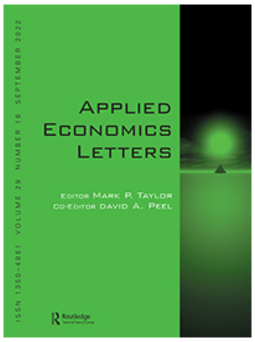


Applied Economics Letters

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/rael20

Risk preferences and sibling sex composition

Vegard Sjurseike Wiborg

APPLIED ECONOMICS LETTERS
https://doi.org/10.1080/13504851.2022.2042464

Routledge
Taylor & Francis Group

OPEN ACCESS Check for updates

Risk preferences and sibling sex composition

Vegard Sjurseike Wiborg

Nordic Institute for Studies in Innovation, Research and Education (NIFU)

ABSTRACT
This article presents evidence on the malleability of preferences over monetary risk of men and women in the context of the family. I focus on sibling sex composition by estimating the causal effect of having a younger brother compared to a sister on the risk attitudes of the first-born child. Results show that women with a younger brother are significantly less risk averse than women with younger sisters. The effect wears off as the age difference increases. The sex of the second-born has a similar but smaller effect on men's preferences, however, the effect is not statistically significant. The findings provide new causal evidence on how risk preferences are shaped by social environmental factors.

KEYWORDS
Risk aversion; uncertainty; family; sibling

JEL CLASSIFICATION
J16; J13; D8

I. Introduction

It is widely documented that women are more risk averse than men, a factor that may be critical in explaining gender differences in economic outcomes (see Croson and Gneezy 2009). Hence, it is important to understand how risk preferences of men and women are shaped and whether they are malleable or fixed from the outset. In terms of social factors, previous research suggests that individuals' risk preferences are at least partly affected by features of their social environment. For instance, exposure to male students reduces female students' willingness to take risks (Booth and Nolen, 2012). Moreover, girls in all-female, randomly matched experimental groups are less risk averse compared to girls in mixed-gender groups (Booth and Nolen, 2012; Booth, Cardona-Sosa, and Nolen 2014).

While estimates based on observational data may be biased because of self-selection into certain social environments, experimental interventions often only measure the effect of short-term exposure. This paper complements previous literature by studying long term influences of social factors by comparing preferences over monetary risk of adult individuals in same- and mixed-sex sibling groups. To avoid the issue of self-selection and potential endogeneity of the sex composition of entire sibling groups (see Dahl and Moretti 2008), I restrict attention to the effect of having a younger brother or sister on the first-born's risk preferences.

The sex of the second-born child may influence the first-born through at least two channels. First, the second-born child may influence the first-born directly. Being in a mixed-sex environment may generate awareness to gender roles thus activating more gender-stereotypical preferences (Booth, Cardona-Sosa, and Nolen 2014). Alternatively, preferences might spill over from one sibling to the other (Joensen and Nielsen 2018). Second, the sex composition of children may impact the type of parenting style. For instance, Brenøe (2021) documents that women are subject to a larger extent of gender-specialized parenting in mixed-sex sibling groups, leading to more stereotypical interests and educational choices. This paper documents a considerable positive effect on the risk tolerance of first-born women of having a brother, hence contrasting the prediction that mixed-sex environments and sibling groups in particular produce more gender-stereotypical preferences for women.

CONTACT Vegard Sjurseike Wiborg vegard.wiborg@nifu.no NIFU Nordic institute for Studies in Innovation, Research and Education PO Box 2815 Tøyen, Oslo, 0608 Norway
Researcher at Nordic Institute for Studies in Innovation, Research and Education. This paper was partly written while I was working at the University of Oslo. Data was generously made available by the Danish National Archives and has been essential for this project. The comments of one anonymous referee substantially improved the paper.

Finally, I show that the effect of the second-born child's sex on the first-born's risk aversion is sensitive to the method used to elicit risk preferences. This result corroborates previous findings on different determinants for diverse concepts and operationalizations of risk aversion (see e.g. Booth and Nolen, 2012; Dohmen et al. 2012).

II. Data and identification

I use the Danish Longitudinal Survey of Youth (DLSY – C) from 2010, which contains information on 3519 individuals (81% response rate) whose parents participated in the original DLSY in 1968 (see Jæger 2016). Due to this sampling scheme, the data is not representative and I do not use any type of population weights to adjust for the lack of such.[1]

In this paper, the sample of respondents to the DLSY – C is restricted to first-born men and women with at least one brother or sister. I also exclude siblings born in the same year since I am unable to identify the first-born. These constraints result in a final sample of 1121 individuals with an average age of 30.14 at the time of data collection.

I use the following hypothetical question on preferences over monetary risk: 'You get the opportunity to buy a lottery ticket. Ten people participate in the lottery, and the prize sum is DKK 20,000.[2] The winner is drawn at random, so all participants have the same probability of winning. How much would you pay as a maximum for a ticket to this lottery?'. To obtain a theoretically sound scale of risk aversion, I follow Hartog, Hartog, Ferrer-i-Carbonell, and Jonker (2002) to construct Arrow's and Pratt's workhorse measure of absolute risk aversion (ARA) by using the following formula: $ARA = \frac{\alpha Z - \lambda}{\lambda^2/2 + \alpha Z^2/2 - Z\lambda\alpha}$. λ is an individual's willingness to pay for a lottery ticket, α is the probability of winning and Z is the prize. The resulting measure is nonlinear in the individuals' willingness to pay. Risk aversion is increasing as ARA increases and ARA $= 0$ implies risk neutrality. The latter will be the case if the reservation price is equal to the expected gain $\alpha * Z$.[3] Both men and women in the sample are slightly risk averse on average, corresponding to a previous study of a representative sample of Danes (Harrison, Lau, and Rutström 2007).

The survey also asks about individuals' willingness to take risks in life, measured on a scale from 1 to 10 where 1 is 'avoiding risk' and 10 is '(. . .) willing to take risks'.[4] Both measures display differences in risk aversion between men and women but they hardly correlate ($\rho = -0.0139$), indicating that they might operationalize different concepts of risk. Table 1 displays summary statistics about the first-born children on the variables used in the analyses.

I employ the following OLS to measure the effects of interest:

$$ARA(std)_s = \alpha + \beta \text{SexSB}_s + \gamma \text{Age difference}_s + \theta(\text{SexSB}_s * \text{Age difference}_s) + \in_s \quad (1)$$

ARA (std) $_s$ measures the absolute risk aversion (standardized) of a first-born child in a sibling pair, s. α is the constant parameter, while *Sex SB* measures whether the second-born is female (0) or male (1). First-borns with brothers and sisters are balanced on a set of parental characteristics measured prior to the birth of the second-born child (Table A.1). *Age difference* measures the difference

Table 1. Descriptive statistics by first-borns' sex.

		Female		Male	
Variable	Description	Mean	Std	Mean	Std
Sex SB	Second-born sister (0) or brother (1)	0.51	0.50	0.50	0.50
Age	Age of the individuals in the sample	30.20	4.81	30.06	4.72
Age difference	Difference in age between siblings	3.98	2.41	3.90	2.26
ARA (std)	Absolute risk aversion (Arrow-Pratt)	0.233	0.736	−0.281	1.201
General risk	Willingness to take risk from 1 to 10.	5.595	1.984	5.742	2.138

Notes: This table shows the means and standard deviations of the variables used in the analyses in this paper. ARA (std) is a measure of absolute risk aversion which is standardized on the sample of first-born men and women that are included in the analyses.

[1]See Appendix A for more information on the DLSY.
[2]1 EUR ≈ 7.5 DKK.
[3]Analyses using the untransformed measure can be found in Table B.1.
[4]Question: 'Do you see yourself as a person who is willing to take risks in order to achieve something in life, or do you see yourself as somebody who prefers to avoid risk?'

Table 2. Effects of having a brother compared to a sister on first-borns' risk preferences.

	Women		Men	
Age difference		≤ 5		≤ 5
Dep Var: ARA (std)	b/se	b/se	b/se	b/se
Sex SB	−0.236	−0.399 **	0.0638	−0.175
	(0.150)	(0.163)	(0.202)	(0.349)
Sex SB x Age Difference	0.0463	0.0950 **	−0.0392	0.0471
	(0.0405)	(0.0471)	(0.0443)	(0.109)
Age difference	−0.0500 *	−0.0519	0.0350	−0.00285
	(0.0265)	(0.0329)	(0.0319)	(0.0742)
Constant	0.455 ***	0.454 ***	−0.366	−0.261
	(0.0890)	(0.0965)	(0.132)	(0.222)
Observations	613	511	508	424
R^2	0.013	0.012	0.003	0.001

Notes: The dependent variable is a measure of absolute risk aversion which is increasing in risk aversion. *Sex SB* is equal to one if the second-born sibling is male and zero otherwise, *Age difference* is the spacing, in birth years, between the two first-born siblings and *Sex SB x Age Difference* is their interaction. * $p < 0.1$, ** $p < 0.05$ and *** $p < 0.01$. Robust standard errors in parentheses.

between the birth years of the second- and first-born child. The interaction term captures the possibility that first-borns are affected to a greater extent by a more closely spaced sibling, for instance through more interaction or longer exposure to changed parenting style.

I estimate the regression on the sample of all first-borns and on a restricted sample only including sibling pairs where the maximum age difference is five years. Adams (1972) argues that siblings with an age difference greater than five years are almost different sibships, while those born closer in time are more competitive and hence more likely to affect each other. This window of spillovers fits well with the findings of Joensen and Nielsen (2018), suggesting that spillovers in educational choices are most pronounced for siblings who are born less than 5 years apart (see also Brenøe 2021).

III. Results

Table 2 includes four OLS regressions specified by function (1). Columns 1 and 2 are estimated on the sample of first-born women and columns 3 and 4 on the sample of first-born men. The estimates suggest that there are no significant treatment effects when all first-borns are included (columns 1 and 3). However, when the age difference is restricted to a maximum of five years, it appears that first-born women with brothers are significantly more risk tolerant than those with sisters (column 2, p-value = 0.015). The effect of having a brother increases as the age difference between siblings becomes smaller (p-value = 0.044). Specifically, the point estimates suggest that, conditional on a one-year age difference, first-born women who have a brother are approximately 0.3 of a standard deviation less risk averse than those having a sister. By the age difference of four-five years, the estimated effect of having a brother is approximately zero. These effects are robust to controlling for family size (see Table D.2) and using the individuals' willingness to pay for a lottery ticket instead of the ARA measure (Table B.1).

Column 4 suggests that having a brother increases the risk tolerance of first-born men, but the point estimate is much lower compared to the coefficient on *Sex SB* in column 2. The coefficient on the interaction term is positive, suggesting that the effect wears off as the age difference between siblings increases. However, the estimates are very imprecise and not significant, possibly indicating that the sample is too small.

Using instead the survey question regarding general willingness to take risk produces no significant treatment effects (Table C.1). If anything, the point estimates suggest that first-born men and women in this sample become more risk averse when having a brother.

IV. Discussion

The findings presented in this paper complement previous research documenting the effect of nurture on the risk preferences of individuals, and that the risk preferences of women can be affected by the gender composition of their social environment (Booth, Cardona-Sosa, and Nolen 2014). However, the results contrast the prediction that women develop more gender stereotypical preferences in mixed-sex sibling groups due to either the salience of gender roles or gender-specialized parenting. The correlation between the age difference between the two first-borns and the size of the treatment effect is consistent with the proposition that a smaller age difference increases familial influences, for instance through prolonged sibling interaction or changes in parenting style in early childhood. However, I am careful about teasing out the exact mechanisms because of the small sample size and lack of relevant survey measures of parent-child and sibling interaction.

Finally, using instead a survey question regarding general willingness to take risks produces different (but insignificant) point estimates. This emphasizes how sensitive analyses of risk preferences may be to different methods of elicitation, possibly because of instability of risk preferences across contexts (e.g. Booth and Nolen, 2012; Dohmen et al. 2012).

Disclosure statement

No potential conflict of interest was reported by the author(s).

References

Adams, B. N. 1972. "Birth Order: A Critical Review." *Sociometry* 35 (3): 411–439. doi:10.2307/2786503.

Booth, A., L. Cardona-Sosa, and P. Nolen. 2014. "Gender Differences in Risk Aversion: Do Single-sex Environments Affect Their Development?" *Journal of Economic Behavior & Organization* 99: 126–154. doi:10.1016/j.jebo.2013.12.017.

Booth, A. L., and P. Nolen. 2012. "Gender Differences in Risk Behaviour: Does Nurture Matter?" *The Economic Journal* 122 (558): 56–78. doi:10.1111/j.1468-0297.2011.02480.x.

Brenøe, A. A. (2021)." Brothers Increase Women's Gender Conformity." *Journal of Population Economics*. Retrieved from http://www.econ.uzh.ch/static/wp/econwp376.pdf

Croson, R., and U. Gneezy. 2009. "Gender Differences in Preferences." *Journal of Economic Literature* 47 (2): 448–474. doi:10.1257/jel.47.2.448.

Dahl, G. B., and E. Moretti. 2008. "The Demand for Sons." *The Review of Economic Studies* 75 (4): 1085–1120. doi:10.1111/j.1467-937X.2008.00514.x.

Dohmen, T., A. Falk, D. Huffman, and U. Sunde. 2012. "The Intergenerational Transmission of Risk and Trust Attitudes." *The Review of Economic Studies* 79 (2): 645–677. doi:10.1093/restud/rdr027.

Falk, A., A. Becker, T. Dohmen, D. Huffman, and U. Sunde (2016). "The Preference Survey Module: A Validated Instrument for Measuring Risk, Time, and Social Preferences." IZA Discussion Paper 9674.

Harrison, G. W., M. I. Lau, and E. E. Rutström. 2007. "Estimating Risk Attitudes in Denmark: A Field Experiment." *Scandinavian Journal of Economics* 109 (2): 341–368. doi:10.1111/j.1467-9442.2007.00496.x.

Hartog, J., A. Ferrer-i-Carbonell, and N. Jonker. 2002. "Linking Measured Risk Aversion to Individual Characteristics." *Kyklos* 55 (1): 3–26. doi:10.1111/1467-6435.00175.

Joensen, J. S., and H. S. Nielsen. 2018. "Spillovers in Education Choice." *Journal of Public Economics* 157: 158–183. doi:10.1016/j.jpubeco.2017.10.006.

Jæger, M. M. 2015. "Danish Longitudinal Survey of Youth (Dlsy)–cumulative 1968–2004 File." *The Danish National Centre for Social Research Working Paper* 2.

Jæger, M. M. 2016. "Danish Longitudinal Survey of Youth - Children (DLSY-C), Children and Parents, 2010." *Dansk Data Arkiv Danish Data Archive*. 1 data file: DDA-27273, version: 1.0.0. doi:10.5279/DK-SA-DDA-27273.

Appendix

A Data and balancing tests

Data used for this paper is from the Danish Longitudinal Survey of Youth C (2010), which surveyed the children of individuals that participated in the original DLSY survey in 1968. Respondent in the original survey were sampled to constitute a nationally representative pool of pupils in 7th grade of Danish elementary school and the survey had a response rate of 95% (Jæger 2015). Since then, these individuals have been surveyed seven times (Jæger 2015). Rather than representativity, the objective of the DLSY-C survey was to collect information about the children of these individuals to accumulate data that span multiple generations. Hence, while the DLSY-C respondents were sampled independently of sex and risk attitudes – which suggests that the effects are not the result of selection – the effects reported in this paper need not be representative for the Danis population as a whole. The analysis in this paper is based on unweighted data from the DLSY-C.

The share of nonresponse in the DLSY-C survey was 19% which may cause the treatment groups to be unbalanced and bias the estimated effects. For instance, if first-born women with brothers were more likely to not take the survey, the effect sizes would be biased upwards in case these individuals were relatively risk averse or downwards if they were relatively risk tolerant. While this non-response bias seems unlikely, it is not directly testable. The balance tests in Table A.1 suggest, however, that treatment groups are balanced on several parental characteristics and attitudes. The included variables were measured prior to the birth of the second-born to ensure that they are unaffected by the treatment.

B Using the untransformed measure of risk aversion

Table B.1 displays four regressions using the willingness to pay for a lottery ticket (measured in DKK) as the dependent variable: 'You get the opportunity to buy a lottery ticket. Ten people participate in the lottery, and the prize sum is DKK 20,000.[5] The winner is drawn at random, so all participants have the same probability of winning. How much would you pay as a maximum for a ticket to this lottery?'. As implied by the results in Table 2, having a brother increases the willingness to pay for a lottery ticket for both male and female first-borns, however, this effect is only significant for first-born women that are less than four-five years older than their sibling (column 2).

Notes: This table shows the effect of second-born's sex on the risk preferences of first-born women (columns 1 and 2) and men (columns 3 and 4). The dependent variable is the answer to the question: 'You get the opportunity to buy a lottery ticket. Ten people participate in the lottery, and the prize sum is DKK 20,000. The winner is drawn at random, so all participants have the same probability of winning. How much would you pay as a maximum for a ticket to this lottery?'. *Sex SB* is equal to one if the second-born sibling is male and zero otherwise, *Age difference* is the spacing, in birth years, between the two first-born siblings and *Sex SB x Age Difference* is their interaction. * $p < 0.1$, ** $p < 0.05$ and *** $p < 0.01$. Robust standard errors in parentheses.

C General attitudes towards risk

Table C.1 displays the effect of having a second-born brother on the first-borns' general willingness to take risks in life. The point estimates suggest that first-born men and women in this sample become less likely to take risks in life when having a younger brother. Coefficients are, however, not significantly different from zero.

Table A1. Balancing tests on parental characteristics by first-born's sex.

		Sister	Brother		
Variable	Description	Mean	Mean	Difference	p-value
First-born women					
Siblings	Number of siblings	1.080	1.114	−0.034	0.753
People in residence	Number of people in parent's residence	4.538	4.581	−0.042	0.625
Birth year	Year of birth	1953.964	1953.906	0.057	0.085
Parent's attitudes					
Maths-Tech	'Boys are much better at math and technical subjects than girls'	2.776	2.735	0.040	0.659
Work hard	'People expect girls to be more hard-working and diligent than boys'	1.453	1.456	−0.003	0.960
School	'Children are responsible for learning anything in school'	3.642	3.576	0.066	0.295
First-born men					
Siblings	Number of siblings	1.162	1.097	0.065	0.584
People in residence	Number of people in parent's residence	4.682	4.585	0.097	0.305
Birth year	Year of birth	1953.961	1953.913	0.047	0.186
Parent's attitudes					
Maths-Tech	'Boys are much better at math and technical subjects than girls'	2.782	2.791	−0.009	0.933
Work hard	'People expect girls to be more hard-working and diligent than boys'	1.413	1.496	−0.083	0.188
School	'Children are responsible for learning anything in school'	3.660	3.634	0.025	0.703

Notes: This table shows descriptive statistics on characteristics of the parent participating in the original survey in 1968, thus prior to the birth of the second-born child. Answers to the questions regarding attitudes have the following labels: 1 'Strongly agree', 2 'Agree', 3 'Disagree', 4 'Strongly disagree'. Missing status on these variables does not predict the sex of the second-born, neither individually, nor jointly (F = 0.31).

Table B1. Effect of having a brother compared to a sister on first-borns' risk preferences: Willingness to pay for a lottery ticket.

	(1)	(2)	(3)	(4)
Dep Var: WTP Lottery	b/se	b/se	b/se	b/se
Sex SB	442.6	327.8 **	478.3	915.3
	(321.9)	(136.2)	(467.3)	(1127.6)
Sex SB x Age Difference	−131.4	−74.14 **	−27.26	−175.4
	(108.1)	(36.92)	(78.53)	(315.3)
Age difference	152.1	40.23	−25.49	17.83
	(99.07)	(25.55)	(24.59)	(65.61)
Constant	−201.0	104.1	750.4 ***	631.0 ***
	(279.9)	(75.51)	(101.6)	(179.3)
Observations	613	511	508	424
R^2	0.025	0.010	0.008	0.008

There may be several reasons as to why the effects of sibling sex composition differ depending on the survey item used to elicit risk preferences. One explanation might be measurement error. That is, while the individuals might have risk preferences that are stable across contexts, one (or both) of the operationalizations of risk used in this paper might not elicit attitudes accurately. Moreover, Falk et al. (2016) find that qualitative questions on risk attitudes, similar to the dependent variable in Table C.1, is less correlated with behaviour in experiments than multiple price lists. While I do not use a multiple price list in this survey, it might be that there are differences in how well quantitative and qualitative survey questions, in general, gear at the underlying preferences towards risk.

Another explanation is that individuals' risk preferences depend on the context. Several studies find that different survey questions measure different attitudes towards risk – e.g. financial risk, health, car driving – that need not correlate (e.g. Dohmen et al. 2012). For individuals in the DLSY-C it may be that their attitudes towards financial risk only play a minor role in determining their overall attitudes towards risk in life. Alternatively, financial risk and risk in general may be considered to be different concepts.

Table C1. Effects of having a brother compared to a sister on willingness to take risks in life.

	Women		Men	
Age difference		≤ 5		≤ 5
Dep Var: General Risk	b/se	b/se	b/se	b/se
Sex SB	−0.000666	−0.746	−0.274	−0.233
	(0.325)	(0.536)	(0.400)	(0.606)
Sex SB x Age Difference	0.000450	0.241	0.0927	0.112
	(0.0731)	(0.158)	(0.0913)	(0.180)
Age difference	0.0405	−0.135	−0.0436	−0.215
	(0.0569)	(0.115)	(0.0728)	(0.134)
Constant	5.433 ***	5.959 ***	5.851 ***	6.318 ***
	(0.244)	(0.389)	(0.294)	(0.430)
Observations	612	510	507	423
R^2	0.002	0.005	0.003	0.008

Notes: The effect of the second-born's sex on the risk preferences of first-born women (columns 1 and 2) and men (columns 3 and 4). The dependent variable is the answer to the question 'Do you see yourself as a person who is willing to take risks in order to achieve something in life, or do you see yourself as somebody who prefers to avoid risk?', where 1 = ' Avoid risks' and 10 = 'Are willing to take risks'. *Sex SB* is equal to one if the second-born sibling is male and zero otherwise, *Age difference* is the spacing, in birth years, between the two first-born siblings and *Sex SB x Age Difference* is their interaction. * $p < 0.1$, ** $p < 0.05$ and *** $p < 0.01$. Robust standard errors in parentheses.

D Family size

One particular channel that may affect the preferences of children is family size. Table D.1 displays the effects of the sex of the first-born (column 1) and the sex of the second-born (column 2 and 3) on the number of children in the family.

Overall, the sex of the first-born has no effect on the number of children (column 1), neither does the sex of the second-born in families where the first-born is female (column 2). However, if the first-born is male, having a second boy instead of a girl increases the family size by 0.12 children on average.

In Table D.2 I replicate the analysis in Table 1 for first-borns with only one sibling (columns 1 and 3) and for the entire sample while controlling for the number of children in the family (columns 2 and 4). Note that, in both of these approaches one might end up comparing first-borns with parents that have different preferences prior to the birth of the second-born child. The reason is that decisions concerning family size might be affected by the sex of the second-born. In this particular instance, however, Table D.1 shows that the effects of the sex of the two first-born children on family size, are relatively modest.

In all of the columns in Table D.2, the effect of having a second-born brother (Sex SB = 1) as opposed to a sister (Sex SB = 0) remains fairly constant. So does the mediating effect of increasing age difference between the two first-borns.

Table D1. Effects of children's sex on family size.

	Full sample	First-born women	First-born men
Dep Var: Number of children	b/se	b/se	b/se
Sex FB	−0.00991		
	(0.0399)		
Sex SB		0.0268	0.118 **
		(0.0541)	(0.0584)
Constant	2.400 ***	2.386 ***	2.331 ***
	(0.0271)	(0.0362)	(0.0383)
Observations	1121	613	508
R^2	0.000	0.000	0.008

Notes: This table shows the effect of childrens' sex on the total number of children. In all three columns the dependent variable is the total number of children in the family. *Sex FB* is equal to one if the first-born is male and zero otherwise. *Sex SB* is equal to one if the second-born child is male and zero otherwise. The regressions in columns 2 and 3 are run on the sample of first-born women and first-born men, respectively. * $p < 0.1$, ** $p < 0.05$ and *** $p < 0.01$. Robust standard errors in parentheses.

Table D2. Effects of having a brother compared to a sister on first-borns' risk preferences, conditional on the size of the sibling group.

	Women		Men	
Dep Var: ARA (std)	b/se	b/se	b/se	b/se
Sex SB	−0.469 **	−0.403 **	−0.523	−0.152
	(0.232)	(0.164)	(0.468)	(0.351)
Sex SB x Age Difference	0.114 *	0.0962 **	0.133	0.0484
	(0.0622)	(0.0471)	(0.131)	(0.108)
Age difference	−0.0680	−0.0491	−0.0116	−0.0305
	(0.0439)	(0.0338)	(0.0870)	(0.0744)
Number of children		0.0202		−0.210 **
		(0.0392)		(0.0892)
Constant	0.503 ***	0.397 ***	−0.137	0.316
	(0.136)	(0.153)	(0.270)	(0.331)
Observations	343	511	285	424
R^2	0.012	0.012	0.007	0.014

Notes: This table shows the effect of second-born's sex on the risk preferences of first-born women (columns 1 and 2) and men (columns 3 and 4) in families where the age difference between the two is equal to or less than 5 years. The dependent variable is a measure of absolute risk aversion which is increasing in risk aversion. *Sex SB* is equal to one if the second-born sibling is male and zero otherwise, *Age difference* is the spacing, in birth years, between the two first-born siblings and *Sex SB x Age Difference* is their interaction. * $p < 0.1$, ** $p < 0.05$ and *** $p < 0.01$. Robust standard errors in parentheses.

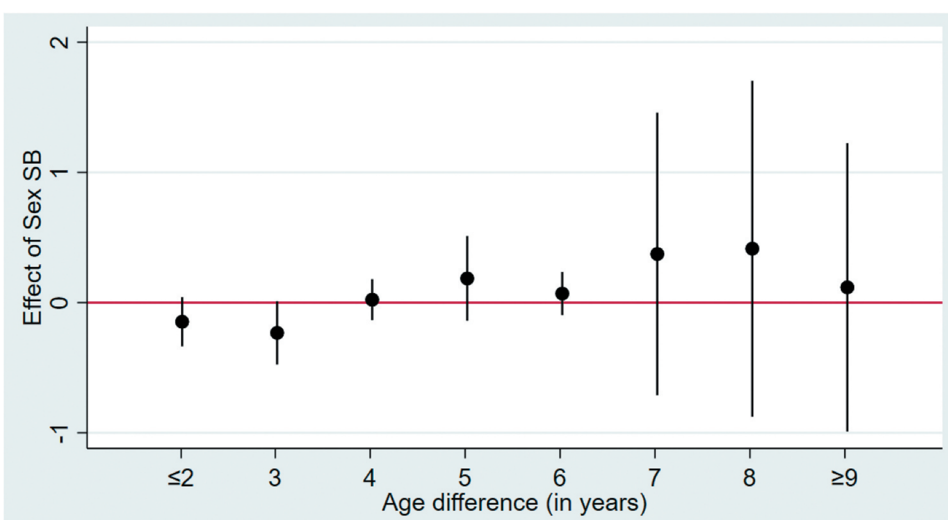
E The effect of the second-born's sex on first-born women's risk preferences, by age difference

Figure E.1 displays the effects of having a second-born brother as opposed to a sister for first-born women depending on the age difference between siblings. For each of the eight bins of age difference I estimate $ARA(std)_s = \alpha + \beta \text{Sex SB}_s + _s$. $ARA(std)_s$ is increasing in risk aversion, SexSB_s is equal to one if the scond-born child in sibship s is male and zero otherwise. Figure E.1 shows the β for each age bin. The age bins are constructed by measuring the difference between the birth years of the second- and first-born child. Due to very small sample sizes at small and large age differences, I merge the bins where the age difference is less than three years and more than 8 years.

Like Table 2, the figure shows that first-born women with a brother are relatively less risk averse when the age difference is small. For siblings that are less closely spaced, the coefficient is both unstable and imprecisely estimated in this particular sample.

Figure E.1: The effect of the sex of the second-born child on the risk preferences of first-born women

by age difference (in years)



Notes: This figure displays the effect size of the having asecond-born brother, compared to asister, on the risk preferences of first-born women. The X-axis measures the difference inyears between the first-born and thesecond-born, while the Y-axis measures the effect on the absolute risk aversion of the first-born.