Tables

Table 1: Probability of Giving Birth to Twins USA (NHIS)

	All	Time	
		1982-1990	1991-2013
Dependent Variable: Twin Birth			
Mother's Education (Years)	0.010**	0.020	0.009*
	(0.005)	(0.019)	(0.005)
Mother's Height (Inches)	0.002	0.007	0.001
	(0.004)	(0.013)	(0.004)
Mother's BMI	0.001**	0.004**	0.001**
	(0.001)	(0.002)	(0.001)
Smoked Prior to Birth	-0.042*	-0.217***	-0.027
	(0.021)	(0.084)	(0.022)
Observations	103,249	6,160	96,374
Pseudo R-Squared	0.015	0.075	0.015

This table presents probit regressions of whether each birth is a twin or a singleton on a number of maternal characteristics. All specifications include a full set of mother's age, survey year, region of birth, and mother's race dummies. Average marginal effects are reported. Height is measured in inches and BMI is weight in kg divided by height in metres squared. Standard errors are included in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Table 2: Probability of Giving Birth to Twins (Developing Countries by Income and Time Period)

	All	Income		Time		Prenatal
		Low inc	Middle inc	1990-2013	1972-1989	
Dependent Variable: Twin Birth						
Mother's Age	0.098***	0.100***	0.096***	0.105***	0.071***	0.099***
	(0.004)	(0.005)	(0.007)	(0.005)	(0.009)	(0.004)
Mother's Age Squared	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age at First Birth	-0.005***	-0.009***	-0.000	-0.005***	-0.006***	-0.005***
	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)
Mother's Education (years)	0.002***	0.002**	0.001	0.002**	0.002	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Mother's Height (cm)	0.008***	0.008***	0.008***	0.008***	0.007***	0.008***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Mother's BMI	0.006***	0.008***	0.005***	0.006***	0.008***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Prenatal Care (Doctor)						0.046**
						(0.022)
Prenatal Care (Nurse)						0.042*
						(0.022)
Prenatal Care (None)						-0.001
						(0.028)
Observations	2,210,676	1,379,640	830,716	1,536,262	674,414	2,206,009
Pseudo R-Squared	0.034	0.037	0.030	0.034	0.031	0.034

NOTES: This table presents results for the developing country sample splitting by pre- and post-1990, and by country income level. Main specifications for the developing country sample are pooled for all years. All specifications include a full set of year of birth and country dummies, and are estimated using a probit model. Average marginal effects are reported. Height is measured in cm and BMI is weight in kg divided by height in metres squared. Prenatal care variables refer to average levels of coverage in DHS clusters. These prenatal measures are only recorded for births in 5 years preceding each survey wave, and as such, a small number of (small) clusters do not have records available. Standard errors clustered by mothers are presented in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Table 3: Maternal Health and Child Investments/Outcomes (NHIS)

	No Health Insurance	Health Limits	Education Z-Score	Excellent Health
main				
Mother's Education (Years)	-0.076***	-0.009***	0.019***	0.052***
	(0.002)	(0.003)	(0.002)	(0.002)
Mother's Height (Inches)	-0.007**	-0.012***	0.005***	0.020***
	(0.003)	(0.003)	(0.002)	(0.002)
Mother's BMI	0.000	0.002***	0.000	-0.004***
	(0.000)	(0.000)	(0.000)	(0.000)
Smoked Prior to Birth	0.101***	0.183***	-0.046***	-0.153***
	(0.016)	(0.015)	(0.009)	(0.011)
Observations	103,502	103,502	74,777	103,502
R-Squared/Pseudo R-Squared	0.072	0.021	0.019	0.025

Regressions are presented of child investments or child outcomes on a number of maternal characteristics. Dependent variables are indicated in column headings. All specifications and variable definitions follow Table 1 and include a full set of mother's age, survey year, region of birth, and mother's race dummies. No Health insurance, health limits and excellent health are binary variables, and models are estimated as probit models. Education Z-Score is a standardized score of the child's completed years of education compared with his or her birth year and birth month cohort. Height is measured in inches and BMI is weight in kg divided by height in metres squared. Standard errors are included in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Table 4: Maternal Health and Child Investments/Outcomes (Developing Country Sample)

	Maternal Characteristics			With Cluster-Level Health Measures		
	Home Birth	Antenatal Visits	Education Z-Score	Home Birth	Antenatal Visits	Education Z-Score
main						
Mother's Age	0.084***	0.024***	0.004***	0.085***	0.030***	0.003*
	(0.002)	(0.005)	(0.001)	(0.002)	(0.004)	(0.001)
Mother's Age Squared	-0.001***	-0.001***	-0.000***	-0.001***	-0.001***	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age at First Birth	-0.042***	0.070***	0.009***	-0.039***	0.061***	0.008***
	(0.001)	(0.002)	(0.000)	(0.001)	(0.001)	(0.000)
Mother's Education (years)	-0.113***	0.267***	0.079***	-0.100***	0.220***	0.075***
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)
Mother's Height (cm)	-0.005***	0.020***	0.005***	-0.004***	0.016***	0.005***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)
Mother's BMI	-0.046***	0.076***	0.023***	-0.041***	0.060***	0.021***
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)
Prenatal Care (Doctor)				-0.766***	1.217***	0.066***
				(0.016)	(0.031)	(0.008)
Prenatal Care (Nurse)				-0.153***	0.092***	0.060***
				(0.016)	(0.030)	(0.008)
Prenatal Care (None)				1.027***	-3.715***	-0.438***
				(0.020)	(0.035)	(0.010)
Observations	750,213	616,448	1,289,528	750,211	616,446	1,285,129
R-Squared/Pseudo R-Squared	0.253	0.334	0.138	0.278	0.383	0.145

Regressions are presented of child investments or child outcomes on a number of maternal characteristics. All specifications and variable definitions follow Table 2 and include a full set of country and year of birth fixed effects. Specifications with binary outcome variables (home birth) are estimated using a probit model, and average marginal effects are reported. Other models are estimated using OLS. Home birth and antenatal visits are recorded only for children aged 0-4 at the time of the survey, and the standardised education score is recorded only for children aged 6-18 (of school age). Additional notes are available in Table 2. *p<0.1; **p<0.05; ***p<0.01.

Table 5: OLS Estimates of the Fertility–Human Capital Trade-off: Developing Country and US

Dependent Variable:	2+			3+			4+		
Child Quality	Base	+H	+S&H	Base	+H	+S&H	Base	+H	+S&H
Panel A: Developing Country Results									
Dependent Variable = School Z-Score									
Fertility	-0.152***	-0.129***	-0.084***	-0.139***	-0.116***	-0.074***	-0.120***	-0.098***	-0.061***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)
Observations	259,958	259,958	259,958	395,687	395,687	395,687	409,576	409,576	409,576
R-Squared	0.109	0.134	0.196	0.093	0.122	0.193	0.081	0.115	0.191
Altonji et al. Ratio			1.243			1.131			1.044
Panel B: US Results									
Dependent Variable = School Z-Score									
Fertility	-0.031***	-0.031***	-0.024***	-0.032***	-0.031***	-0.023***	-0.020	-0.018	-0.011
	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)	(0.013)	(0.013)	(0.013)
Observations	61,267	61,267	61,267	47,308	47,308	47,308	21,352	21,352	21,352
R-Squared	0.027	0.030	0.034	0.027	0.030	0.034	0.041	0.045	0.049
Altonji et al. Ratio			3.202			2.587			1.157
Dependent Variable = Excellent Health									
Fertility	-0.002	-0.005**	-0.003	-0.010***	-0.008***	-0.007***	-0.024***	-0.018***	-0.016***
	(0.003)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.004)	(0.003)	(0.003)
Observations	70,277	70,277	70,277	53,393	53,393	53,393	24,358	24,358	24,358
R-Squared	0.033	0.321	0.323	0.041	0.329	0.331	0.054	0.341	0.343
Altonji et al. Ratio			-4.069			1.801			2.126

OLS regressions of equation **??** are presented using developing country (DHS) and US (NHIS) data. The 2+, 3+ and 4+ samples are defined in the estimation sample section of the paper (section **??**). Base controls consist of fixed effects for child's age and year of birth, child gender, mother's age at birth, birth order, and a cubic for mother's age at time of survey. For the USA sample, mother's race fixed effects are included. For DHS data, country fixed effects are also included. Additional socioeconomic controls consist of mother's education and (for DHS data) wealth quintile fixed effects, and health controls include a continuous measure of mother's BMI and its square, and for DHS, mother's height and its square, and coverage of prenatal care at the level of the survey cluster. For USA data, we include controls for mother's self assessed health on a Likert scale. In the final columns (+S&H), quadratic health variables are interacted with year of education indicators. Standard errors are clustered by mother.*p<0.1; **p<0.05; ***p<0.01.

Table 6: Developing Country IV Estimates

	2+			3+			4+		
	Base	+H	+S&H	Base	+H	+S&H	Base	+H	+S&H
Panel A: First Stage									
Dependent Variable = Fertility									
Twins	0.832***	0.844***	0.842***	0.829***	0.838***	0.840***	0.860***	0.866***	0.867***
	(0.029)	(0.028)	(0.028)	(0.025)	(0.025)	(0.025)	(0.026)	(0.026)	(0.026)
Kleibergen-Paap rk statistic	826.32	876.23	931.50	1066.33	1124.84	1158.90	1119.75	1096.09	1145.77
p-value of rk statistic	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Panel B: IV Results									
Dependent Variable = School Z-Score									
Fertility	-0.004	-0.018	-0.012	-0.028	-0.041**	-0.048**	-0.027	-0.038*	-0.036*
	(0.028)	(0.027)	(0.026)	(0.022)	(0.021)	(0.020)	(0.022)	(0.021)	(0.019)
Observations	259,958	259,958	259,958	395,687	395,687	395,687	409,576	409,576	409,576
Coefficient Difference		0.005	0.414		0.007	0.032		0.108	0.348

Panels A and B present coefficients and standard errors for the first and second stages of twin instrumented impacts of fertility on schooling outcomes. The 2+, 3+ and 4+ samples are defined in the estimation sample section of the paper (section **??**). Base controls consist of child age, mother's age at birth and birth order fixed effects plus country and year-of-birth FEs. Additional socioeconomic controls consist of mother's education and wealth quintile fixed effects, and health controls include a continuous measure of mother's height and BMI and their square, and coverage of prenatal care at the level of the survey cluster. In the final columns (+S&H), quadratic health variables are interacted with year of education indicators. In each case the sample is made up of all children aged between 6-18 years from families in the DHS who fulfill 2+ to 4+ requirements. In panel B each cell presents the coefficient of a 2SLS regression where fertility is instrumented by twinning at birth order two, three or four (for 2+, 3+ and 4+ groups respectively). The *rk* test statistic and corresponding *p*-value reject that the twin instruments are weak in each case. Coefficient Difference in Panel B refers to a test that the coefficient estimate on Fertility in a given model is identical to the estimate on Fertility in the base case. This test takes account of the correlation between errors in the base and augmented regression model (in the spirit of seemingly unrelated regressions), but is estimated by GMM to house the IV models estimated here. Low *p*-values are evidence against equality of the two estimates. Standard errors are clustered by mother.*p<0.1; **p<0.05; ***p<0.01.

Table 7: US IV Estimates

	2+			3+			4+		
	Base	+H	+S&H	Base	+H	+S&H	Base	+H	+S&H
Panel A: First Stage									
Dependent Variable = Fertility (School Z-Score Second Stage)									
Twins	0.698***	0.701***	0.704***	0.739***	0.739***	0.742***	0.801***	0.804***	0.818***
	(0.026)	(0.026)	(0.026)	(0.047)	(0.047)	(0.047)	(0.079)	(0.079)	(0.078)
Kleibergen-Paap rk statistic	704.66	710.97	737.35	247.09	250.27	251.38	101.80	102.35	108.62
p-value of rk statistic	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Panel B: IV Results									
Dependent Variable = School Z-Score									
Fertility	-0.098	-0.099	-0.101*	-0.011	-0.014	-0.017	-0.125	-0.134	-0.142
	(0.061)	(0.061)	(0.060)	(0.067)	(0.067)	(0.067)	(0.151)	(0.151)	(0.148)
Observations	61,267	61,267	61,267	47,308	47,308	47,308	21,352	21,352	21,352
Coefficient Difference		0.818	0.434		0.546	0.390		0.233	0.115
Dependent Variable = Excellent Health									
Fertility	0.009	0.027	0.026	-0.036	-0.058*	-0.057*	0.032	-0.025	-0.031
	(0.025)	(0.021)	(0.021)	(0.039)	(0.032)	(0.032)	(0.060)	(0.053)	(0.051)
Observations	70,277	70,277	70,277	53,393	53,393	53,393	24,358	24,358	24,358
Coefficient Difference		0.164	0.213		0.340	0.365		0.123	0.090

NOTES: Regressions in each panel and the definition of the 2+, 3+ and 4+ groups are identical to Table 6 and are described in notes to Table 6. This table presents the same regressions however now using NHIS survey data (2004-2014). Base controls include child age FE (in months), birth order FEs, mother's age and mother's race FEs. Additional socioeconomic controls consist of mother's education fixed effects, and health controls include a continuous measure of mother's BMI, and a Likert scale measure of a mother's self-assessed health. In each case the sample is made up of all children aged between 6-18 years from families in the NHIS who fulfill 2+ to 4+ requirements for schooling variables, and for children aged between 1-18 years for health variables. The first stage results and tests of instrument strength are displayed for the regression using the education sample only. Qualitatively similar results are observed for the health sample. A description of the Kleibergen-Paap statistic and Coefficient Difference are provided in notes to Table 6. Descriptive statistics for each variable can be found in table A2. Standard errors are clustered by mother. *p<0.1; **p<0.05; ***p<0.01.

Table 8: Linear and Non-Linear IV Estimates for Marginal Effects with and without Full Twin Controls

	Two-Plus			Three-Plus			Four-Plus		
	Baseline	+S&H	Interactions	Baseline	+S&H	Interactions	Baseline	+S&H	Interactions
Panel A: Linear Estimates of Marginal Effects									
Number of Children	0.034	0.014	0.091	-0.015	-0.052**	-0.062*	0.009	-0.024	-0.019
	(0.036)	(0.034)	(0.055)	(0.030)	(0.026)	(0.035)	(0.037)	(0.031)	(0.037)
Panel B: Unrestricted Estimates of Marginal Effects									
Siblings ≥ 2	0.222***	0.193**	0.182**						
	(0.081)	(0.087)	(0.085)						
Siblings ≥ 3	-0.094**	-0.115**	-0.153	-0.016	-0.070*	-0.076**			
	(0.045)	(0.051)	(0.106)	(0.044)	(0.039)	(0.035)			
Siblings ≥ 4	-0.036	-0.039	-0.058	-0.039	-0.041	-0.035	0.013	-0.031	-0.022
	(0.077)	(0.083)	(0.093)	(0.062)	(0.055)	(0.088)	(0.062)	(0.061)	(0.046)
Siblings ≥ 5	0.051	0.057	0.024	0.030	0.030	0.025	0.028	0.026	-0.002
	(0.063)	(0.064)	(0.089)	(0.058)	(0.049)	(0.060)	(0.064)	(0.060)	(0.055)
Observations	239,898	239,898	239,898	350,155	350,155	350,155	329,230	329,230	329,230
Joint Significance (p-value)	0.000	0.000	0.022	0.843	0.109	0.080	0.790	0.870	0.879

Each column and panel presents a separate regression using DHS data. Siblings ≥ 2 refers to the marginal effect of moving from 1 to 2 siblings, Siblings ≥ 3 refers to moving from 2 to 3 siblings, and so forth. Each model includes maternal age, country, survey year, birth order and child age fixed effects as well as child's gender. The regressions in columns 2, 4 and 6 are augmented with all socioeconomic and health controls described in Table 5 of the paper. Standard errors are estimated using a block bootstrap sampling each family with replacement, and for each bootstrap replication the both the regression and the constructed instruments are re-estimated. The p-value for "Joint Significance" refers to the null hypothesis that each parameter is zero. This is implemented using a χ^2 test based on the estimated coefficients, and block-bootstrap variance-covariance matrix. Low p-values provide evidence against joint insignificance of the Sibling indicators. First stage regressions are displayed in Appendix Table A9.*p<0.1; **p<0.05; ***p<0.01.

Table 9: Parental Investment Responses to the Child Endowment (DHS)

Dependent Variable:	All Observations			< Mean Education			≥ Mean Education		
Duration of Breast-feeding	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Birth weight in kg	0.445***		0.386***	0.330***		0.278***	0.510***		0.445***
	(0.056)		(0.057)	(0.093)		(0.095)	(0.071)		(0.071)
Twin		-1.903***	-1.627***		-1.761***	-1.571***		-2.022***	-1.696***
		(0.295)	(0.298)		(0.507)	(0.516)		(0.359)	(0.361)
Observations	65,815	65,815	65,815	22,361	22,361	22,361	43,454	43,454	43,454
R-Squared	0.8133	0.8133	0.8136	0.8179	0.8179	0.8181	0.8098	0.8097	0.8101
Mean Breastfeeding	10.795	10.795	10.795	11.643	11.643	11.643	10.359	10.359	10.359

Regressions of duration of breast-feeding in months on each child's birth weight include maternal fixed effects as well as fixed effects for the child's age, mother's age at birth, and birth order of the child. The sample consists of all DHS observations for which birth weight is recorded, and whose mothers report that breastfeeding is no longer ongoing. Birth weight is recorded in grams and rescaled to kilograms for ease of presentation. DHS record breastfeeding duration for all children born within 5 years of the date of the survey. Results are split by the mother's education level, compared to the average of all women in her country and survey wave (irrespective of whether the woman is in the breastfeeding sample). In the table footer, mean breastfeeding refers to the average duration of breastfeeding of each estimation sample in months. $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$.

Table 10: Parental Investment Responses to the Child Endowment (NLSY Child and Young Adult Survey)

	All Observations			No College			Some College		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: Dependent Variable = Child Breastfed									
Birth weight in kg	0.060***		0.060***	0.061***		0.064***	0.057***		0.050**
	(0.012)		(0.012)	(0.015)		(0.015)	(0.021)		(0.021)
Twin		-0.069	-0.010		-0.008	0.051		-0.157	-0.104
		(0.052)	(0.054)		(0.034)	(0.038)		(0.118)	(0.119)
Observations	8,605	8,605	8,605	5,640	5,640	5,640	2,965	2,965	2,965
Mean Breastfeeding	0.438	0.438	0.438	0.361	0.361	0.361	0.584	0.584	0.584
Panel B: Dependent Variable = Mother Reads to Child Frequently									
Birth weight in kg	-0.023		-0.024	0.015		0.006	-0.070***		-0.066**
	(0.016)		(0.016)	(0.019)		(0.020)	(0.027)		(0.027)
Twin		-0.001	-0.025		-0.156	-0.150		0.128	0.066
		(0.078)	(0.079)		(0.097)	(0.099)		(0.119)	(0.121)
Observations	6,636	6,636	6,636	3,949	3,949	3,949	2,687	2,687	2,687
Mean Reading	0.477	0.477	0.477	0.424	0.424	0.424	0.554	0.554	0.554
Panel C: Dependent Variable = Mother Reads to Previous Child Frequently									
Birth weight in kg	0.005		-0.001	0.039		0.027	-0.027		-0.027
	(0.024)		(0.025)	(0.030)		(0.031)	(0.036)		(0.039)
Twin		-0.066	-0.066		-0.166**	-0.140		0.028	-0.000
		(0.076)	(0.080)		(0.082)	(0.086)		(0.114)	(0.125)
Observations	2,907	2,907	2,907	1,894	1,894	1,894	1,013	1,013	1,013
Mean Reading	0.429	0.429	0.429	0.386	0.386	0.386	0.508	0.508	0.508

Each regression includes maternal fixed effects and FEs for the mother's age at birth, and birth order of the child. The sample consists of all NLSY child observations for which mothers report having breastfed their child (top panel), and report the frequency of reading with their child (bottom panels). Birth weight is recorded in ounces and rescaled to kilograms for ease of presentation. The frequency of reading is recoded from a categorical question with responses, "never", "several times a year", "several times a month", "once a week", "about 3 times a week" and "everyday". Frequently reading is an indicator variable coded as one if the response is "about 3 times a week" or "everyday". All responses are for when children are aged between 6 and 9 years of age. Results are split by the whether the mother has completed any college education, or not. The final panel regresses mother's reading to previous children on the birth weight/twin status of each child, and so is only defined for children with younger siblings. *p<0.1; **p<0.05; ***p<0.01.

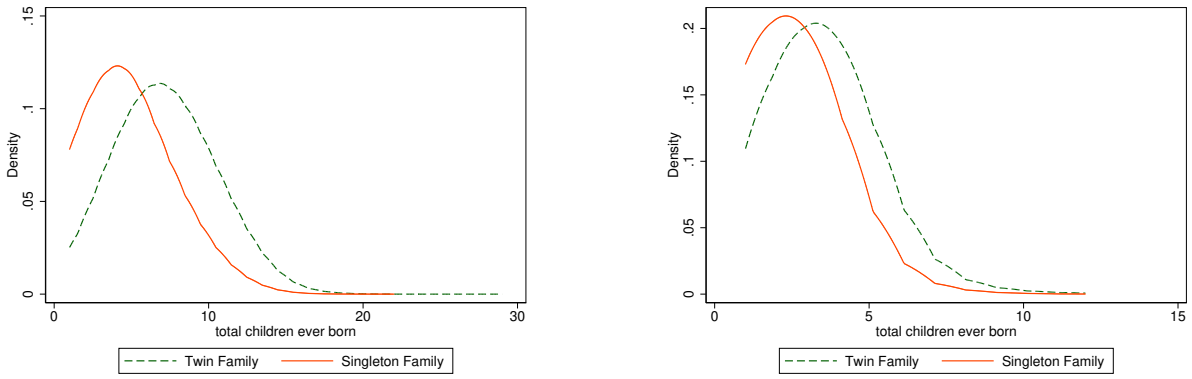
Table 11: Maternal Education, The Twin Instrument and the Fertility-Human Capital Trade-off

	OLS			IV		
	Base	+H	+S&H	Base	+H	+S&H
Panel A: Developing Country Results						
Fertility (Less Educated)	-0.099***	-0.085***	-0.068***	-0.034**	-0.042***	-0.043***
	(0.002)	(0.002)	(0.002)	(0.017)	(0.016)	(0.015)
Observations	366,799	366,799	366,799	366,799	366,799	366,799
Fertility (More Educated)	-0.094***	-0.084***	-0.055***	-0.024	-0.031	-0.029
	(0.002)	(0.002)	(0.002)	(0.019)	(0.019)	(0.018)
Observations	247,258	247,258	247,258	247,258	247,258	247,258
Panel B: US Results						
Dependent Variable = School Z-Score						
Fertility (Less Educated)	-0.030***	-0.029***	-0.022**	-0.015	-0.015	-0.022
	(0.010)	(0.010)	(0.010)	(0.075)	(0.074)	(0.074)
Observations	41,733	41,733	41,733	41,733	41,733	41,733
Fertility (More Educated)	-0.021***	-0.022***	-0.022***	-0.094	-0.098	-0.098
	(0.007)	(0.007)	(0.007)	(0.059)	(0.059)	(0.059)
Observations	46,553	46,553	46,553	46,553	46,553	46,553
Dependent Variable = Excellent Health						
Fertility (Less Educated)	-0.009***	-0.006**	-0.005*	-0.053	-0.051*	-0.051*
	(0.004)	(0.003)	(0.003)	(0.038)	(0.031)	(0.031)
Observations	49,050	49,050	49,050	49,050	49,050	49,050
Fertility (More Educated)	0.007*	-0.001	-0.001	0.018	0.012	0.012
	(0.004)	(0.003)	(0.003)	(0.025)	(0.022)	(0.022)
Observations	54,070	54,070	54,070	54,070	54,070	54,070

OLS and IV results are shown for the pooled 2+, 3+ and 4+ samples, splitting samples by the educational level of each mother. In the case of IV estimates, fertility is instrumented using the twin instruments with pooling procedure described in **?** and refinement discussed in **?**. In the developing country sample, less and more educated refers to mothers with education respectively below and above the country-level mean (calculated in each survey) given heterogeneity in educational attainment by countries. In the case of the US, less educated refers to mothers with high school education or less, and more educated refers to mothers with college education or higher. All other details follow OLS and IV estimates in Tables 5-7. *p<0.1; **p<0.05; ***p<0.01.

Figures

Figure 1: Twins shift the fertility distribution outward

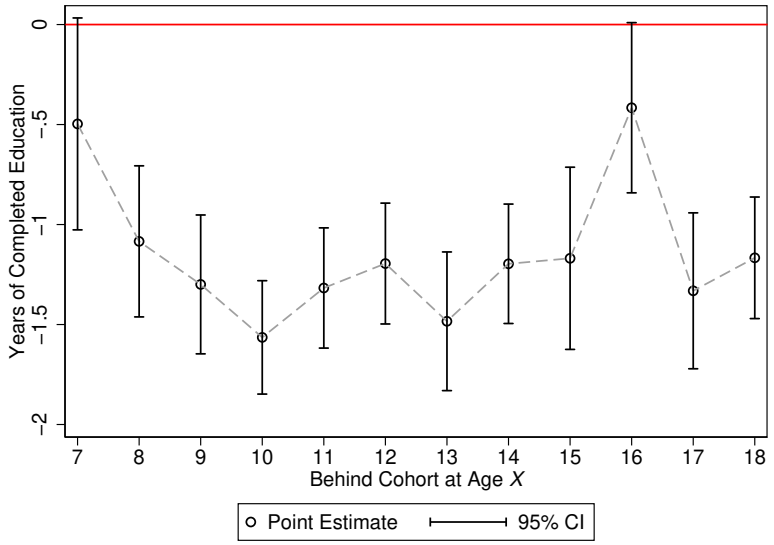


(a) Developing Countries

(b) United States

Note to Figure 1: Densities of family size come from the full estimation samples from DHS and NHIS data. Kernel densities are plotted (bandwidth equals two in all cases), and present the frequency of the total number of children per family by family type.

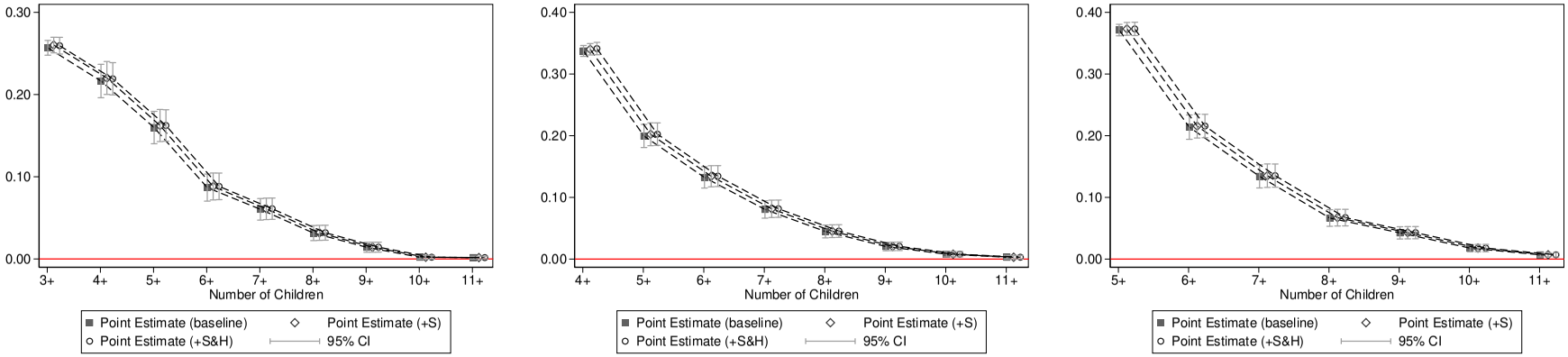
Figure 2: School Completion Rates and Lifetime Educational Accumulation



Notes: Each point estimate and 95% confidence interval displays the coefficient from a separate regression of an individual's eventual completed education on whether the individual was behind his or her cohort at the age indicated on the horizontal axis. All data from the NLSY79 child and young adult panel is used, covering individuals who were born to NLSY79 women, and who were children or young adults at some point between 1986 and 2014. In each survey wave, the individual's current age and education is reported, and at the end of the panel survey we observe their eventual completed education. Regressions are only estimated on observations who are at least 25 years old in the final wave, to ensure that education is approximately completed. Similar results are observed if we condition on being 30 years old in the final wave. In each case, an individual is behind their cohort if their grade accumulation is at least 1 year less than their age minus 6. Each coefficient and point estimate comes from a separate regression, given that NLSY survey waves occur every 2 years, and so we do not observe the same sample of respondents at each age.

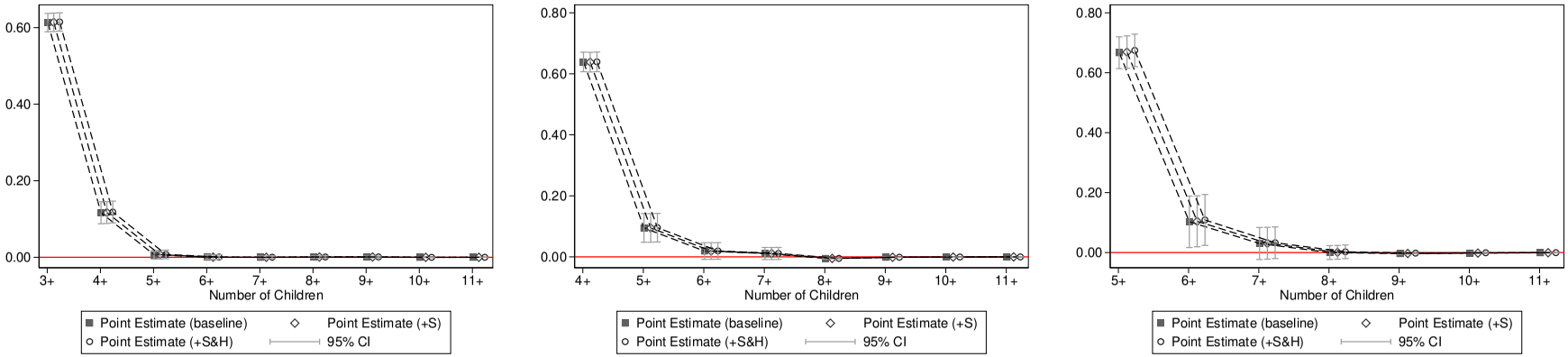
Figure 3: First stage impact of twinning on fertility, and average causal response weights

Panel A: Developing Country Data



(a) Twin at 2nd Birth (b) Twin at 3rd Birth (c) Twin at 4th Birth

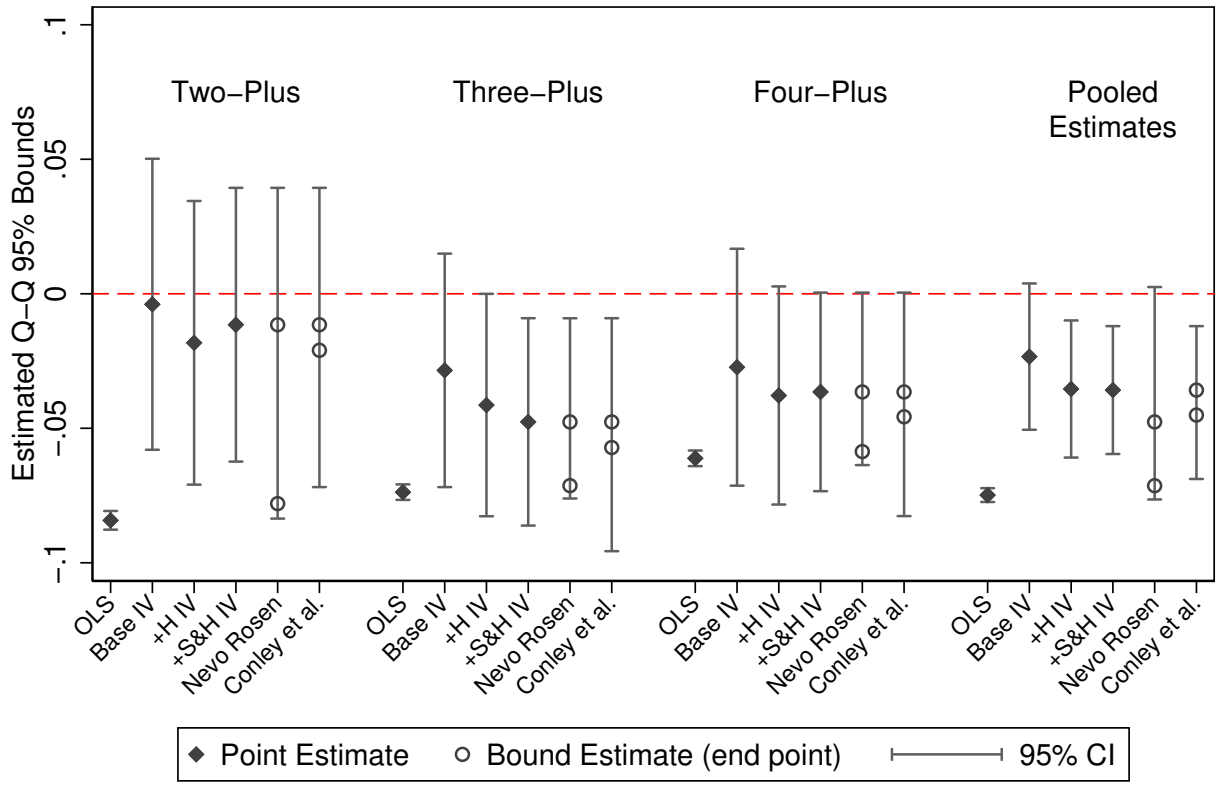
Panel B: USA Data



(d) Twin at 2nd Birth (e) Twin at 3rd Birth (f) Twin at 4th Birth

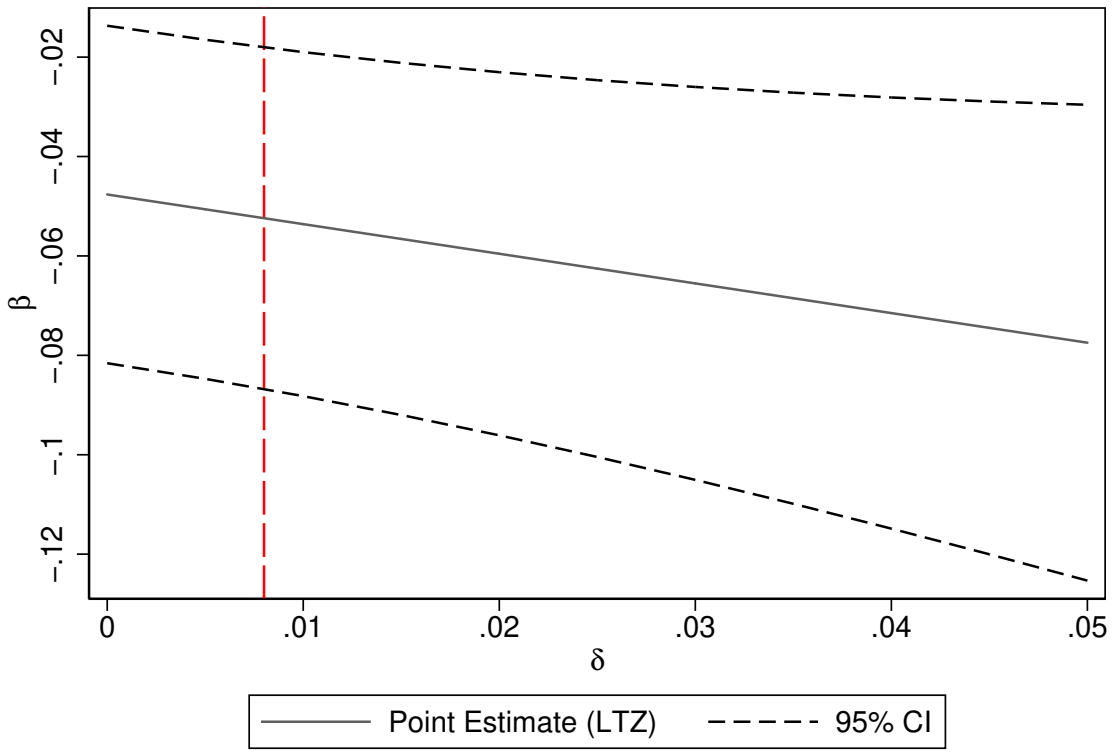
Notes to Figure 3: Each panel documents the impact of a twin at a particular birth order on the likelihood of exceeding a particular family size (indicated on the x-axis). These "average causal response" function give the weights placed on each parity in LATEs estimated using twins at a particular birth order as an IV. In each panel, point estimates and 95% confidence intervals are plotted in three cases, corresponding to the impact of twins on fertility conditional on baseline controls, baseline plus health controls, or baseline, plus health, plus socioeconomic controls. Each of the three estimates refer to the same fertility outcomes documented on the x-axis, however have been slightly shifted for ease of visualisation.

Figure 4: Parameter and Bound Estimates of the Q–Q Trade-off



Note to Figure 4: Each set of estimates refer to the 95% confidence intervals on parameter bounds of the impact of fertility on child education. Two-Plus, Three-Plus and Four-Plus refer to parity specific groups, and pooled estimates refer to these samples pooled following the procedure described in **?** and refinement discussed in **?**. Base IV refer to the IV estimate most closely following the existing literature, with +H and +S&H presenting IV estimates controlling for maternal health and socioeconomic variables. OLS point estimates are presented along with their 95% confidence intervals, which are quite narrow. OLS estimates include all maternal controls (corresponding to base, and +S&H). Versions without maternal controls are even more negative. The final two sets of bounds in each group are estimated following **?** and **?** procedures, and do not have a corresponding point estimate. Confidence intervals on Nevo and Rosen bounds are estimated following **?**. Upper and lower end points of the interval estimates are plotted with hollow circles.

Figure 5: Plausibly Exogenous Bounds: School Z-Score



Note to Figure 5: Confidence intervals and point estimates are calculated according to **?** using DHS data for the 3+ sample. Estimates reflect a range of priors regarding the validity of the exclusion restriction required to consistently estimate $\hat{\beta}_1$ using twinning in a 2SLS framework. The local to zero (LTZ) approach treats the uncertainty surrounding γ, the coefficient on the instrument when included in the structural equation, as being normally distributed, with the mean and variance of of a $U(0, \delta)$ variable. The vertical dashed line indicates the point at which priors are comparable to those in Figure 4.