

Where have all the young girls gone?

Causes

Manifestation

Interventions

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Overview: Causes, mechanisms, shifts

- Underlying cause of son preference is patrilineal norms:
 - Sons have inheritance rights, daughters receive dowry
- Mechanisms by which it is exercised:
 - Son-biased fertility stopping (several demography pp, Bhalotra & Van Soest model birth spacing jointly with neo mortality)
 - Parental investments favour boy survival (EFM)
 - Sex selective abortion (marked by sex ratio at birth)
- Son preference is centuries old.
 - No evidence that the underlying preference for sons is increasing
 - Manifestation of son preference has changed, with a shift towards prenatal sex selection
 - Declining fertility has contributed to this shift (consistent with Bhat & Dasgupta, Jayachandran, Anukriti)

Roadmap 1: Changing manifestations of son preference

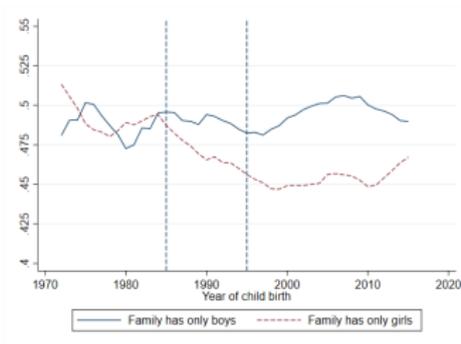
- After ultrasound is available, families that have not yet had a son are less likely to give birth to a girl. This marks a relentless trend in **sex selective abortion**
- Consequences:
 - **Compositional shift**- more prenatal selection in better-off families, girls disproportionately born into poorer families
 - Substitution of prenatal for **postnatal selection** has led to declining excess mortality of girls after birth
 - And to declining **fertility**- which is thus a "cause" and consequence
 - Prenatal selection often involves unsafe abortion which harms **maternal health**, though lower fertility can mitigate

Sex selective abortion trending up

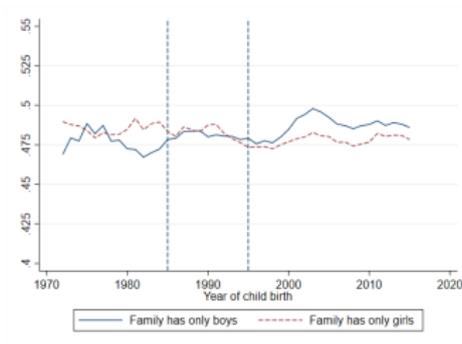
Where have all the young girls gone? Identification of sex selection in India. S Bhalotra, T Cochrane 2010, update with H Tam

- We estimate 0.48m girl abortions p.a. in 1995-2005, 3% of potential births order 2-4, exceeds girls born in the UK
- Driven not by changes in preferences but by technological & economic changes
 - SRB tracks availability of prenatal sex detection (ultrasound)
 - Availability determined by (a) **technology** and (b) **dismantling of economic regulation**: trade liberalization (mid-80s), industrial de-licensing (mid-90s)
 - Intent intensified by **fertility decline**
 - Our estimates indicate selection stops at 2 boys, 1 girl

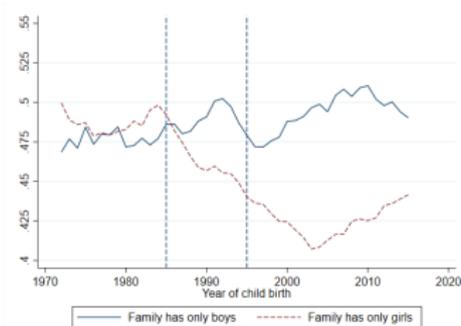
Gaps open post-ultrasound in high status families



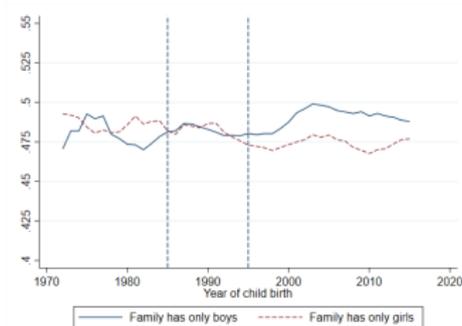
(a) 2nd birth: High educ



(b) 2nd birth: Low educ



(c) 2nd birth: Top 20% wealth



(d) 2nd birth: Bottom 80% wealth

Prenatal selection leads to lower postnatal selection: both girl mortality and fertility decline

On the quantity and quality of girls: New evidence on fertility and parental investments. EJ forthcoming. S Anukriti, S Bhalotra, HF Tam

- For every 3 aborted girls, 1 additional girl survived to age five
- Mechanisms: moderation of son-biased fertility stopping, narrowing of gender gaps in parental investments
 - Under-5 mortality of girls relative to boys declined by 60% post-ultrasound (in families with firstborn girls)
 - Narrowing of gender gaps in breastfeeding and immunization explains 30% of narrowing of mortality gap
 - Gap in fertility narrows 40 to 50%.

Roadmap 2: Underlying causes

- Using policy/natural experiments in India we find exacerbation of son preference (multiple manifestations) following:
 - Property rights reform, 1977 onward
 - Equalization of inheritance rights for women, culminating 2005
 - Gold price inflation which changes the cost of dowry, 1970-2005
- Upshot:
 - It is difficult to change social norms through legislation
 - Commodity price movements on world markets can skew the number of surviving girls in India
 - There is limited previous evidence as often underlying causes are time-invariant, challenging identification e.g. soil quality (Carranza 2014)

Property rights reform in favour of the poor

Property rights and gender bias: Evidence from land reform in West Bengal. AEJ Applied 2019. S Bhalotra, A Chakravarty, D Mookherjee, F Pino

- Major reform gave property rights to tenant farmers, we find:
 - Reform increased farm incomes (Banerjee et al. 2002)-this increased girl (and boy) survival in families with a son
 - It intensified son preference on all margins in families without a firstborn son
 - Consistent with tenancy rights being heritable by sons
- Upshot:
 - Secure property rights address poverty but as long as inheritance is male-biased, they exacerbate son preference

Inheritance rights reform in favour of women

Women's inheritance rights and the preference for sons. JDE 2020.
S Bhalotra, S Roy, R Brule

- Legislation equalizing inheritance rights
- Families reacted by eliminating daughters
 - Increase in sex-selective abortion in post-ultrasound cohorts
 - At other margins too: increase in relative infant mortality of girls & in male-biased fertility stopping
- Another case where legal reform is frustrated by persistent social norms (Platteau and Wahhaj, Doepke and Tertilt)

Dowry inflation

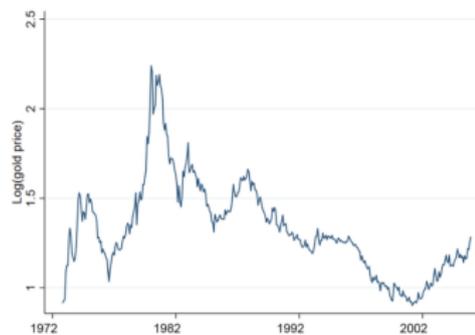
The price of gold: Dowry and death in India. JDE 2020. S Bhalotra, A Chakravarty, S Gulesci

- Established literature argues dowry raises costs of daughters and motivates son preference, but limited direct causal evidence
- We leveraged variation in dowry costs created by variation in gold prices on world markets (gold is integral to dowry)
- We find gold price inflation triggers elimination of girls:
 - Pre-ultrasound cohorts: girl relative to boy neonatal mortality increases, and survivors are shorter (marker of investment)
 - Post-ultrasound cohorts: sex selective abortion increases

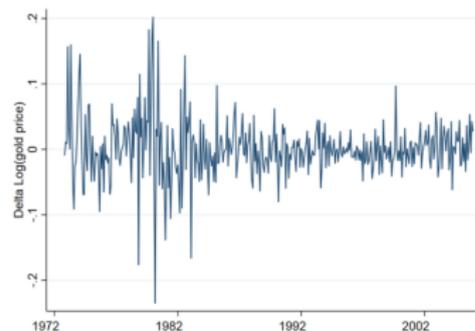
World gold price movements

Figure 1: GOLD PRICES

(a) $L(\text{GOLD PRICE})$



(b) $\Delta L(\text{GOLD PRICE})$



Roadmap 3: Selected proximate causes

- **Political will:** Our evidence suggests that Hindu legislators (the majority) lack the will to control sex-selective abortion
- **Maternal depression** is a cause of low investment in & survival of girls
- **Poverty:** Girls are less likely to survive in recessions, (pecking order), Bhalotra JDE 2010
- Upshot:
 - Political will can curb sex selection, as can interventions that address income shocks or maternal depression in the early years
 - These interventions do not alter the **underlying** desire for sons

Political preferences over abortion

Religion and abortion: The role of politician identity, 2018, JDE RR. S Bhalotra, I Clots, L Iyer

- We test the hypothesis that Muslim leaders more effectively control (sex-selective) abortion- we find they do
 - Consistent with Muslims being more anti-abortion than Hindus
 - We rule out the competing hypothesis that Muslims have weaker son preference - we find that families **compensate** on the other two margins [son preference does not change]
- Upshot:
 - Suggests lacking political will among majority Hindu leaders
 - Shows minority leaders can modify majority behaviour
 - Shows leader preferences influence individual behaviour (not just public provision); Rasul, Dahl, Beaman et al.

Stated preferences for abortion and sons, WVS India

Table 1
Abortion and Son Preferences by Religion

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Agree that abortion is acceptable when				NFHS Surveys		
	Mother's health is at risk	Child is physically handicapped	Mother is not married	More children are not wanted	Ideal number of boys	Ideal number of girls	Ideal share of boys
Muslim	-0.0720** (0.0319)	-0.125*** (0.0433)	-0.0882** (0.0426)	-0.0551 (0.0431)	0.290*** (0.0139)	0.205*** (0.00878)	0.00275** (0.00111)
Dep var Mean for Non-Muslims	0.908	0.688	0.723	0.613	1.275	0.979	0.562
N	2344	2344	2344	2344	317185	317185	283528
R-squared	0.013	0.011	0.008	0.012	0.223	0.101	0.038

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Data from World Values Survey for India in 1990 in columns 1-4; 6% of this sample is Muslim. Controls include gender, age, education categories, marital status of the respondent and family income categories. Data from NFHS-2 and NFHS-4 in columns 5-7. Controls include district fixed effects, mother's year-of-birth fixed effects, dummies for rural residence, Scheduled Caste, Scheduled Tribe, Other Backward Caste, education levels of mother, categorical variables for mother height and age at marriage).

RCT treating maternal depression with psychotherapy

Maternal depression, women's empowerment, and parental investment: Evidence from a randomized control trial. AER 2020.
S Bhalotra, V Baranov, P Biroli, J Maselko

- 10-20% of women in the OECD and 20-30% in poorer countries suffer perinatal depression
- In Pakistan, **postnatal depression is greater among mothers of girls**
- We recruited c.1000 women depressed in pregnancy in rural Pakistan, and implemented a cluster-randomized RCT
- CBT for 10m starting third trimester, provided by community health workers who we trained

Maternal depression harms children and especially girls

- We find treating perinatal depression raises maternal investment in children, esp girls
 - Time and money investments and parenting style improve
 - Girl siblings are more likely to survive
- Identified mechanisms:
 - Treated women have more **bargaining power** with husbands
 - Reduced **effort costs** of breastfeeding & structured play

Maternal investments in children: The role of expected effort and returns. 2020. S Bhalotra, A Delavande, P Font, J Maselko

RCT time line

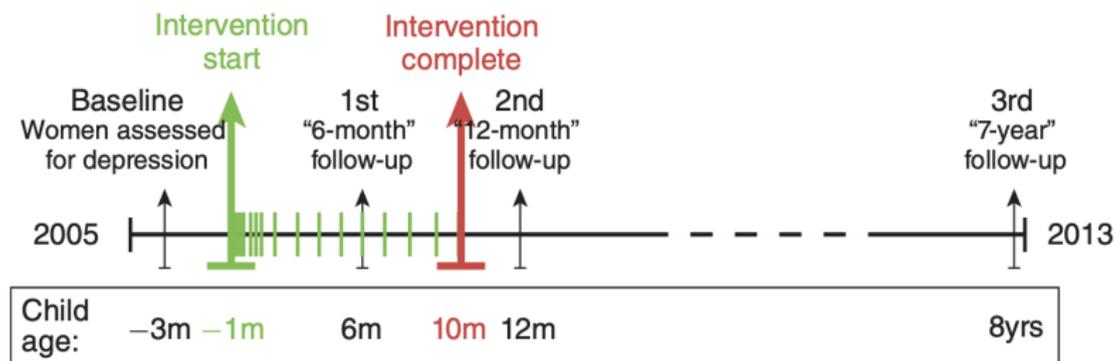


FIGURE 1. TIME LINE OF INTERVENTION AND FOLLOW-UPS

Results: Maternal depression treatment

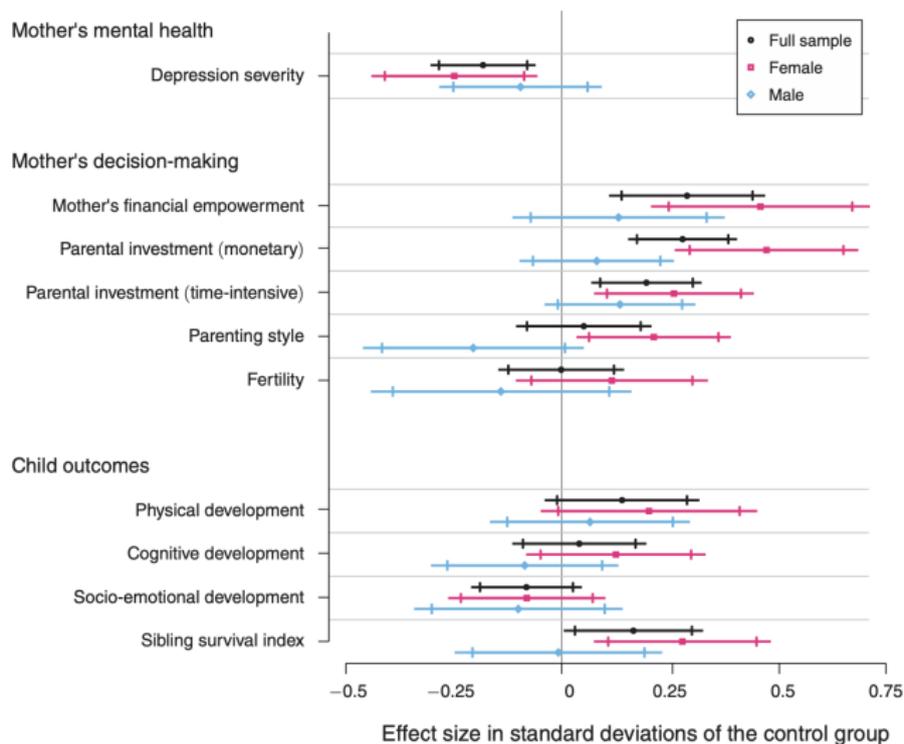


FIGURE 2. INTERVENTION EFFECTS ON MAIN OUTCOMES, POOLED, AND BY GENDER

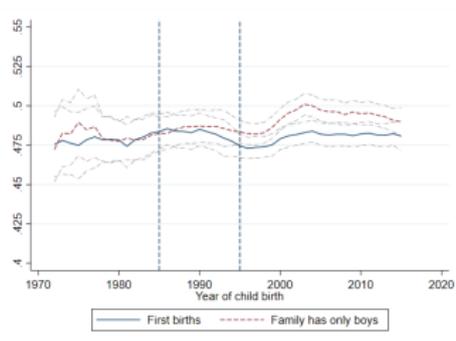
Concluding remarks- what about the right to abortion?

- Is abortion not a reproductive health right of women?
 - Abortion legislation empowers women & improves birth quality
 - As do innovations in birth control & ultrasound technology
 - Goldin and Katz 2002, Bailey 2006, Gruber et al. 1999, Donohue and Levitt 2001, Bailey and McLaren 2018
 - Abortion is widespread: 21% of pregnancies in the US
- Sex-selective abortion is a particular concern as it creates an increasing demographic imbalance
- This skews marriage and labour markets with implications for crime, inequality and productivity

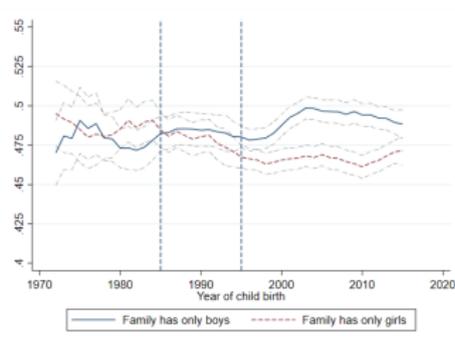
Concluding remarks- sticky underlying causes in India

- Patrilocal norms have changed in other regions
 - Sons provide old-age security- extend scope of **state pension**, Ebenstein
 - Change social norms- media, info campaigns, school curricula, Jensen, Jayachandran et al
- Women's suffrage led to women's rights legislation in history
 - India: equal voting rights since 1947, but small **share of women in government** (Bhalotra, Clots, Iyer 2018)
- Male support for women's rights emerges as returns to human capital investment rise (Doepke and Tertilt 2009)
 - Returns have risen in India but **barriers to women realizing returns** (Field et al., 2016)

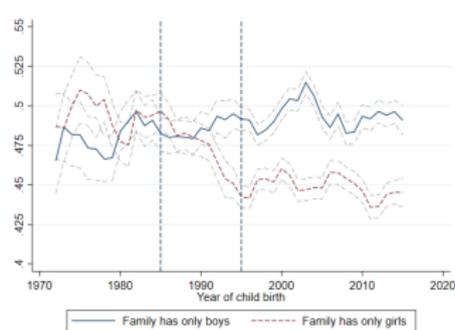
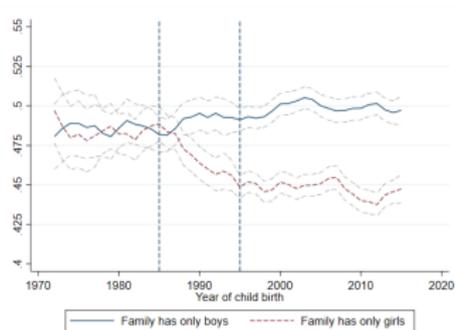
Son preference is increasingly manifest as a declining share of girls at birth, 1970-2015



(e) First birth



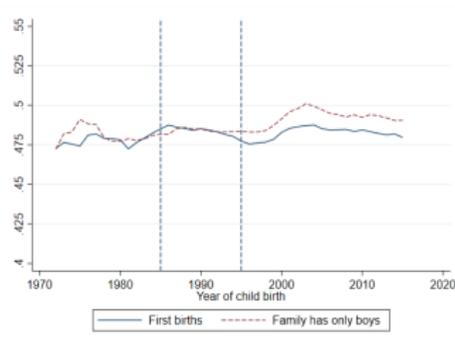
(f) Second birth



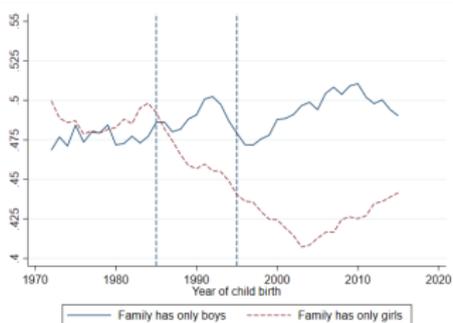
Prenatal sex selection greater in wealthy families- 1



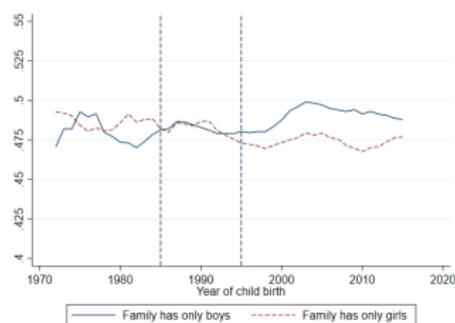
(i) First birth: Top 20% wealth



(j) First birth: Bottom 80% wealth

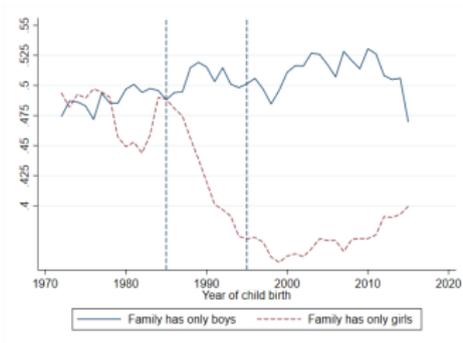


(k) 2nd birth: Top 20% wealth

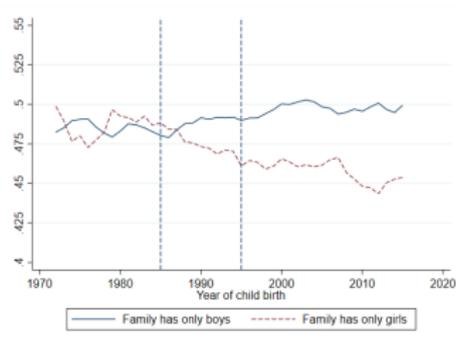


(l) 2nd birth: Bottom 80% wealth

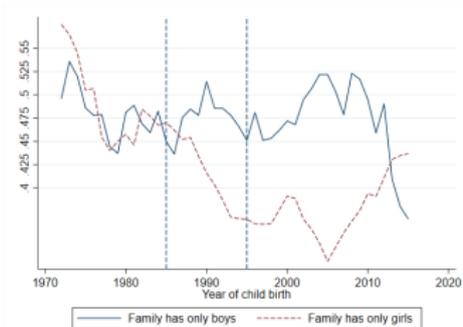
Prenatal sex selection greater in wealthy families- 2



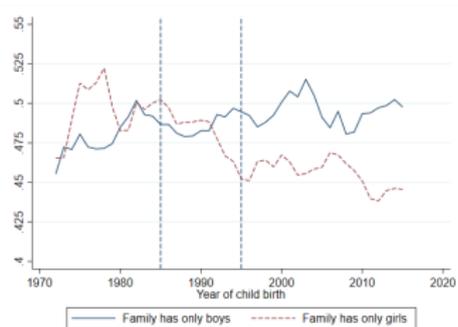
(m) 3rd birth: Top 20% wealth



(n) 3rd birth: Bottom 80% wealth

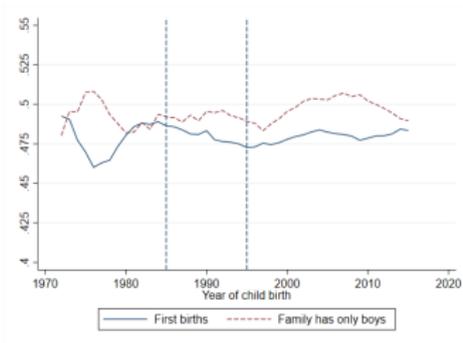


(o) 4th birth: Top 20% wealth

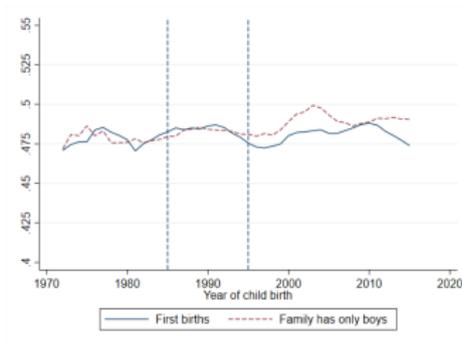


(p) 4th birth: Bottom 80% wealth

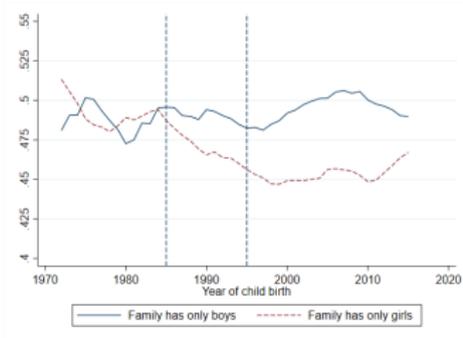
Prenatal selection greater among educated women- 1



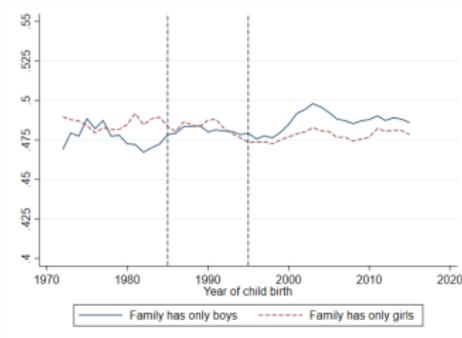
(a) First birth: High educ



(b) First birth: Low educ

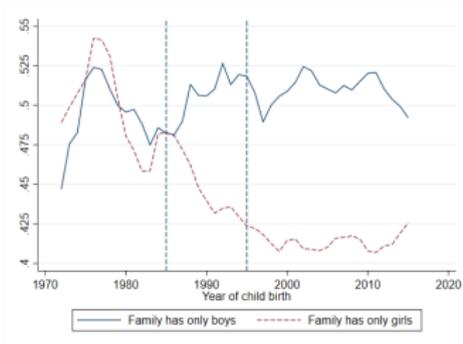


(c) 2nd birth: High educ

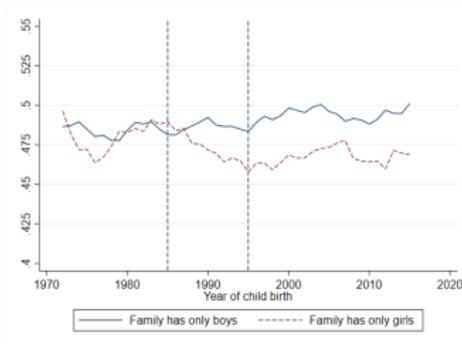


(d) 2nd birth: Low educ

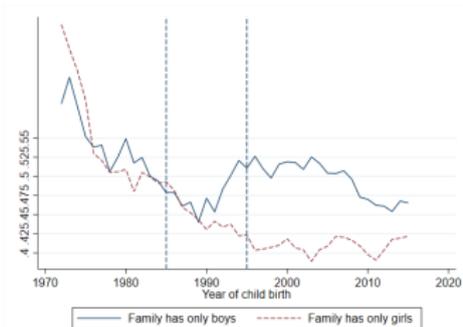
Prenatal selection greater among educated women- 2



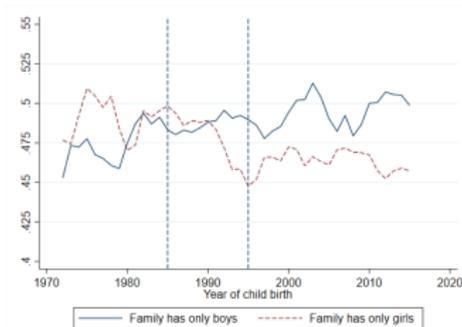
(e) 3rd birth: High educ



(f) 3rd birth: Low educ



(g) 4th birth: High educ



(h) 4th birth: Low educ

Simulation

- Upon conception (C), if a woman decides to perform an ultrasound test (with prob. u) to determine the sex of foetus, she would carry to term for male and abort with prob. a for female. Define joint probability of the decisions as $\hat{s} = ua$, and assume natural proportion of female births is p .

- Observed female births among live births is:

$$\hat{p} = \text{Prob}(\text{female}|\text{livebirth}) = \frac{\text{Pr}(\text{female}|C=1)}{\text{Pr}(\text{livebirth}|C=1)} = \frac{p(1-\hat{s})}{1-\hat{s}.p}$$

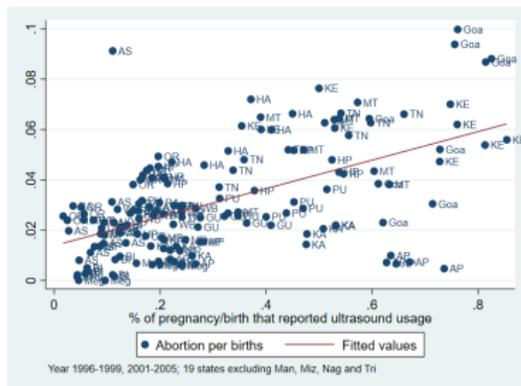
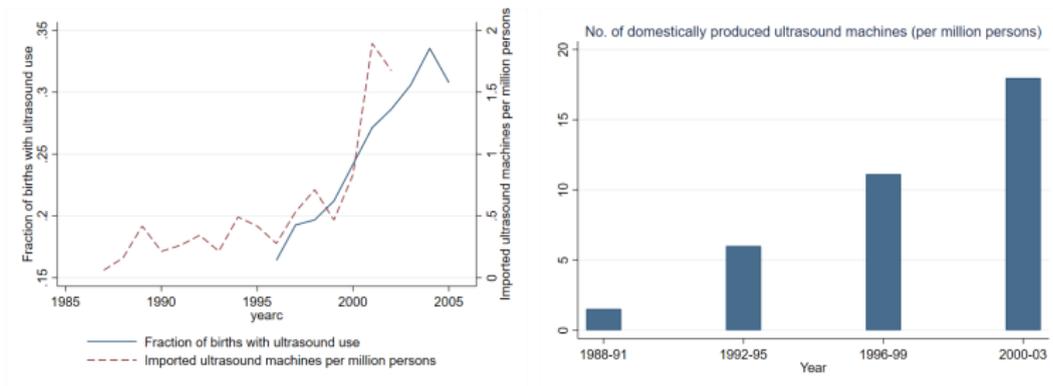
- Prob. of live birth is $\text{Pr}(\text{livebirth}|C) = 1 - \hat{s}p$
- Prob. of a female (live) birth is $\text{Pr}(\text{female}|C) = p(1 - \hat{s})$
($(1 - \hat{s})$ is the prob. that no ultrasound test and abortion conducted)

1. With our estimate of ultrasound adoption on sex ratio as $\hat{\beta}$, we calculate $\hat{p} = p + \hat{\beta}$. (varies by sub-group)
2. Estimate \hat{s} with observed \hat{p} , as $\hat{s} = \frac{p-\hat{p}}{p(1-\hat{p})}$
3. No. of selective abortions = $\hat{N} \frac{\hat{s}p}{1-\hat{s}p}$. p is assumed to be 48.8%, \hat{N} is the number of actual births.

Simulation results

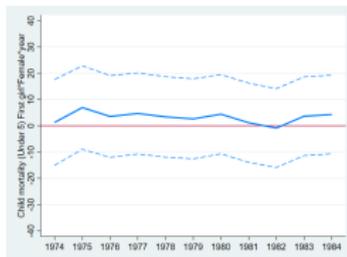
	baseline	high_p
1. Selective abortions per year		
total	277842	281136
upper	166922	168902
lower	388762	393372
2. Selective abortions as % of would-be births		
all	.0123896	.0125346
bord13	1.13	1.14
bord4	2.09	2.12
3. Selective abortions as % of would-be births by preceding births		
b	0	0
g	2.78	2.81
bb	0	0
bg	1.57	1.59
gg	6.14	6.2
bbb	0	0
bbg	0	0
bgg	1.98	2
ggg	4.93	4.97

Ultrasound scanner accessibility in India

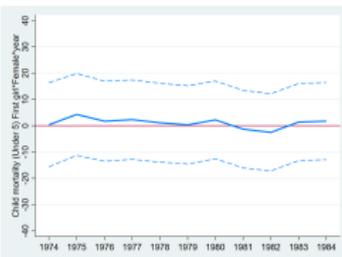


Source: Anukriti et al. (Forthcoming)

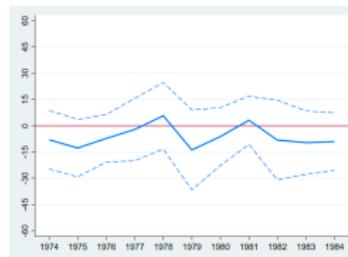
Test of pre-trend



(a) Under-5 EFM (no controls)



(b) Months breastfed (no controls)



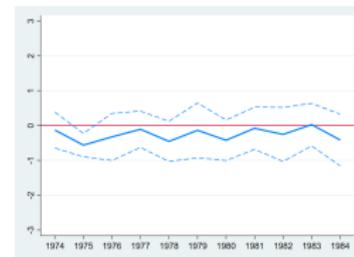
(c) Immunization (no controls)



(d) Under-5 EFM (no controls)



(e) Months breastfed (no controls)



(f) Immunization (no controls)

Source: Anukriti et al. (Forthcoming)

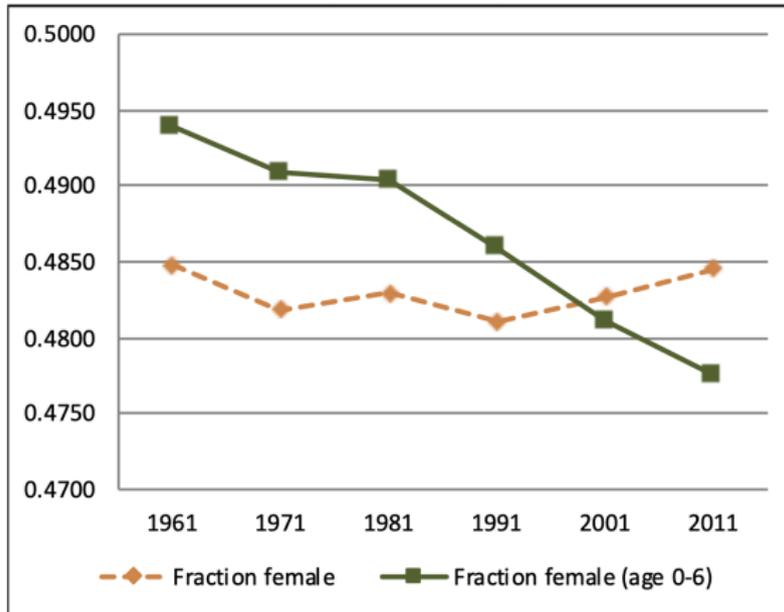
Balance

	FB pre	FG pre	FB post1	FG post1	FB post2	FG post2	FB-FG
Rural	0.68	0.68	0.65	0.65	0.70	0.71	-0.00**
Hindu	0.78	0.78	0.76	0.76	0.75	0.75	-0.00
Muslim	0.11	0.11	0.12	0.12	0.13	0.13	-0.00
Mother educ. (incomplete sec. or higher)	0.24	0.24	0.35	0.35	0.54	0.54	0.00
Father educ. (incomplete sec. or higher)	0.44	0.45	0.55	0.54	0.68	0.68	0.00*
Mother cohort (42-53)	0.11	0.11	0.00	0.00	0.00	0.00	-0.00
Mother cohort (54-79)	0.89	0.89	0.99	0.99	0.31	0.31	0.00
Mother(80-01)	0.00	0.00	0.00	0.00	0.69	0.69	-0.00
Age of mother at birth (12-15)	0.13	0.13	0.11	0.11	0.04	0.04	0.00
Age of mother at birth (16-18)	0.35	0.35	0.32	0.31	0.22	0.21	0.00
Age of mother at birth (19-24)	0.44	0.44	0.47	0.48	0.57	0.57	-0.00
Age of mother at birth (25-30)	0.07	0.07	0.09	0.09	0.14	0.15	-0.00*
Age of mother at birth (31-49)	0.01	0.01	0.01	0.01	0.02	0.02	0.00
Household wealth (2nd quantile)	0.19	0.19	0.18	0.18	0.21	0.21	-0.00
Household wealth (3rd quantile)	0.14	0.13	0.17	0.18	0.19	0.19	0.00*
Household wealth (4th quantile)	0.20	0.20	0.21	0.20	0.19	0.19	0.00*
Household wealth (5th quantile)	0.24	0.24	0.21	0.21	0.17	0.16	0.01***
N	27019	24849	45534	42507	205101	188960	.

GRAPHS

Figure 1
Sex Ratio Trends in India (Fraction of Females)

A: Total and 0-6 Years (Census Data)



Preferences over abortion and fertility

Table 1
Abortion and Son Preferences by Religion

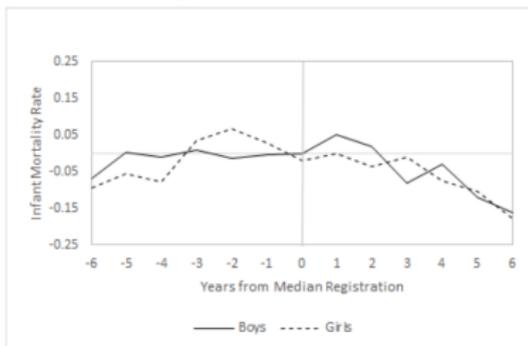
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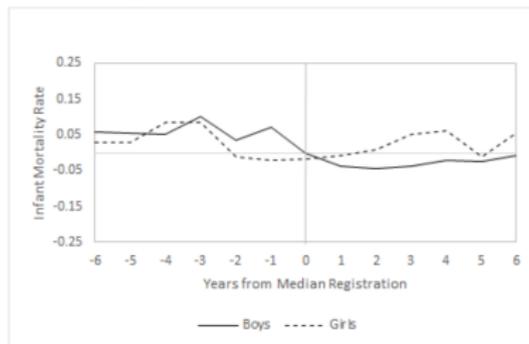
Event studies- land reform

Figure 3: Infant Mortality of Hindu Children

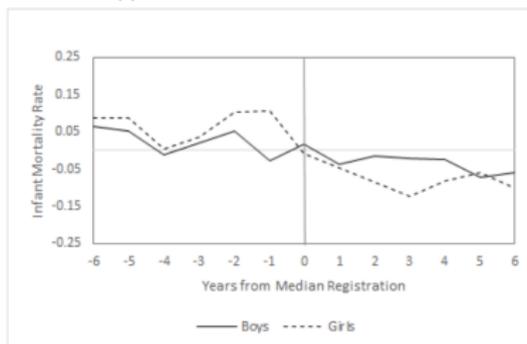
(a) First-born Children



(b) Children with First-born Sisters

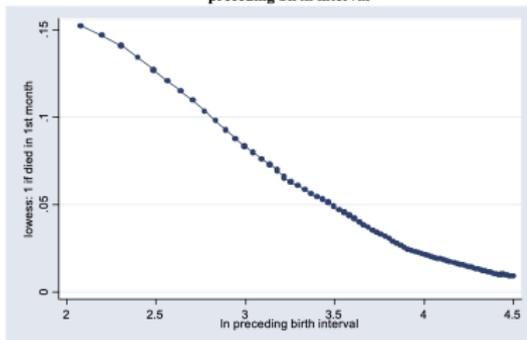


(c) Children with First-born Brothers



Neonatal mortality and birth intervals

Figure 1: Nonparametric (lowess) relation of (predicted) neonatal mortality and preceding birth interval



Notes: The top 1% of observations were deleted.

Figure 2: Density of log birth interval by survival status of preceding sibling

