Paper title: Brothers, dowry, and spousal quality

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Appendix A.

Figures

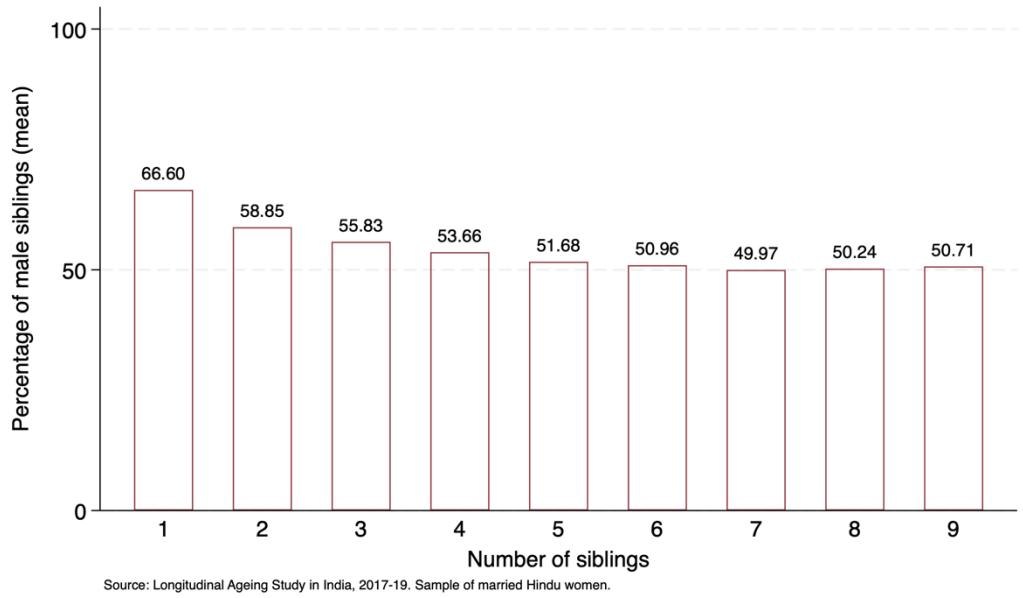

Figure A1. Percentage of male siblings by sibling size in LASI.

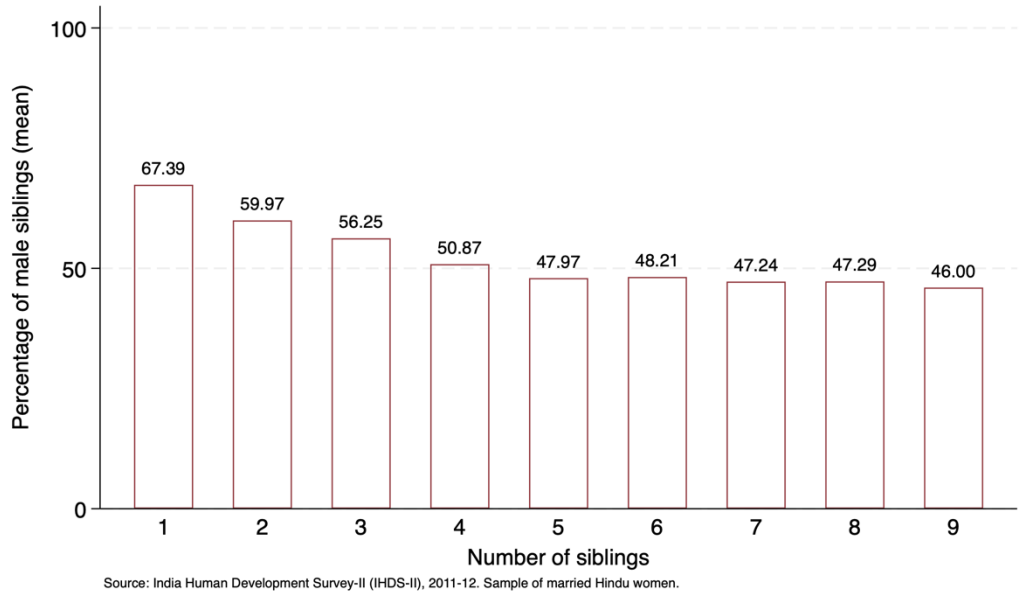

Figure A2. Percentage of male siblings by sibling size in IHDS.

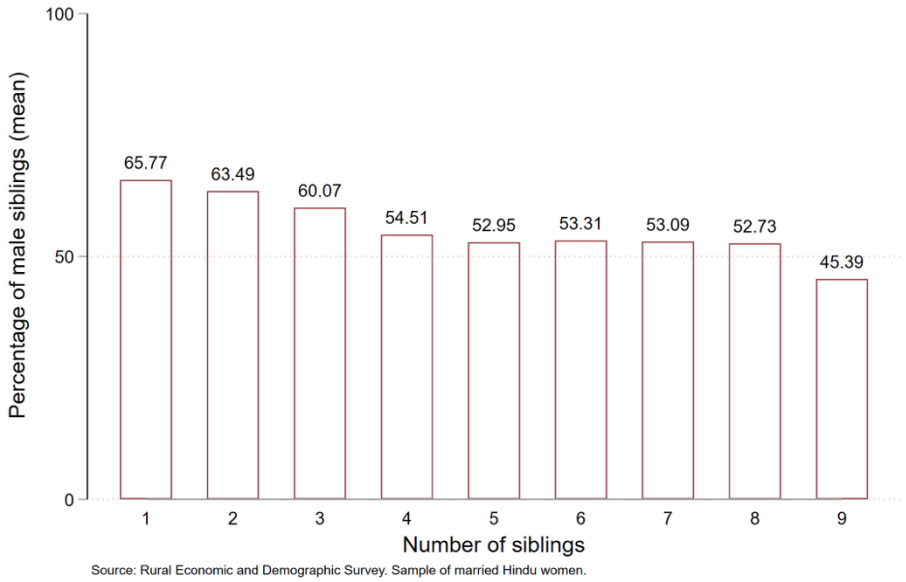

Figure A3. Percentage of male siblings by sibling size in REDS.

Tables

Table A1. Exogeneity test, robustness check based on PSU clustering in IHDS.

	(1)	(2)
	No Sib Control	Sibling size FE
VARIABLES	Dependent variable: Percentage of male siblings	
Father any school	1.206**	0.874*
	(0.478)	(0.469)
Caste: SC/ST	0.715	0.945
	(0.637)	(0.623)
Caste: OBC	-0.254	0.106
	(0.567)	(0.554)
Childhood in rural area[#]	0.268	0.780
	(0.515)	(0.508)
Age	-0.068	0.030
	(0.044)	(0.043)
Sibling size dummies	No	Yes
Observations	15,544	15,544
R-squared	0.001	0.045
F	2.356	1.431
Prob > F	0.0382	0.210

Notes: Joint significance test does not include the number of siblings in column 2. Robust standard errors in parentheses. Errors clustered at PSU level. *** p<0.01, ** p<0.05, * p<0.1. [#]Childhood in rural area is captured by whether the respondent's childhood place of residence was in a rural area in the IHDS sample.

Table A2. Robustness checks for spousal education.

	Spouse's years of schooling			
	(1) Main specification	(2) control for birth order	(3) errors clustered at sibsize	(4) errors clustered at district
Panel A: LASI				
Percentage of male siblings	0.009***	0.009***	0.009***	0.009***
	(0.001)	(0.001)	(0.001)	(0.002)
Constant	8.193***	8.142***	8.193***	8.193***
	(0.176)	(0.195)	(0.268)	(0.320)
Observations	9,605	9,605	9,605	9,605
R-squared	0.262	0.263	0.262	0.262
	Main specification	errors clustered at sibsize	errors clustered at district	errors clustered at PSU
Panel B: IHDS				
Percentage of male siblings	0.003**	0.003***	0.003***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
Constant	10.937***	10.937***	10.937***	10.937***
	(0.287)	(0.451)	(0.348)	(0.335)
Observations	15,544	15,544	15,544	15,544
R-squared	0.278	0.278	0.278	0.278
	Main specification	control for birth order	errors clustered at sibsize	errors clustered at district
Panel C: REDS				
Percentage of male siblings	0.010***	0.009**	0.010**	0.010**
	(0.003)	(0.003)	(0.003)	(0.005)
Constant	4.735***	4.121***	4.735***	4.735***
	(0.872)	(0.832)	(1.189)	(0.975)
Observations	3,026	3,026	3,026	3,026
R-squared	0.276	0.280	0.276	0.276

Notes: LASI Sample consists of married Hindu women aged 45 to 60. IHDS Sample consists of married Hindu women aged 31 to 49. LASI & IHDS estimates control for respondent's age, number of siblings, father's educational attainment, caste (general, SC/ST, or OBC), and childhood in rural area. REDS sample is based on data reported by women's fathers. Robust standard errors clustered at percentage of male siblings. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table A3. Testing for statistical significance of urban-rural differences.

	LASI	IHDS
	(1)	(2)
VARIABLES	Spouse's years of schooling	
Percentage of male siblings	0.011***	0.002*
	(0.003)	(0.001)
Rural	-1.714***	-1.913***
	(0.263)	(0.090)
Rural x Percentage of male siblings	-0.003	0.002*
	(0.004)	(0.001)
Constant	8.287***	11.859***
	(0.307)	(0.296)
Observations	9,605	15,544
R-squared	0.284	0.301

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A4. Non-linearity in spousal schooling by urban-rural.

	LASI		IHDS	REDS	
	urban	rural	urban	rural	rural
	(1)	(2)	(3)	(4)	
VARIABLES	Spouse's years of schooling				
Reference group: % of male siblings < 25%					
% of male siblings: 25.01–74.99%	0.288*	0.111	-0.042	-0.014	-0.220
	(0.168)	(0.162)	(0.058)	(0.068)	(0.446)
% of male siblings: 75–100%	0.727***	0.612***	0.160**	0.295**	0.623
	(0.144)	(0.164)	(0.063)	(0.141)	(0.470)
Observations	3,218	6,387	5,422	10,122	3,026
R-squared	0.210	0.186	0.253	0.218	0.279

Notes: LASI Sample consists of married Hindu women aged 45 to 60. IHDS Sample consists of married Hindu women aged 31 to 49. LASI & IHDS estimates control for respondent's age, number of siblings, father's educational attainment, caste (general, SC/ST, or OBC), and childhood in rural area. Robust standard errors clustered at percentage of male siblings. *** p<0.01, ** p<0.05, * p<0.1

Table A5. Male siblings and spousal age gap.

	LASI	IHDS
	(1)	(2)
VARIABLES	Age gap with spouse	
Percentage of male siblings	-0.003	-0.002**
	(0.002)	(0.001)
Observations	8,304	14,750
R-squared	0.008	0.007

Notes: Samples consist of married Hindu women who are first born among siblings. Robust standard errors clustered at percentage of male siblings. *** p<0.01, ** p<0.05, * p<0.1

Table A6. Heterogeneity in spousal schooling by natal family SES.

		REDS	
	(1)	(2)	(3)
	Full sample	Natal household head's father with some schooling	Natal household head's father with no schooling
VARIABLES	*Dependent variable: spousal schooling*		
Percentage of male siblings	0.010***	-0.005	0.015***
	(0.003)	(0.006)	(0.004)
Observations	3,026	640	2,386
R-squared	0.276	0.279	0.200

Notes: REDS sample is based on data reported by women's fathers. Robust standard errors clustered at percentage of male siblings. *** p<0.01, ** p<0.05, * p<0.1

Table A7. Non-linearity in dowry payments in REDS.

VARIABLES	(1) Net Dowry	(2) Dowry Paid	(3) Natural Log of Net Dowry
Reference group: % of male siblings < 25%			
% of male siblings: 25.01–74.99%	-510.360	650.863	0.068
	(4,921.422)	(5,088.602)	(0.127)
% of male siblings: 75–100%	7,730.711	9,320.903*	0.319*
	(5,184.851)	(5,239.270)	(0.174)
Observations	1,359	1,359	1,221
R-squared	0.154	0.165	0.168

Notes: Robust standard errors clustered at percentage of male siblings. *** p<0.01, ** p<0.05, * p<0.1

Table A8. Male siblings and spousal schooling among first born women.

	REDS	
VARIABLES	(1) Natural Log of Net Dowry (CPI Adjusted)	(2) Spouse's years of schooling
Percentage of male siblings	0.006***	0.007*
	(0.002)	(0.004)
Observations	233	619
R-squared	0.155	0.248

Notes: Samples consist of married Hindu women who are first born among siblings. Robust standard errors clustered at percentage of male siblings. *** p<0.01, ** p<0.05, * p<0.1

Table A9. Male siblings and women's intra household decision making.

	LASI	IHDS
	(1)	(2)
VARIABLES	Intra-household decision making index	
Percentage of male siblings	0.001**	-0.001***
	(0.000)	(0.000)
Observations	9,590	15,528
R-squared	0.010	0.005

Notes: Robust standard errors clustered at percentage of male siblings. *** p<0.01, ** p<0.05, * p<0.1

Appendix B.

Consider a two-period model. In our model, parents can't choose the number of children and the sex-composition. We make this assumption to avoid endogenous fertility choice. Furthermore, a parent incurs wedding expense and dowry paid for daughters and keeps the net money received from sons' wedding.

In period 1, a parent observes the number of children and the sex-composition of children. The total number of children $N = S + D$, where N is the total number of children, and S and D are total number of sons and daughters, respectively. In period 1 and 2, the parent earns an income Y_1 and Y_2, respectively. In period 1, she can invest in the human capital (h) of each of the children, save (S_1), or consume (C_1). In period 2, the parent can consume (C_2), spend (E) on the wedding of the daughter (including paying dowry), earn net transfer (I) from the weddings of Sons, and earn interest (r) from saving S_1.

The maximization problem looks like the following:

$$\max_{C_1, C_2, h_s, h_d, q_s, q_d} U(C_1, C_2, W)$$

$$W = \sum_{s=1}^{S} w_s(h_s, q_s) + \sum_{d=1}^{D} w_d(h_d, q_d)$$

Subject to period 1 budget constraint: $C_1 + S_1 + \sum_{s=1}^{S} P_{hs} h_s + \sum_{d=1}^{D} P_{hd} h_d \leq Y_1$

period 2 budget constraint: $C_2 + \sum_{d=1}^{D} E_d\left(\frac{q_d}{h_d}\right) \leq Y_2 + S_1(1 + r) + \sum_{s=1}^{S} I_s\left(\frac{h_s}{q_s}\right)$

Here, w_s and w_d is the welfare of son 's' and daughter 'd', respectively. The welfare depends on both the human capital (h) invested in the child and quality of spouse they get married to. The parent's utility increases at a decreasing rate with respect to C_1, C_2, W. P_{hs} is the price of human capital for sons, and P_{hd} is the price of human capital for daughters. Note that the daughter's wedding expense, E_d is function of $\frac{q_d}{h_d}$, which captures the quality of the spouse relative to the daughter. The higher relative quality, the greater the expense. Martial transfer received from sons' wedding is denoted with I_s. The marital transfer received from a son's wedding depends on the human capital of the son relative to the quality of the son's spouse.

While the model is simple utility maximization subject to budget constraint, it generates key lessons pertaining to our study.

1) A parent faces important tradeoffs. She can invest in daughters' human capital, sons' human capital, or save money for the later period for future expenses.
2) Investing in a daughter's human capital can potentially reduce future marriage expenses. It depends on the curvature of the function E_d, but the households need to spend P_{hd} for each unit of human capital purchased for daughter.
3) If the gain in reduced martial expense in daughter's wedding is less than the price of human capital for daughters, the households will be less likely to invest in daughter's wedding. Furthermore, if the households believe investing in sons' human capital will help them gain more I, they may invest more in sons and pay for daughter's wedding through the marital transfer received from sons' wedding.