the 2008 survey, the annual survey months for January babies and July babies have been January and July, respectively. We currently have access to each and every wave up to the 13th wave which relates to 2014.

One of the advantages of using the *Longitudinal Survey of Newborns in the 21st Century* is that it asks respondents (and his or spouse) about the amount of money spent on *the* child that is the subject of the survey rather than the total amount of expenditure on all children in the family. Since the survey asks directly about the expenditure and certain categories of expenditure for the child surveyed, we can avoid measurement error issues stemming from estimating them from the total amount of spending spent on the children in the family. As stated in Section 2, the outcome variables used in y_{it} are the total expenditure on the child surveyed, the expenditure on extra-curricular activities of the child surveyed, the expenditure on the extra-educational activities of the child surveyed, and the pocket money given to the child[6]. Information on the parent's total expenditure on the child surveyed is available in each of the 13 waves. The survey asks the respondent how much they spend on the child surveyed in a particular month where the expenditure includes food such as artificial baby milk, diapers, clothing, childcare, books and toys. The extra-educational activities are educational related activities outside regular schools, for example, cram schools, private tutoring, and correspondence/online courses. Extra-curricular activities

Sakata et al. (2015) provide a summary of this survey in Japanese. Nozaki ((2017) contains a recent analyses using this data.

[6] Since there are zero observations for expenditure on a child and for a child's pocket money, we added one to each observation before taking logs.

include gymnastics, swimming, baseball/softball, soccer, tennis, kendo, judo, ballet, dance, English conversation, abacus, calligraphy, music lessons, handicraft, flower arranging (ikebana), and the tea ceremony. Information on these two categories are available for waves 8 to 12. The information on the amount of pocket money for the child surveyed is available for 2013 (wave 12) and 2014 (wave 13). The 2013 survey asks parents how much pocket money they give to the child on average per month, while the 2014 survey asks the same question to the child. It should be noted that information on the annual labour income for mothers and fathers and their other income, which is used to calculate the household income, is only available for waves 2, 4, 5, 7, 10, 12, and 13, and relates to the year prior to the year of the survey, so that for wave 13 which was collected in 2014, the income data relates to 2013.

The job-offers-seekers ratio for the prefecture is taken from Ministry of Health, Labour and Welfare's *Employment Referrals for General Workers*. The exact definitions of all variables used in the analysis are contained in Appendix 1.

Our sample selection rules are as follows: We confined the sample to those households which have 2 or 3 children, and exclude the families in the sample who have any pair of consecutive children with more than 6 years between their birth years. Since household income is included in every equation, we only can use data from the waves where income is available. The top 1% of values for total expenditure, expenditure on extra-educational activities, and expenditure on extra-curricular activities are excluded from the sample. Finally, restricting the sample to those who answer the questions providing necessary information reduces the final samples to 149,311 for the expenditure analysis, 32,427 for the analysis of the expenditure on extra-curricular activities, 32,657 for the analysis of expenditure on extra-educational activities, and 29,117 for pocket money analysis. Table I displays some descriptive statistics for the key variables used in the regression analysis in section 4.

[Table I around here]

Table II provides some simple evidence on how the four types of expenditure change as birth order changes when no sample selection rules are applied and the control variables are not taken into consideration. For total expenditure, expenditure on

extra-curricular activities and expenditure on extra-educational activities, the average spending falls as birth order increases. In contrast, the average amount of pocket money increases as birth order increases. As will be seen in section 4, even when account is taken of the control variables in equation (1) and the endogeneity of family size, these findings are by and large maintained.

[Table II around here]

Table III provides some simple evidence on the gender differences for the four types of expenditure. For total expenditure, expenditure on extra-curricular activities and pocket money, the average spending is higher for girls, whereas the average spending on extra-educational activities is higher for boys. As will be seen in section 4, even when account is taken of the control variables in equation (1), these findings are maintained.

[Table III around here]

4. Estimated Results and Discussion

All regression results reported in this section are estimated using STATA version 14 (StataCorp 2014). Table IV presents the results of estimating equation (1) for the log of parental expenditure on the child surveyed using all the data (equations (IV-1) and (IV-2)), and using the data for prior to 2007 (equations (IV-3) and (IV-4)) and after 2007 (equations (IV-5) and (IV-6)). Using all the data, the estimated results for RE and REIV (equations (IV-1) and (IV-2)) both show that the estimated coefficients for the first child dummy are positive and statistically significant. The estimated coefficient for first child dummy obtained using the REIV estimator suggests that Japanese parents spend 7.6% points more on their first born than on their second or third born child when they are of the same age. When all the data is used, the boy dummy variable is also statistically significant in both the RE and REIV estimates. Interestingly, the signs of its estimated coefficients are negative, which means that daughters receive more financial inputs from their parents than sons do. To be precise, based

on the REIV estimates, parental expenditure on daughters is 1.9% points higher than the expenditure for sons. The row labelled "2nd_twin (First Stage)" at the bottom of Table IV reports the estimated coefficients of 2nd_twin and its standard error in the first stage REIV estimates, namely, the estimates of equation (2), and indicates that this instrument is significant in explaining family size.

When all the data is used the sample period spans the period 2002 until 2014, so it is worth splitting the data to see if there is any structural change in the relationship. We split the sample into observations before the children have started primary school (before 2007), and after the children have started primary school (after 2007), and estimate equation (1) separately using data before and after 2007, respectively. While no change is observed in the sign of the estimated coefficient of the 1st child dummy and its significance, it is important to note that prior to 2007, that is, for younger children, spending is higher for boys. After 2007, total spending is significantly higher for girls.

[Table IV around here]

Tables V reports the results of analyses of the three components of expenditure that are available, expenditure on extra-curricular activities (equations (V-1) and (5-2)), expenditure on extra-educational activities (equations (V-3) and (5-4)), and pocket money (equations (V-5) and (5-6)), respectively. There are some interesting differences both with respect to gender and birth order effects. For first born children, spending on extra-curricular activities is significantly higher than for later born children, but that is not true for extra-educational activities. According to the REIV results in Tables V, parents spend 11% more on extra-curricular activities for their first born children than for later children. In contrast, later born children receive more pocket money than a first born child when they are identical ages. Using the REIV results suggests first children receive 5.9% less pocket money. One interpretation of this outcome is that the amount of pocket money the first born sibling receives rises with their age, and then parents may want to equalize the pocket money among children and try to give higher order children a similar amount of pocket money to first born children. An alternative interpretation is that higher order children negotiate the amount of their pocket money with their parents when they have elder siblings, using

the amount paid to the elder sibling as their initial request. A third interpretation is that first born children are more likely to have more siblings, so they appear to receive less pocket money compared to higher order children at the same age.

Examining the gender effects in Tables V, we observe that parents spend significantly more on extra-curricular activities for girls, while they spend significantly more on extra-educational activities for boys. In fact, according to the REIV estimates, spending on girls is 18.1% higher and 7.8% lower for extra-curricular and extra-educational activities, respectively. It is possible that these educational related spending patterns are related to the significant gender gap for wages in favor of men in Japan (see, for example, Abe (2010) and Chiang and Ohtake (2014)). Parents may decide to invest less in girls in the knowledge that the return to that investment will be lower, or the decisions by parents to spend less on girls may itself be the cause of the gender gap[7]. According to Table V, girls also receive more pocket money too, 3.2% more according to the REIV estimates. This contrasts with the findings for the United Kingdom reported in the Halifax (2016) pocket money survey which suggests that British boys receive more pocket money than girls. Although there is a significant gender gap for wages in favor of men in Japan, this is not the case for pocket money.

[Table V around here]

There are several potential reasons for why parents spend more on their first born child. The first relates to learning by doing. For their second and subsequent children, parents have some experience with raising children and so may engage in less spending. The second relates to different parental preferences between their first child and later children. Alternatively,

[7] There is some conflicting evidence relating to the desires of Japanese parents in relation to educating male and female children. The Japanese responses in Wave 6 of the *World Values Survey* in answer to the statement "A university education is more important for a boy than a girl" (question v52) suggest that only 16% agree with the statement, and the majority of Japanese disagree with it. (Accessed 10 February 2018. Available from URL: http://www.worldvaluessurvey.org/WVSOnline.jsp). National Institute of Population and Social Security Research (2017, Table III-1-12) reports that there is at least a 10 percentage point difference in the proportion of couples who want a son to get at least a university education compared to a daughter.

the effect of hand-me-downs from the first to subsequent children may reduce expenditure for second and later children. In order to investigate this last possibility a little further, it is useful to distinguish gender-specific durable goods, for example, clothes, and gender-irrelevant goods, for example, prams. In order to pick up the possible impact of the former type of hand-me-downs, we investigated whether there were differences in expenditure between households where the first two children are of the same gender and when they are of different genders. In the models for the four categories of expenditure, we added a same sex sibling dummy, that is, a 0-1 dummy variable that takes the value 1 if the first two children have the same sex, and also this dummy interacted with the first child dummy. The results for the key variables are presented in Table VI. For total expenditure, expenditure on extra-curricular activities and expenditure on extra-educational activities, it is found that compared to households with children of different gender, expenditure on a child in a family with children of the same gender tends to be lower, but the first child in this household still receives higher expenditure. These findings are consistent with gender-specific hand-me-downs. However, it is worth pointing out that even after taking account of this effect, the first child still receives more resources, so gender-specific hand-me-downs cannot explain all of the first born effect. We do not expect gender-specific hand-me-down effects for pocket money, and the results in Table VI support this expectation.

[Table VI around here]

5. Concluding Remarks

This paper has examined the effects of birth order and gender on parental investment in children using the *Longitudinal Survey of Newborns in the 21st Century*. Unlike previous studies which mainly examine the effects of birth order on the outcomes of children such as educational attainment, academic achievement and health status, this paper rather focuses on the *actual* investments in children, namely total expenditure, and three components of expenditure for the child surveyed. In doing so, we provide a clearer picture of the channel between the birth order of the child and their later outcomes. Using twin births as an instrument, we take account of the endogeneity of family size by estimating random effect instrumental

variable estimator. Our findings suggest that in Japan gender effects and first born effects are not the same across all types of expenditure. For total expenditure we find that the gender effects depend on the age of the child. The finding of significant gender effects for these four expenditure groups also implies that a gender related dummy cannot be used as an instrument for family size in these cases. Due to data limitations, the exact cause of the gender-specific parental investments is not clear (whether it comes from the preferences of parents or the child), but our findings suggest that in a rather early stage of their life, children receive different kinds of human capital investments according to their gender. This may partly explain why men and women make different choices regarding human capital formation later in their lives.

Compliance with Ethical Standards:

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Conflict of Interest:

The authors declare that they have no conflict of interest.

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Appendix 1: Definitions of Variables

Variable Name	**Definition**
Expenditure	Total expenditure on the child in question (1000 yen)
log of expenditure	log(Expenditure)
Expenditure on extra-curricular activities	Expenditure on extra-curricular and sporting activities, where these activities include gymnastics, swimming, baseball/softball, soccer, tennis, kendo, judo, ballet, dance, English conversation, abacus, calligraphy, music lessons (piano, etc.), handicraft, flower arranging (ikebana), and the tea ceremony. (1000 yen)
log of expenditure on extra-curricular activities	log(Expenditure on extra-curricular activities+1)
Expenditure on extra-educational activities	Expenditure on extra-educational activities where these are educational related activities outside regular schools, for example, cram schools, private tutoring, and correspondence/online courses. (1000 yen)
log of expenditure on extra-educational activities	log(Expenditure on extra-educational activities+1)
Pocket Money	Pocket money given to the child. (yen)
log of pocket money	log(Pocket Money+1)
1st child	0-1 dummy variable taking the value of unity if the child surveyed was the first born child, and 0 otherwise
Boy	0-1 dummy variable taking the value of unity if the child was a boy, and 0 otherwise.
No of siblings	Number of brothers and sisters of the child surveyed.
Household income	Sum of father's and mother's labour income and other income for the previous year. (10,000 yen)
Log of household income	log(Household income+1)
Mother's age	Age of the mother (years)
Mother's university degree	0-1 dummy variable taking the value of unity if the mother has a university or higher degree, and 0 otherwise.
Father's age	Age of the father. (years)
Father's university degree	0-1 dummy variable taking the value of unity if the father has a university or higher degree, and 0 otherwise.
Coresidence with a grandparent	0-1 dummy variable taking the value of unity if there is at least one grand parent co-residing with the child, and 0 otherwise.
Vacancy rate	Job offers seekers ratio for the prefecture where the child lives.
July dummy	0-1 dummy variable taking the value of unity if the child was born in July, and 0 otherwise.
2nd child is twin	0-1 dummy variable taking the value of unity if the second born (and third born) child was a twin, and 0 otherwise.
City size1	0-1 dummy variable taking the value of unity if the child lives in one of the 13 largest cities, and 0 otherwise.
City size2	0-1 dummy variable taking the value of unity if the child lives in a city other than the 13 largest cities, and 0 otherwise.
City size3	0-1 dummy variable taking the value of unity if the child lives in a rural area, and 0 otherwise.
Same sex siblings	0-1 dummy variable taking the value of unity if all the children have the same sex, and zero otherwise. (Only defined for two children families).

Table I: Descriptive Statistics

Variable	Sample size	Mean	Std. Dev.	Min	Max
Expenditure on child (1000 Japanese yen)	149,311	35.755	25.853	1	213
Log of expenditure	149,311	3.360	0.663	0	5.361
Expenditure on extra-curricular activities (1000 Japanese yen)	32,427	10.164	7.164	0	47
Log of expenditure on extra-curricular activities	32,427	2.216	0.647	0	3.871
Expenditure on extra-educational activities (1000 Japanese yen)	32,657	14.363	13.040	0	84
Log of expenditure on extra-educational activities	32,657	2.458	0.718	0	4.443
Pocket money (Japanese yen)	29,117	1242.534	786.905	0	4800
Log of pocket money	29,117	6.933	0.669	0	8.477
1st child	149,311	0.381	0.486	0	1
Boy	149,311	0.523	0.499	0	1
No of siblings	149,311	1.269	0.444	1	2
Household income (10,000 Japanese yen)	149,311	643.924	508.562	0	73000
Log of household income	149,311	6.343	0.531	0	11.198
Mother's age	149,311	36.615	5.953	17.250	61.167
Mother's university degree	149,311	0.153	0.360	0.000	1.000
Father's age	149,311	38.660	6.632	17.833	76.583
Father's university degree	149,311	0.395	0.489	0	1
Co-residence with a grandparent	149,311	0.229	0.420	0	1
Vacancy rate	149,311	0.849	0.296	0.26	1.67
July dummy	149,311	0.505	0.500	0	1
City size1 (13 biggest cities=1)	149,311	0.226	0.418	0	1
City size2 (other cities=1)	149,311	0.640	0.480	0	1
City size3 (rural area=1)	149,311	0.134	0.340	0	1
year2001	149,311	0.096	0.294	0	1
year2002	149,311	0.100	0.300	0	1
year2004	149,311	0.139	0.346	0	1
year2005	149,311	0.152	0.359	0	1
year2008	149,311	0.117	0.322	0	1
year2011	149,311	0.137	0.344	0	1
year2013	149,311	0.130	0.337	0	1
year2014	149,311	0.129	0.335	0	1
2nd child is twin	149,311	0.009	0.093	0	1
Same sex siblings * 1st child	108,589	0.211	0.408	0	1
Same sex siblings	108,589	0.488	0.500	0	1

Notes:

(1) The top 1% of values for total expenditure, expenditure on extra-curricular activities, and expenditure on extra-educational activities are excluded from the sample. Values of total expenditure that were zero are also excluded.

(2) Since there are some zero values for expenditure on extra-curricular activities, expenditure on extra-educational activities, pocket money and household income, one was added to every observation before the logs of these variables were computed.

(3) $US1=110 yen.

Table II: Expenditures by Birth Order

	Total Expenditure		Expenditure on Extra-curricular Activities		Expenditure on Extra-educational Activities		Pocket Money	
Birth order	Sample size	Mean	Sample size	Mean	Sample size	Mean	Sample size	Mean
1	236,331	36.3	78,488	11.7	49,940	14.3	22,455	1271.5
2	174,812	32.8	56,660	10.5	34,310	13.2	17,046	1285.7
3	53,767	29.4	15,717	9.2	8,035	12.5	4,948	1317.1
4	7,905	27.5	1,839	9.5	883	12.9	671	1417.0
5	1,305	25.2	278	8.2	96	13.6	105	1489.9

Notes:

(1) Computed by the authors using data from the *Longitudinal Survey of Newborns in the 21st Century* .

(2) The units of measurement for total expenditure, expenditure on extra-curricular activities, and expenditure on extra-educational activities are 1000 yen, while pocket money is measured in yen.

(3) No sample selection rules are applied for the computations in this Table.

Table III: Expenditures by Gender

Variable	Total Expenditure			Extra-curricular Activities			Extra-educational Activities			Pocket Money		
Sex	Boys	Girls	t-value	Boys	Girls	t-Value	Boys	Girls	t-value	Boys	Girls	t-value
Mean	38.2	39.2	-5.12***	10.1	11.9	-31.3***	14.3	13.2	9.57***	1447.2	1470.6	1.70*
Sample Size	248,796	230,577		77,688	75,360		47,047	46,248		23,995	22,872	

Notes

(1)Computed by the authors using data from the *Longitudinal Survey of Newborns in the 21st Century* .

(2) The units of measurement for total expenditure, expenditure on extra-curricular activities and expenditure on extra-educational activities are 1000 yen, while the unit of measurement for pocket money is yen.

(3) ***, ** and * indicate significance at the 1%, 5% and 10% significance levels, respectively.

(4) t-value is a t-statistic for the null hypothesis that the expected values for boys and girls are equal.

(5) No sample selection rules are applied for the computations in this Table.

Table IV: Analysis of Total Expenditure

	All		Year<2007		Year>2007	
	(IV-1)	(IV-2)	(IV-3)	(IV-4)	(IV-5)	(IV-6)
	RE	REIV	RE	REIV	RE	REIV
1st child	0.0487***	0.0763***	0.0361***	0.0742***	0.0800***	0.0947***
	[0.005]	[0.012]	[0.007]	[0.018]	[0.006]	[0.012]
Boy	-0.0172***	-0.0185***	0.0111**	0.0098*	-0.0410***	-0.0421***
	[0.004]	[0.004]	[0.006]	[0.006]	[0.005]	[0.005]
No of siblings	-0.0837***	0.0324	-0.0774***	0.0678	-0.0874***	-0.013
	[0.005]	[0.047]	[0.007]	[0.064]	[0.005]	[0.054]
Log of household income	0.1236***	0.1280***	0.1215***	0.1210***	0.1597***	0.1619***
	[0.005]	[0.005]	[0.006]	[0.006]	[0.006]	[0.006]
Mother's age	0.0017**	0.0022***	0.0004	-0.0002	0.0045***	0.0054***
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Mother's university degree	0.0865***	0.0863***	0.0622***	0.0649***	0.1049***	0.1040***
	[0.007]	[0.007]	[0.009]	[0.009]	[0.008]	[0.008]
Father's age	0.0028***	0.0026***	0.0029***	0.0022***	0.0027***	0.0028***
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Father's university degree	0.0598***	0.0610***	0.0019	0.0059	0.1103***	0.1105***
	[0.005]	[0.005]	[0.007]	[0.007]	[0.006]	[0.006]
Co-residence with a grandparent	0.0246***	0.0213***	0.0550***	0.0492***	-0.0026	-0.0054
	[0.005]	[0.005]	[0.007]	[0.007]	[0.006]	[0.006]
Vacancy rate	0.0232***	0.0225***	0.015	0.0192*	0.0221**	0.0226**
	[0.008]	[0.008]	[0.011]	[0.011]	[0.009]	[0.009]
July dummy	-0.0822***	-0.0818***	-0.1246***	-0.1244***	-0.0418***	-0.0418***
	[0.004]	[0.004]	[0.006]	[0.006]	[0.005]	[0.005]
City dummies	YES	YES	YES	YES	YES	YES
Time dummies	YES	YES	YES	YES	YES	YES
Sample size	149,311	149,311	72,610	72,610	76,701	76,701
Number of id	32,186	32,186	28,724	28,724	25,841	25,841
R-squared overall model	0.236	0.23	0.16	0.154	0.192	0.188
Hausman (1978) Test	-0.1259**		-0.1529**		-0.0767	
Weak identification test (Cragg-Donald (1993) Wald F statistic)		1044.055		765.519		628.822
2nd child is twin (First Stage)		0.4260***		0.4047***		0.5325***
		[0.014]		[0.011]		[0.021]

Notes:

(1) Data from the surveys in 2002, 2004 2005, 2008, 2011, 2013 and 2014 are used to estimate models (IV-1) and (IV-2).

(2) The figures reported in square brackets are robust standard errors.

(3) All equations include a constant term, but details are not reported.

(4) 2nd child is twin (First Stage) provides details of the estimates and their standard errors for the variable used in identification in the first stage regression.

(5) ***, ** and * indicate significance at the 1%, 5% and 10% significance levels, respectively.

Table V: Analysis of Expenditure on Extra-curricular Activities, Extra-educational Activities and Pocket Money

	Extra-curricular Activities		Extra-educational Activities		Pocket Money	
	(V-1)	(V-2)	(V-3)	(V-4)	(V-5)	(V-6)
VARIABLES	RE	REIV	RE	REIV	RE	REIV
1st child	0.1226***	0.1110***	0.0869***	0.0667***	-0.0437***	-0.0587***
	[0.009]	[0.019]	[0.010]	[0.018]	[0.009]	[0.019]
Boy	-0.1822***	-0.1812***	0.0767***	0.0780***	-0.0329***	-0.0319***
	[0.008]	[0.008]	[0.009]	[0.009]	[0.008]	[0.008]
No of siblings	-0.0788***	-0.138	-0.0532***	-0.1684*	-0.0290***	-0.1106
	[0.009]	[0.086]	[0.010]	[0.088]	[0.009]	[0.088]
Log of household income	0.1294***	0.1304***	0.2122***	0.2148***	0.0319***	0.0327***
	[0.010]	[0.010]	[0.012]	[0.012]	[0.009]	[0.009]
Mother's age	0.0103***	0.0096***	0.0192***	0.0175***	-0.0062***	-0.0073***
	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
Mother's university degree	0.0806***	0.0813***	0.0447***	0.0460***	-0.0435***	-0.0429***
	[0.012]	[0.012]	[0.014]	[0.014]	[0.012]	[0.012]
Father's age	0.0004	0.0002	0.0099***	0.0096***	0.002	0.0018
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Father's university degree	0.1150***	0.1142***	0.0569***	0.0563***	-0.0960***	-0.0968***
	[0.009]	[0.009]	[0.010]	[0.010]	[0.009]	[0.010]
Coresidence with a grandparent	-0.0139	-0.011	-0.0321***	-0.0275**	0.0540***	0.0580***
	[0.010]	[0.011]	[0.011]	[0.012]	[0.011]	[0.012]
Vacancy rate	0.011	0.0121	0.6414***	0.6423***	-0.0291*	-0.0298*
	[0.021]	[0.021]	[0.014]	[0.015]	[0.017]	[0.017]
July dummy	0.0326***	0.0322***	-0.0821***	-0.0827***	-0.0401***	-0.0402***
	[0.008]	[0.008]	[0.009]	[0.009]	[0.008]	[0.008]
City dummies	YES	YES	YES	YES	YES	YES
Time dummies	YES	YES	YES	YES	YES	YES
Sample size	32,427	32,427	32,657	32,657	29,117	29,117
Number of id	19,885	19,885	17,040	17,040	18,518	18,518
R-squared overall model	0.0828	0.0815	0.103	0.101	0.098	0.0951
Hausman (1979) Test	0.06		0.118		0.0818	
Weak identification test (Cragg-Donald(1993) Wald F statistic)		314.838		390.325		258.388
2nd child is twin (First Stage)		0.5927***		0.5983***		0.5452***
		[0.017]		[0.021]		[0.026]

Notes:

(1) Data from the 2011 and 2013 surveys are used to estimate the models for the expenditure on extra-curricular activities ((V-1) and (V-2)) and the expenditure on extra-educational activities ((V-3) and (V-4)), while data from the 2013 and 2014 surveys are used to estimate the models for pocket money ((V-5) and (V-6)).

(2) Notes (2)-(5) for Table IV apply.

Table VI: Hand-me-down Effects

	Total Expenditure	Extra-curricular Activities	Extra-educational Activities	Pocket Money
Same_sex_siblings * 1st child	0.0214**	0.0427**	0.0406*	0.0266
	[0.010]	[0.020]	[0.022]	[0.020]
Same_sex_siblings	-0.0213***	-0.0536***	-0.0461***	-0.025
	[0.007]	[0.015]	[0.016]	[0.015]
1st child	0.0233***	0.0978***	0.0594***	-0.0584***
	[0.007]	[0.014]	[0.016]	[0.014]
Boy	-0.0147***	-0.2062***	0.0819***	-0.0341***
	[0.005]	[0.010]	[0.011]	[0.010]
Sample size	108,589	21,901	23,349	19,985

Notes:

(1) For each expenditure category, the sample is limited to households with 2 children and the model is estimated using a random effects (RE) estimator.

(2) In addition to the explanatory variables reported in Table VI, the models contain the same explanatory variables as In Tables IV and V with the exception of no of siblings which is excluded.

(3) Notes (2) and (5) for Table IV also apply.