

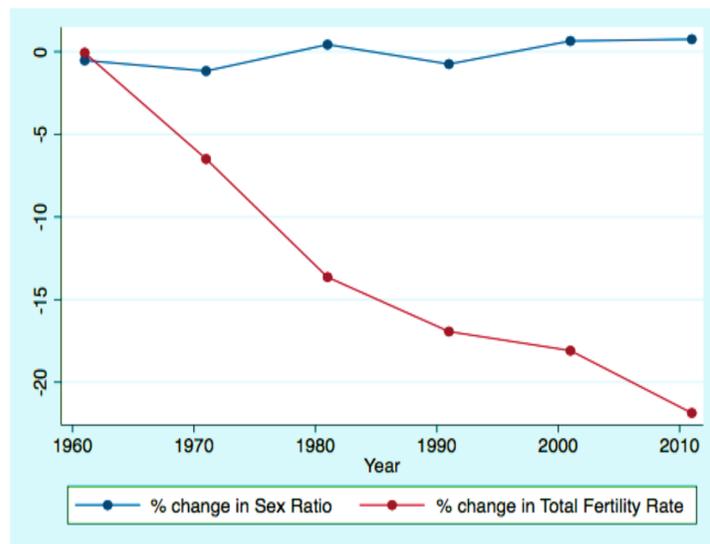
# Does a Legal Ban on Pre-Natal Sex Determination Improve Female Educational Attainment? Evidence from India

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## INTRODUCTION

The study attempts to empirically estimate the causal impact of a legal ban on pre-natal sex determination and female educational attainment in the Indian context. The paper establishes the economic channels linking the direct effect of the Act to the odds of occurrence of a female birth to its indirect effect on female educational attainment. Hence, this study contributes to the scarce literature on the long term impact of this legislation and to the relevance of demographic policies in shaping human capital formation.

Figure 1: Trends in Sex Ratio and Total Fertility Rate in India



Notes: Data has been sourced from the Census of India. The percentage change in sex ratio and percentage change in total fertility rates have been plotted against the respective census years spanning between 1961 and 2011.

1980s: Access to affordable ultrasound technology resulted in a steady decline in female birth.

1994: The Pre-Conception and Pre-Natal Diagnostic Techniques (PCPNDT) Act was introduced in all Indian states except for the state of Jammu and Kashmir.

## DATA AND METHODOLOGY

Individual level data from the National Family Health Survey (NFHS) : 1992-2016

The differences-in-differences framework is employed to compare educational attainment between J&K and the other states of India.

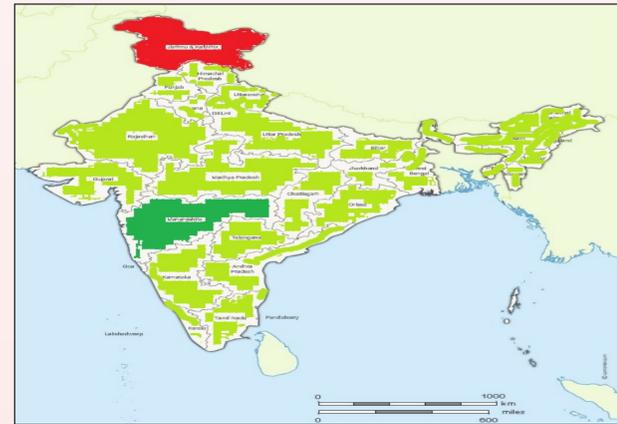


Figure 2: Map of India with state boundaries

### Estimating Equation

$$Y_{ist} = \beta_0 + \beta_1 PCPNDTAct_s + \beta_2 Post_t + \beta_3 (PCPNDTAct_s \times Post_t) + \beta_4 X_{ist} + \beta_5 S_{st} + e_{ist}$$

$Y_{ist}$  denotes education received in years.  $\beta_3$  is the interaction term coefficient derived from differences in outcomes across states and time.  $X$  and  $S$  are the individual level and state level controls respectively.

### Probit Model

$$\tau [Y | T = 1, S = 1, X] = E[Y^1 | T = 1, S = 1, X] - E[Y^0 | T = 1, S = 1, X] = \Phi(\alpha + \beta + \gamma + X\theta) - \Phi(\alpha + \beta + X\theta)$$

$Y$  = probability of birth of girl child "desired outcome" ( $Y=1$ ) is conditional on covariates ( $X$ ), with  $\alpha$  and  $\beta$  being defined as the time and group effects which are not constant across the group and time dimensions respectively.

## RESULTS

Table 1: Average Marginal Effects on Probability of a female birth

	Average Marginal Effect	z-score	Robust Standard Error
PCPNDT Act	0.0102	1.55	.006578
Post	-0.01929	-3.38	.0057152
PCPNDT Act x Post	<b>0.02559</b>	4.88	.0052452

Notes: The Average Marginal Effects have been computed to provide estimates of the probability of the occurrence of a female birth. Robust standard errors are clustered at the state level. Number of observations is 2,01,876.

The implementation of the law has increased the probability of a female birth by 2.56%. The z-score of the interaction term implies that the effect was different from zero at the 5% level.

Table 2: Impact of the PCPNDT Act on Years of Education for Females

	(1)	(2)	(3)
Constant	6.284*** (3.52e+12)	-3.540*** (-7.66)	3.141 (0.46)
PCPNDT Act	-1.183* (-2.84)	-0.252 (-1.00)	-1.127 (-1.76)
Post	2.725*** (1.52e+12)	1.725*** (19.60)	-1.706* (-2.40)
PCPNDT Act x Post	0.810* (2.49)	0.401 (1.69)	<b>2.154*** (8.26)</b>
Individual Controls	No	Yes	Yes
State Controls	No	No	Yes
No. of Individuals	149911	148832	148832
Adjusted R-squared	0.1038	0.3287	0.3462

Notes: This table reports results obtained from regressions on education. T-statistic is in parentheses, where \*  $p < 0.05$ , \*\*  $p < 0.01$  and \*\*\*  $p < 0.001$ . Standard errors are clustered robust at the state level.

The differences-in-differences estimator, is positive and significant at the 0.1% level. This explains that the rest of India experienced an increase in educational attainment by 2.154 years between the pre-PCPNDT Act period and post-PCPNDT Act period, relative to the change in years of education that occurred in J&K (-1.706). It can be inferred that while female educational attainment in J&K was ahead of the rest of the country before 1996, the other Indian states experienced a significant increase in education while J&K witnessed a decline in the same over time. Hence, the findings reaffirm the main hypothesis of the study; the increase in female education in the treatment group can be attributed to the Act.

## ROBUSTNESS CHECKS

Estimated the difference in the impact of the PCPNDT Act between J & K (control group) and neighboring districts to J & K from the treated group > Coefficient is positive and significant at the 5% level.

Placebo Tests > Placebo Treatment has a positive insignificant effect on education ; treatment has an insignificant effect on placebo outcomes

## CONCLUSIONS

The Act has been an effective policy instrument by producing another relevant policy outcome in terms of educational attainment, other than its direct intended effect on balancing skewed sex ratios. Hence, this research paper has been the first attempt to contribute to the long-run consequential impact of this demographic policy.

One of the possible extension that can be made to this study is including males in the sample and introducing a triple difference approach, facilitating the estimation of the gender gap in education. In the context of India, where son preference is prevalent, it would also be prudent to calculate separately, this gender gap in the cases of one-child families and families with two or more children.