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FERTILITY AND MOTHERS' LABOUR FORCE PARTICIPATION IN RURAL INDIA

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ABSTRACT

This paper estimates the causal effect of having young children aged 0 to 5 years on mothers' labour force participation in rural India. In order to address the potential endogeneity in the fertility decision, I exploit Indian families' preference for having sons. I leverage exogenous variation in the gender of older children aged 6+ years as an instrumental variable for having younger children aged 0 to 5 years in the family. IV estimates show that the mothers' participation is significantly reduced by 9.9% due to the presence of young children aged 0 to 5 years in the household, with the negative effect mostly driven by mothers belonging to the highest income quartile; mothers with high education; and mothers residing in nuclear families.

Keywords: Female labour force participation, Fertility, Instrumental variable, Local average treatment effect (LATE), India, Compliers

JEL classification: J13, J22, C26

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"I myself would like one son.
And I don't want many children.
But it isn't a question of what I want.
Until I have a son, I won't stop having children."
-- (Clark, 2000)

1. INTRODUCTION

Motherhood has been stated as a major contributor to lower labour force participation among women globally because of the biologically dictated burden of childbearing and childrearing on the mothers. In India, gender roles defined by society disproportionately place onus of raising children on mothers, leading to their withdrawal from the labour force.

In this paper, I estimate the causal effect of having young children aged 0 to 5 years on mothers' labour force participation in rural India wherein almost 70 per cent of the female population lives. According to the 2011 Indian Census, 79% of the female population aged 15-49 years in rural India has been married at least once in their lifetime, and among them, 85% have at least one child. Since mothers comprise a major share of the female population, gauging how fertility affects mothers' participation decision is important from a policy perspective and will help policy makers to make informed policy decisions to raise female labour force participation. For example, by investing towards the education of girls to break cultural setbacks and encouraging women's labour force participation by projecting child care as a shared responsibility in the home; introducing family-friendly policies at work; and improving quality and quantity of child care facilities, schools and day care facilities.

This study contributes to the literature in the following two ways: first, to the best of my knowledge, this is the first attempt in the Indian context to estimate the magnitude of the causal effect of fertility on mothers' labour force participation decision. Although there are a number of studies concluding a robust correlation between fertility and female labour force participation in India[1], there are no studies capturing the causal effect. This study also characterizes the subpopulation of mothers who are more likely to withdraw from labour market in response to having young children aged 0 to 5 years.

Second, it specifically focuses on capturing the magnitude of the effect of the presence of pre-school children aged 0 to 5 years on mothers' participation decision. The existing studies[2], covering other countries, estimate the effect of total fertility on mothers' participation, i.e. effect of having an additional child on mothers' participation, without taking into account the age of the child. However, there are differential effects on the participation decision of the

[1] See, for ex. Das, Jain-Chandra, Kochhar, & Kumar (2015); Klasen & Pieters (2012); Klasen & Pieters (2015); Bhalla & Kaur (2011)

[2] See, for ex. Rosenzweig & Wolpin (1980); Angrist & Evans (1998); Lee (2002); Fleisher & Rhodes (1979)

mother depending on the age of the children. A pre-school aged child, for example, requires more care and attention of the mother compared to a child who is 6+ years and consequently poses more responsibility onto mothers. Also, mother's physical presence is deemed necessary in the early years of childhood, thus, making it difficult for mothers with young children to work.

The main challenge involved in estimation of this causal effect is that fertility decisions and mothers' labour-supply are jointly and simultaneously determined. Mothers who decide to have (more) children are not a random subgroup of the population. For instance, women who are more family oriented and thus, have lower labour market attachment or earnings potential, might choose to have more children as compared to women who are more career-oriented and have higher labour market attachment.

To deal with this problem of endogeneity, I exploit the preference of Indian parents to have at least one son in the family, as an instrument for having younger children. Parents without any male child aged 6+ years are more likely to have younger children aged 0 to 5 years as compared to parents who already have a male child. Since the gender of children is virtually randomly assigned, a dummy variable indicating whether parents already have a boy child or not aged 6+ years- conditional on the number of children - serves as a plausible instrument for further childbearing .[3]

The identification strategy is reminiscent of Angrist & Evans (1998) and Kugler & Kumar (2017), who employ gender of children as an instrument for fertility. The motivation behind using this instrument in this paper is derived from studies like Mutharayappa, Choe, Arnold, & Roy (1997) and Clark (2000); showing that India is characterized by a patriarchal family system where parents prefer sons to daughters (also termed as son-preference) and desire at least one son in the family. In order to the achieve ideal number of sons, parents in most cases, continue having children until the ideal number of sons are achieved. This practice is often named as Differential Stopping Behaviour(DSB).

I use publicly available data from the latest wave of India Human Development Survey (IHDS) conducted in 2011-12 for the empirical analysis. The results suggest that mothers' participation significantly reduces by 9.9% due to the presence of younger children in the household. The negative effect seems to be driven by mothers with higher education, residing in nuclear families and belonging to families from highest income quartile. These results bring attention towards the need for policies introducing high skilled and white-collar job opportunities to increase women's participation rate, especially to attract women with high level of education to the labour market. In addition, investment in quality and quantity of formal child care facilities,

[3] There are concerns about sex-selective abortions in India, in which case the instrument is no longer randomly assigned and the estimates may be biased. To address this concern, I carry out various sub-sample analysis and I discuss more about this in section 5.2.

schools and day care facilities is required as a substitute for informal child care facilities to help mothers residing in nuclear families and incentivize mothers who are out of labour force to invest their time on child care and development. And publicly funded information campaigns that encourage and value women as workers and project child care as a shared responsibility in the home, are likely to remove some of the guilt that women often experience when they leave children behind to go out to work (Das & Žumbytė, 2017).

Instrumental variable approach estimates the local average treatment effect only for the sub-sample of the population called compliers, who, in this case, are the mothers who would go on to have an additional child if they do not have a boy aged 6+ but would not choose to have another child if they already have a boy aged 6+ years.[4] In this paper, I profile the compliers and comment on their size and characteristics' distribution. I also answer if the LATE for compliant population can be extrapolated to the other populations. I find that the compliers are positively selected and significantly different from the general population. However, the negative effect of the presence of young children on mothers' labour supply is homogenous across the whole population and thus, the results are externally valid.

The remainder of the paper proceeds as follows. Section two reviews some relevant literature. Section three and four describe the data and methodology used in this study. Section five discusses the relevance and validity of the instrument. Section six presents the main results of the paper and finally, section seven concludes.

2. LITERATURE REVIEW

There is a vast literature on the determinants of female labour force participation in India that points towards both demand and supply side factors in play. On the supply side, factors such as education, social group, expected wages, marital status, presence of children in household, income level of the family are crucial determinants of female labour force participation (FLFP). On the demand side, labour market conditions like availability of jobs, infrastructure and changes in the sectoral structure- e.g. declining share of agriculture and manufacturing which employ more women - have been found to affect female participation. This paper looks at one of the determinants of female labour supply decision, namely fertility.

Globally, there is an extensive literature attempting to explain the causal effect of fertility on female labour supply. The evidences have been mixed with some studies finding very strong negative effect of fertility (see, e.g. Rosenzweig & Wolpin (1980); Angrist & Evans (1998),

[4] IV fails to identify the effects for always-takers (i.e. sub-population of mothers who always choose to have a younger child irrespective of having a boy child aged 6+ years already or not) and never-takers (sub-population of mothers who always choose 'NOT' to have an additional child irrespective of having a boy child among children aged 6+ years or not).

Fontaine (2017), Lundborg, Plug, & Rasmussen (2017), etc.); while some conclude no significant effect of fertility on female labour supply (see, e.g. Lee (2002); Fleisher & Rhodes (1979) etc.). Another study by Trako (2016) on developing country in the Balkans find that fertility in fact raises the labour force participation of both parents. These mixed evidences suggest that the relationship between fertility and mothers' labour supply is complex in nature and is very culture and demographic specific, thus, requiring greater attention.

There are several challenges in estimation of uni-directional effect of fertility on labour supply. First, the two phenomena may be explained by common factors such as education. The education level of mothers may influence both, their career opportunities and their childbearing behavior. Second, there is the problem of reverse causality as both fertility and labour supply decisions are jointly determined. For example, a woman might decide not to participate if there is a child to be taken care of in the house or she may decide to participate more in order to contribute to family's income and thus, material investment towards child's welfare. On the other hand, if a woman is ambitious and wishes to work then she may decide to delay motherhood (or have fewer children), or alternatively, women with lesser labour market attachment might self-select into motherhood and have more children. Because of this endogenity problem, simple OLS would generally provide biased estimates (Killingsworth & Heckman, 1986).

There are many papers using instrumental variable and difference-in-difference estimation to tackle this problem of endogeneity. In the literature, the following two empirical strategies have been commonly used to handle this endogeneity problem by exploiting an exogenous source of variation in the number of children through Instrumental Variables technique. The first strategy proposed by Rosenzweig & Wolpin (1980) exploits the natural occurrence of multiple first births as an exogenous source of variation in number of children to estimate the effect of fertility on labour supply. The second strategy, first introduced by Angrist & Evans (1998), exploits the preference for mixed sex-composition of the children of American parents. They proposed that parents of same-sex siblings are more likely to have an additional child and thus, use this as an instrument for having a third child among women with at least two children.

Preference for Sons in India

In this paper, I exploit prevalence of son preference in Indian society as an exogenous source of variation in the presence of young children aged 0 to 5 years. The term 'son preference' refers to the attitude that sons are more important and more valuable than daughters (Clark, 2000). In India, for example, adult sons are expected to provide economic support for their parents (Das N. , 1984). In contrast, daughters may represent a substantial economic burden in places where their parents provide a dowry. The bridal dowry practice also often entails loss or mortgage of family land at the time of a daughter's marriage.

In India, marriage is exogamous for women, who leave their natal family village to marry into families in villages much further away to avoid marrying a possible relative. Sons on the other hand care for parents and natal family members in their old age by remaining with the natal family and working on the family land.

Thus, Indian families express a strong preference for having at least one son, and often at least two sons, among their children (Mutharayappa, Choe, Arnold, & Roy, 1997).

In order to achieve ideal number of sons, parents often practice son-preferring Differential Stopping Behaviour (DSB). The most common stopping rule being, continuing having children until ideal number of sons are achieved. In fact, some studies have also found that couples with more sons are more likely than couples with more daughters to use contraception because they do not want any more children (Clark, 2000). The birth of a daughter with no older brothers causes her parents to exceed their intended fertility (Jayachandran & Pande, 2017). Kugler & Kumar (2017) exploit this preference to explore quantity-quality tradeoff of children and instrument family size with the gender of the first child, as parents tend to have more children if the firstborn is a girl.

A woman from a village in India when asked about her plans to have children, said “I myself would like one son. And I don’t want many children. But it isn’t a question of what I want. Until I have a son, I won’t stop having children” (Clark, 2000). This statement itself hints towards the intense and strong desire for sons in rural India. I leverage exogenous variation in the gender of older children aged 6+ years as an instrumental variable for having younger children aged 0 to 5 years in the family.

3. DATA

I use data from the latest wave of India Human Development Survey (IHDS) conducted in 2011-12. IHDS is a nationally representative, multi-topic survey of 41,554 households in 1503 villages and 971 urban neighborhoods in 33 states across India. Data are publicly available through ICPSR (Interuniversity Consortium for Political and Social Research). The first round of interviews was completed in 2004-05 and second round of IHDS re-interviewed 83% of the households in 2011-12 (N=42,152). The survey contains a wide range of information on individual demographics and socio-economic characteristics like fertility, education, employment, health, income and consumption level of the household. The employment data is very detailed and the women are asked about work status, number of hours per day and number of days spent by a woman in the year preceding the survey in all types of economic activities (own farm work, non-farm business, regular salaried/wage work in farm and non-farm set-up).

For the analysis, I limit the analysis to mothers in rural India, aged between 15 and 49 years old with at least one child aged 6+ years and no children aged 18+ years. Women without any children older than 5 years at the time of the survey are excluded from the sample because the identification strategy exploits the gender of children aged 6+ years in the family as the instrument for having younger children aged 0 to 5 years. Mothers with children older than 18 years at the time of the survey are also excluded from the sample because of the following two reasons. Firstly, for these women it is highly likely that their elder children start working or move out of the household, thus, affecting the participation of the woman through channels other than the presence of younger children. Secondly, these women are less likely to have very young children aged 0 to 5, which is the variable of interest. In my data, only 17% mothers with children over 18 years have young children aged 0 to 5 years, whereas this number is 39% for mothers without children over 18 years.

I also did some data consistency checks and eliminated from the analysis the mothers for whom i) the number of children in the household did not match the reported number of children ever born; ii) the number of children alive did not match the reported number; and, iii) the numbers of sons and daughters in th household did not match the reported number. The final sample consists of 7553 observations of rural mothers aged 15-49 years, having at least one child aged 6+ years and no children older than 18 years.

Descriptive Statistics

Demographic and labor-force participation descriptive statistics for the mothers are reported in table 1. The table includes variables such as mothers' age, education, household size, religion, caste, among others. Descriptive statistics of the data indicate that the labour force participation rate in rural India for mothers aged 15-49 with at least one child above 6 years and no child above 18 years is only 56% (table 1). The mean age for the sample of mothers is 32.5 years and the mean education is just above primary education. Mothers in the sample have on an average 2.67 children, and 38% of them have at least one child aged 0 to 5 years.

Table 1:

Descriptive Statistics.

Variable	Mean	Std. Dev.	Min	Max
Work (Dep variable)	0.561	0.496	0	1
Any child aged 0 to 5 years (kid0_5)	0.393	0.488	0	1
No son aged 6+ (noson6plus)	0.226	0.418	0	1
Number of kids aged 6+ (Nkid6plus)	2.126	1.024	1	8
Any daughter aged 6+ (Daught6plus)	0.686	0.464	0	1
Mother-in-law in HH	0.396	0.489	0	1
Father-in-law in HH	0.278	0.448	0	1
Share of non-working married women	0.301	0.446	0	1
Joint family	0.433	0.496	0	1
Family size (excluding own kids)	3.325	1.974	2	12
Age	32.407	4.841	19	49
Education	1.199	1.114	0	4

Marital status	0.950	0.217	0	1
Caste (Base- Forward/Upper/General)	2.196	0.991	1	5
Religion	1.283	0.761	1	5
HH Assets	14.105	6.013	1	31
HH Highest male education	1.733	1.202	0	4
Per capita income excl. woman (per 10k INR)	1.579	2.805	-7.82	80.96
No. of children (Children alive)	2.667	1.082	1	10
Observations: 7553				

Notes: This table reports the descriptive statistics for the sample of mothers aged 15-49 years with at least one child aged 6+ years and no children aged 18+ years.

Table 2 reports that, for mothers with no children aged 0 to 5 years, labour force participation rate is 60.6%, however it is only 50% among mothers with younger children. This difference in participation for mothers with and without pre-school aged children is statistically significant at the 1% level, indicating a strong correlation between presence of young children and mothers' labour supply decision.

Table 2:

Participation rate among mothers with and without younger children aged 0 to 5 years.

	Sample of mothers		
	Without kid aged 0 to 5 years (1)	With kid aged 0 to 5 years (2)	Difference (1)-(2)
Work	0.606	0.501	0.105***
Observations	4,584	2,969	

*Notes: This table reports the participation rates for mothers with and without a child aged 0 to 5 years. Sample includes mothers aged 15-49 years with at least one child aged 6+ years and no child aged 18+ years. * Indicates statistical significance at 10%. ** Indicates statistical significance at 5%. *** Indicates statistical significance at 1%.*

The data also indicates that there is potential selection into childbearing and fertility. As shown in panel A of table 3, total fertility of mothers decreases with higher education. Uneducated women have an average fertility of 3, whereas among women with tertiary education, the average fertility is 1.95. Also, lesser educated women have on an average higher number of younger children aged 0 to 5 years.

Indian society is characterized as highly patriarchal society and co-residence of women with parents-in-law is ubiquitous, especially in rural India where most of the families are involved in family farming activities. There is evidence from the past literature that mothers-in-law in the household affect the fertility decision of the women through various channels like providing child care support to the women; and imposing own-preference for number of grand children and their gender on daughter-in-law. Statistics reported in panel A of table 3 show that fertility decisions also seem to be associated with presence of mother-in-law in the household. About 61% of women residing with mothers-in-law have younger children, while only 49% women without mothers-in-law residing in the same house have younger children aged 0 to 5 years. Also, women residing with their mothers-in-law have on an average higher number of younger children aged 0 to 5 years and on an average work less as compared to women not residing with their mothers-in-law.

Also, mothers in the households belonging to higher quintiles of per capita household income (excluding woman's own income) tend to have lesser number of children on average as compared to mothers belonging to lower quintile of per capita household income (table 3, panel B).

These facts are suggestive of the fact that fertility is not randomly assigned among women and there may be potential self-selection involved into childbearing and fertility based on various observed and unobserved factors. Thus, simple cross-sectional correlation between mothers' labour-force participation and fertility would generally provide biased estimates. In this paper, I use instrumental variable technique to deal with this problem of endogeneity.

Table 3:
Evidence for potential self-selection into childbearing.
Panel A.
Education and presence of mother-in-law

	Mothers with different education level					Mother-in-law in the household	
	None	Primary	Secondary	Higher sec	Tertiary	No	Yes
# of children	3.081	2.656	2.395	2.110	1.952	2.707	2.605
Any Kid 0 to 5	0.425	0.387	0.360	0.405	0.388	0.358	0.447
# kids aged 0 to 5	0.643	0.521	0.466	0.470	0.418	0.493	0.614
Work	0.638	0.614	0.482	0.398	0.520	0.589	0.518
Observations	2818	1407	2,608	447	273	4560	2993

Panel B.
Per capita income of the HH excluding woman's own income

	Income Quintiles (Per capita income excluding women's own income)				
	1	2	3	4	5
# of children	2.992	2.952	2.711	2.459	2.222
Any Kid 0 to 5	0.437	0.455	0.421	0.356	0.295
# kids aged 0 to 5	0.636	0.671	0.585	0.462	0.348
Work	0.772	0.607	0.568	0.483	0.374
Observations	1511	1518	1503	1511	1510

Notes: The tables report the evidence towards self-selecting into childbearing. Average number of total children, presence of child aged 0 to 5 years, no. of children aged 0 to 5 years and participation rate are reported for mothers with different education levels; belonging to different income quintiles; and residing with/ without mother-in-law in the household. Sample consists of mothers aged 15-49 years with at least 1 child aged 6+ and no child over 18 years.

4. Empirical Model: Female Labour Supply

I, first, estimate the effect of family size on children's educational outcomes using the following ordinary least squares (OLS) model:

$$Work_i \;=\; \beta_0 + \beta_1\,\mathrm{kid0\_5}_i + \gamma\,\mathrm{X}_i + \;\mu_i$$

'*Work$_i$*' is a binary variable for mothers' participation as defined by Usual Principal Subsidiary Status. The Usual Principal Subsidiary approach of measuring unemployment looks at the principal activity and subsidiary activity status of the worker. According to this, all individuals who are either unemployed or outside the labour force, but have worked for a minor period of not less than 30 days during the reference year are classified as subsidiary status workers. In this study, the dependent variable 'Work' takes the value 1, when woman worked>240hrs in the last year and takes 0, otherwise. Variable '*kid0_5$_i$*' is the independent variable of interest and captures the presence of pre-school children aged 0 to 5 years. It takes the value 1, if the mother has a young child aged 0 to 5 years and 0 otherwise. X_i is the vector of individual and household level covariates and state fixed effects and μ_i is the error term.

Coefficient $\beta_1$would capture the correlation between presence of pre-school children and mothers' participation. β_1 would, however, provide the causal impact of pre-school children aged 0 to 5 years on mothers' participation only if presence of a young child is exogenously determined. On the other hand, if decisions about fertility and labour force participation are simultaneously determined, the OLS estimate of β_1 is subject to endogeneity bias and is unlikely to capture the casual effect of fertility on mothers' participation.

Therefore, I rely on Instrumental Variable method and estimate the two-stage least square (2SLS) model to estimate the causal effect of having young child aged up to 5 years on mothers' labour supply decision.

First stage equation:

$$kid0\_5_i \;=\; \alpha + \beta\,\mathrm{noson6plus}_i + \gamma\,\mathrm{X}_i + \;\omega_i$$

Structural equation:

$$Work_i \;= \delta + \theta\, kid0\_5_i + \;\emptyset\,\mathrm{X}_i + \varepsilon_i$$

Variable $'kid0\_5'$ is the independent variable of interest and captures the presence of children aged 0 to 5 years. Since this variable is endogenous to the mothers' participation, I instrument it with $'noson6plus'$ which indicates that the mother doesn't have a son aged 6+ already. This instrument is drawn from literature indicating that Indian parents are "son preferring" and desire at least one boy child in the family. In this context, mothers without a boy child are more likely to have another child. Variable '*noson6plus*' is a binary variable indicating whether the mother already has a boy child aged 6 or above. It takes the value 1, if the mother doesn't have a son aged 6+ and 0, otherwise. So, β captures the effect of not having a son aged 6+ on the probability of having a younger child aged 0 to 5 years.

X is a vector of following control variables and is drawn from the literature on determinants of female labour force participation in Indian context:

- '*Nkid6plus'* capturing the total number of children aged 6+ years. As having a younger child aged 0 to 5 years mechanically also depends on the number of children a woman already has. I also tried with the quadratic terms of Nkid6plus and the dummies for each number, to capture the non-linearity. But they turn out to be insignificant and increase the standard error of the estimates. As a robustness check, I also used mothers' age fixed effects instead of using Nkid6plus to proxy the number of children aged 6+ years.

- Social status and wealth of the household proxied by- i) Income per capita of the household excluding woman's own earnings; ii) assets index and its square; and iii) highest education of the male in the household. The asset index is calculated based on the number of durable consumer goods and housing related assets possessed by the household. These assets include items such as television, fridge, telephone, motor cycle, washing machine, etc. and ranges from 0 to 33.

- Other individual level characteristics of the mothers like *age* and *age squared; education*; *marital status.*

- Social group like *Caste* and *Religion* to capture the direct impacts of culturally or religiously determined restrictions on women, which are expected to be strongest among Muslim and high-caste Hindu households (Klasen & Pieters, 2015)

- Variables for household composition: i) binary variable indicating presence of daughter aged 6+ (no*daught6plus*); ii) whether mother-in-law resides in the household (*MIL_in_HH*); iii) whether father-in-law resides in the household (*FIL_in_HH*); iv) joint family or not (*jointfamily*)- defined as co-living of two or more ever-married women together; and v) family size excluding woman's own children.

- Share of unemployed married women in the household, excluding the surveyed woman. This captures the effect of social-norms in the family. Families with higher share of un-employed married women (other than the woman of interest) are expected to have stricter social norms restricting the woman the work (*share_nonWK_married*). This is calculated as the ratio of 'number of non-working married women in the household excluding the reference woman' and 'total number of married women in the household excluding this woman'.
However, women living in nuclear families do not have any other married women in the household and in such cases this variable takes the value 0 and I am controlling for the joint family to capture these women.

- Dummy variable for states to control for state fixed effects.

5. Instrument relevance and validity

5.1. Instrument relevance: the first stage

Estimation using instrumental variable requires that the instrument is relevant. In my application, this would mean that not having a son aged 6 or above is strongly correlated with the presence of young child aged 0 to 5.

I regress the endogenous variable, kid0_5, on the instrument, noson6plus, controlling for various covariates discussed above. The results indicate that not having a male child increases the probability of having younger children by 32.4% (table 4, column 1). This relation is statistically significant at the 1% level. The first stage F-statistics is 509.9. The full results of first-stage regression are reported in table A1 in the appendix.

I also carry out various sub-sample analyses in order to confirm son-preference in the Indian context. The results are reported in table 4. It can be seen that for sub-sample of mothers with one child aged 6+ years, not having a boy child increases the probability of having an additional child aged 0 to 5 years by 7.9%. Among mothers with two children aged 6+ years, mothers with mixed-sex and two daughters are 7% and 39.5% more likely to have another child aged 0 to 5 years, respectively, as compared to mothers with two sons. For the sample of mothers with at least two children aged 6+, mothers with mixed- sex children and all daughters are 3.8% and 40% more likely to have another child aged 0 to 5 years as compared to mothers with all sons. The results are significant at the 1% level. The results corroborate with the fact that Indian parents exhibit strong son-preferring behavior. Parents with all daughters go on to have more children in the hope of having at least one male child in the family. Parents with mixed-sex composition of children, as well, are more likely to go on to have more children as compared to parents with all sons. The preference for sons is significantly stronger as compared to preference for mixed-sex composition of children or daughters, upholding the relevance of the instrument.

Table 4:
Validation analysis for son-preference in India

			Mothers with two children aged 6+		
Dep Variable: Kid0_5	**Pooled sample of all mothers**	**Mothers with one child aged 6+**	**All sex composition**	**Sub sample with two sons or mix-sex composition**	**Sub sample with Two daughters or mix-sex composition**
First-stage	(1)	(2)	(3)	(4)	(5)
All daughters aged 6+	0.324***	0.079***	0.395***		
Mix-sex composition aged 6+			0.070***	0.069***	-0.323***
Observations	7,553	2,272	3,005	2,554	2,028

	Mothers with at least two kids aged 6+ years		
Dep Variable: Kid0_5	**All sex composition**	**Sub sample with all sons or mix-sex composition**	**Sub sample with all daughters or mix-sex composition**
First-stage	(6)	(7)	(8)
All Daughters aged 6+	0.403***		
Mix-Sex composition aged 6+	0.038***	0.037***	-0.365***
Observations	5,281	4,654	4,097

*Notes: This table reports the estimates of the likelihood of having child aged 0 to 5 years for various sub-samples of mothers with different sex-composition of children aged 6+ years, i.e. all sons, mix-sex or all daughters. Sample consists of 7553 mothers from rural India, aged 15-49 years. All the specifications include controls. * Indicates statistical significance at 10%. ** Indicates statistical significance at 5%. *** Indicates statistical significance at 1%*

5.2. Instrument validity

In addition to the instrument being relevant, it should also be as good as random and satisfy exclusion restriction.

Even though the presence of a boy child aged 6+ years conditional on the number of children aged 6+ years is plausibly randomly assigned, there exist some concerns. One concern is the presence of sex-selective abortions. In this case the instrument is not randomly assigned anymore and the estimates are biased. In the context of India, this is an important concern as India is highly son-preferring society with sex ratio of children less than 7 years biased towards males. According to Census (2011), there are only 943 females per 1000 males in India. The child sex ratio (aged 0-6 years) has fallen drastically from 962 girls per 1,000 boys in 1981 to 945, 927, and 918 girls per 1,000 boys in the three successive Censuses of 1991, 2001, and 2011, respectively (Jejeebhoy, Basu, Acharya, & Zavier, 2015).

Jha, et al. (2011) found that the conditional sex ratio for second-order births when the firstborn was a girl fell from 906 per 1000 boys (99% CI 798–1013) in 1990 to 836 (733–939) in 2005; an annual decline of 0.52%. They state that selective abortion of girls, especially for pregnancies after a firstborn girl, has increased substantially in India over the period, from 1991 to 2011. However, the sex ratio for any firstborns or for second-order births, if the firstborn was a boy, did not change between 1990 and 2005, staying near the natural range of 950–975 girls per 1000 boys.

Anukriti (2018) examined an Indian program called Devi Rupak that seeks to lower fertility and the sex ratio and resolve the fertility-sex ratio trade-off. The program provides financial incentives to the parents that have either one child (INR 500 for a girl, INR 200 for a boy) or two daughters and no sons (INR 200). She found that son-preference in India is so strong that the sex ratio at birth worsened as high son-preference families are unwilling to forgo a son despite substantially higher benefits for a daughter.

This gender imbalance is usually attributed to the widespread practice of sex-selective abortions and neglect of girl children in the early years of life. In the literature there are consistent estimates of about 2% sex-selective abortions out of total annual pregnancies (Rosenblum, 2014).

Using United States census data for Indian, Korean and Chinese parents, Almond & Edlund (2008) find that sex-ratio of oldest child is biologically normal, but that of subsequent children is heavily male biased, especially when there was no previous son. The sex ratio of the second child was 1.17 (854 girls per 1000 boys) if the first child was girl and at third parity it was reported as 1.51 (662 girls per 1000 boys) if the first two children were girls. Selective abortion of girls, especially at higher parity and without any previous son, has increased substantially in India. Most of India's population now live in states where selective abortion of girls is common.

Previous studies have also documented that the extent of practice of sex-selective abortion varies significantly across different religions. Muslims, who comprise 14% of India's population, show no significant increase in male-biased sex ratios in the post-ultrasound period. This is attributed to the greater abhorrence of abortions among Muslims (Bhalotra, Figueras, & Iyer, 2018). Using Canadian census data, Almond, Edlund, & Milligan (2009) find that Hindu and Sikh immigrants exhibit male-biased sex ratios while Muslim and Christian immigrants from South Asia instead have larger family sizes. The strong condemnation against infanticide expressed in Christianity and Islam carry over into significantly lower degrees of prenatal sex selection among members of these religious groups (Almond, Edlund, & Milligan, 2009). While immigrants of Christian or Muslim religion preferred sons as evidenced by continued fertility following only daughters, there is little evidence of sex selection (Almond & Edlund, 2008).

One way to check whether the instrument is as good as random is to do balancing check, i.e. to examine whether mothers differ in demographic characteristics by the instrument, controlling for the total number of children aged 6+ years (as the presence of younger children aged 0 to 5 years mechanically depends on the number of children women already has) and state fixed effects. Table 5 reports the difference in means in the demographic characteristics of mothers with and without a son aged 6+ years, controlling for the state fixed effects and the number of children aged 6+. I find no statistically significant difference in the demographic characteristics like mothers' own education, highest education level of males in the family, presence of father-in-law and share of non-working women in the household between mothers with and without a son aged 6+ years. However, there is significant difference in terms of the demographics like assets, per capita household income (excluding mothers, own income), women's age (by approx. 0.80 year or 9.6 months), presence of mother-in-law in the household. Also, mothers with son aged 6+ years are significantly more likely to belong to general/upper caste and less likely to be Muslim.

These significant differences hint towards the prevalence of sex-selective abortions in favor of sons, in certain sub-populations. In order to address this potential issue of sex-selective abortions, firstly, I add control for variables like caste, religion, women's age, income, assets, presence of mother-in-law in all my empirical specifications to account for the differences in observables across mothers with and without a son aged 6+ years.

Secondly, I carry out separate analysis on Muslim mothers who are less likely to engage in sex-selective abortions.

Thirdly, I carry out analysis on the sample of mothers with at-most two children aged 6+ years, as the sex-selective abortions are mostly prevalent at higher birth orders. I report the sex-ratio at first and second order births for this sample in panel A of table A5. It can be seen that the male-female sex-ratio is 1.09 and 1.11 at first and second birth orders, respectively, which is close to the natural rate of 1.03 to 1.07, making sex-selective abortions minor concern in this sample. I also present the results of balancing test for this sample of mothers (mothers with at most two children aged 6+ years and no child over 18 years) in panel B of table A5. The results indicate that the differences between mothers with and without son aged 6+ years in this sample, after controlling for state fixed effects and number of children aged 6+, disappears for most of the variables, except for few demographics like per-capita income excluding women's own income, household assets, women's age and Muslims.

Table 5:

Statistical Test for Balance.

Variable	Unconditional mean (noson6plus (Z)=0)	Difference conditional on Nkid6plus and States	Percentage
Mother-in-law in HH	0.383	0.023*	6.002
	(0.486)	(0.014)	
Father-in-law in HH	0.266	0.013	4.877
	(0.442)	(0.013)	
Share of non-working married women	0.293	0.010	3.410
	(0.443)	(0.012)	
Joint family	0.415	0.038**	9.102
	(0.493)	(0.0142)	
Family size ex. own kids	3.243	0.107*	3.299
	(1.919)	(0.068)	
Age	32.9	-0.807***	2.453
	(4.723)	(0.13)	
Education	4.698	-0.051	1.085
	(4.474)	(0.124)	
Marital status	0.951	0.024*	1.241
	(0.217)	(0.013)	
ASSETS	14.092	-0.420***	2.980
	(6.002)	(0.151)	
HH Highest male edu	6.950	-0.009	0.137

	(4.805)	(0.134)	
Per capita inc excl.	1.590	-0.273***	17.165
woman (per 10k)	(2.882)	(0.076)	
	Caste		
Forward/General	0.270	-0.021*	7.779
	(0.443)	(0.012)	
OBC	0.391	0.018	4.598
	(0.488)	(0.013)	
SC	0.216	-0.007	3.237
	(0.412)	(0.011)	
ST	0.111	-0.005	4.489
	(0.315)	(0.008)	
Other	0.011	-0.000	0.000
	(0.104)	(0.003)	
	Religion		
Hindu	0.836	-0.010	1.196
	(0.370)	(0.010)	
Muslim	0.097	0.014*	14.407
	(0.296)	(0.062)	
Christian	0.024	-0.001	4.175
	(0.152)	(0.003)	
Sikh	0.030	-0.001	3.359
	(0.169)	(0.003)	
Other	0.013	-0.002	15.587
	(0.112)	(0.003)	
Observation:	5845	7553	

*Notes: This table reports the unconditional mean of each variable for mothers with son aged 6+ years (i.e. when instrument is switched off, Z=0); balance statistics computed by regressing covariates on the instrument "not having a son aged 6+ years (noson6plus)", controlling for the number of children aged 6+ years and the state fixed effects; and the size of this difference in percentage terms. Sample consists of 7553 mothers from rural India, aged 15-49 years with at least one child aged 6+ years and no child over 18 years. * Indicates statistical significance at 10%. ** Indicates statistical significance at 5%. *** Indicates statistical significance at 1%. Robust standard errors are in parenthesis.*

Next, the exclusion restriction requires that the presence of a son aged 6+ years should not have a direct effect on mothers' labour force participation other than through its impact on fertility. A possible threat to the validity of this assumption is the potential differential involvement of mothers in the care of pre-existing sons and daughters aged 6+ years. This would imply that mothers respond differently in the presence or absence of male children aged 6+ years. For example, by increasing their labour supply for improving financial investment in sons or reducing labour supply for investing more time in sons and thus, threating the validity of exclusion restriction.

To check if there are differences in labour supply of mothers with and without a son aged 6+, I compare the labour supply of mothers who have most likely completed their fertility and have same number of children but different sex composition of children aged 6+ years, i.e. mothers with and without a son aged 6+ years. The analysis is described in detail in section 6.2.

5.3. Monotonicity

Identification of the LATE with instrumental variables also requires the so-called "monotonicity" assumption, stating that there shall be no defiers (Imbens & Angrist, 1994). In my application, this boils down to assuming that not having a son aged 6+ can only make mothers more likely to have an additional younger child. That is to say, there are no mothers with a preference for daughters. Given the ubiquity of son-preference in Indian context, assumption about the absence of defiers seems plausible.

However, recent literature has proved that IVs are still valid under a weaker condition than monotonicity (Chaisemartin , 2017). IV estimation can tolerate the presence of some defiers. In this paper, I also comment on how many defiers can be tolerated in this analysis for the LATE to hold for compliers. The results can be found in the appendix- section A11.

6. ESTIMATION RESULTS

6.1. Main Results

This section presents the main results of the effect of having younger children aged 0 to 5 years on mothers' labour supply. I use binary variable 'noson6plus', indicating that the mother does not already have a boy child aged 6+ years, as an instrument for the presence of young children. Table 6 reports the main result from OLS and second stage regression.

Table 6:
Results from main specification.

	(1)	(2)	(3)	(4)
VARIABLES	OLS	First stage	Reduced Form	IV
kid0_5	-0.060***			-0.099**
	(0.012)			(0.047)
noson6plus		0.324***	-0.032**	
		(0.014)	(0.015)	
Observations	7,553	7,553	7,553	7,553
State FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Adjusted R-squared	0.246	0.348	0.244	0.113
First-stage F stat for instrument relevance		509.9		
DW Hausman test for endogeneity (p-val):				0.372

*Note: This table reports the OLS, first-stage, reduced form and 2SLS estimates from the main specification. The endogenous independent variable of interest is- having a child 0 to 5 years (kid0_5) and is instrumented with- not having a son aged 6+ years (noson6plus). The dependent variable of interest is mothers' participation (Work). Sample includes mothers aged 15-49 years with at least one child aged 6+ years and no child over 18 years. * Indicates statistical significance at 10%. ** Indicates statistical significance at 5%. *** Indicates statistical significance at 1%. Robust standard errors are in parenthesis.*

The OLS estimates (table 6, column 1) provide the average treatment effect of presence of young children on mothers' participation. The results indicate that after controlling for other covariates, mothers with pre-school children aged 0 to 5 are on an average 6% less likely to work. This is statistically significant at the 1% level. As discussed above, the OLS estimation does not take into account the problem of endogeneity between fertility and mothers' labour force participation. Thus, the estimates are biased and provide mere correlation between fertility and mothers' labour supply.

Under the assumptions discussed above, IV estimates solve the problem of endogeneity and provide the local average treatment effect for the compliers. Using the IV estimation, I find that the effect of presence of younger children aged 0 to 5 years reduces the participation of the mothers by 9.9% which is statistically significant at 5%. The hausman test for endogeneity, however, fails to reject the null that IV estimate is not significantly different from the OLS estimate. In the next section, I check if there is homogenous effect of fertility across the population.

Table A1 in the appendix also reports the effects of other covariates on fertility. The results are consistent with the existing literature on female labour force participation. Effect of social norms within family, depicted by the share of non-working married women in the family, on female labour force participation is negative and highly significant. Living in joint families helps women to work more.

Women's age and education also have expected effects. Participation first increases and then decreases with the age of the women. Less-educated women are less likely to work than women with no education, but high-educated women with tertiary education are more likely to work indicating a U-shaped relationship between education and female labour force participation.

Looking at the social group variables, I find that lower caste women from SC, ST and OBC are more likely to work as compared to upper caste women. The impact of religion appears to be stronger with Muslim women less likely to work by around 13.5% and Christian women 10.4% more likely to work compared to upper caste Hindu women.

The results also indicate that income effects strongly affect female participation: women's decision to work is negatively related to the income of the household excluding woman's own earnings and the assets of the household. Presence of an adult male with higher levels of education significantly discourages women to work in the labour market.

6.2. Robustness Checks

To test the robustness of estimates to various specifications of the control function, I also run models including various interactions of the variable 'noson6plus' with other variables like religion, number of children aged 6+ (Nkid6plus), presence of daughter aged 6+ (daught6plus), etc. as instruments and the results are more or less consistent with the IV estimate of effect of pre-school children aged 0 to 5 years on mothers' participation around -9% (table A2 and A3). I also introduced non-linear terms for number of children aged 6+ years (Nkid6plus), which turn out to be insignificant. I also use mother's age fixed effects in place of Nkid6plus to proxy the number of children aged 6+ and the estimate of the causal effect of fertility on mothers' labour force participation is 11.2%.

Next, I carry out the estimation with limited controls variables- number of children aged 6+, presence of daughter, woman's age, age square, education, marital status, caste, religion, assets, assets square, highest male education in the household and state fixed effects. I eliminate controls of household composition as these are likely to the endogenous to mother's participation. The IV estimate remains stable at -9.2%.

As a robustness check, I also carry out the analysis on the sample including the women with children aged 18+ years. The number of observations rises to 14,570. In this case, presence of younger children reduces the participation by 9.4%, significant at the 5% level. The results are reported in the Table A4 in appendix.

As described in the paper before, in order to take into account the issue of prevalence of sex-selective abortions in India, I run the sub-sample analysis on women with at most 2 children of 6+ years, as according to the literature, the sex-selective abortion is evident at higher parities in India. The results are stable and indicate that presence of younger children reduces the participation of mothers by 10.3% and this effect is significant at the 5% level (table A5, panel C).

Next, I also carry out the analysis on sub-sample of Muslim women as they are less likely to engage in selective abortions due to religious reasons. The results indicate that presence younger children reduce the participation of mothers by 20%, but the estimate is not significant, likely due to lower number of data points (table A6).

To check the robustness of estimates to the concern about potential differential involvement of mothers in the care of pre-existing sons and daughters aged 6+ years, that threatens the validity of exclusion restriction, I execute various sub-sample analyses. Firstly, I restrict the sample to mothers aged 45+ years, as these mothers are most likely to have completed their fertility 5 years back and are less likely to have children aged 0 to 5 years. Secondly, I further restrict these women to mothers who report that they are either infertile or sterilized. Finally, since IHDS is a longitudinal survey with two rounds of survey conducted so far in 2005 and 2011, I restrict the sample to mothers present in both the samples, are aged 45+ years with at least one child aged 6+ years in 2011 and who reported to be infertile or sterilized in 2005. This sample contains 569 women.

In each of the three samples described above, I find that the first stage is absent, i.e. not having a son aged 6+ years does not make mothers any more likely to have another child aged 0 to 5 years. Then, I compare the labour supply of mothers with and without a son aged 6+ years, conditional on the total number of children aged 6+ years and other controls. I also carry out this analysis separately by splitting the sample by number of children aged 6+ years (i.e. mothers with 1, 2, 3, 4 and 5+ number of children aged 6+ years). This comparison would tell if mothers with and without a son aged 6+ years behave differently in terms of labour supply. I do not find any significant difference in the labour supply for mothers with and without a son in all the above samples, thus, holding the validity of exclusion restriction. The first stage and reduced form results are reported in table A10.

Finally, to evaluate if the first-stage and reduced form estimates are robust to omitted variable bias, I follow Oster (2019). I, first, compute bounds for the treatment effect if selection on unobservables is as high as selection on observables and second, estimate the degree of selection on unobservable that would be required to drive the ITT estimates to 0 (called $\tilde{\delta}$). For instance, in our case, one of the omitted unobservable variables is sex-selective abortion. The results of this analysis are reported in table A7. The results indicate that assuming that the selection on unobservables is as high as selection on observables, the first stage as well as reduced form coefficients are stable and robust to omitted variable bias, conditional on state fixed effects and number of children aged 6+ years. I also find that the selection on unobservables should be at least 2.327 times of selection on observables (i.e. $\tilde{\delta} = 2.327$) to drive first stage estimate to zero. And for reduced form estimate, $\tilde{\delta} = -17.106$. These results from Oster tests lower the concern regarding the presence of sex-selective abortions and raise the confidence in the IV estimates' stability.

6.3. Average Causal Response

Table 7 below reports the number of children aged 0 to 5 (Nkid0_5) among the sample of the mothers aged 15-49 years with at least one child aged 6+ and no child aged 18+ years. Until now we looked at the weighted average of causal effect of the presence of children aged 0 to 5 years on mothers' participation decision. But this effect also captures the cumulative effect of having more than one child aged 0 to 5 years. In this section, I describe the weighting function that tells us how the compliers are distributed over the range of Nkid0_5, i.e. the relative size of the group of compliers with Nkid0_5=1, Nkid0_5=2, and so on.

Firstly, I carry out the analysis of the effect of number of children aged 0 to 5 years (Nkid0_5) on mothers' participation rate by instrumenting Nkid0_5 with noson6plus. The results are reported in table A8 in appendix. First stage is significant and indicates that not having a son aged 6+ years increases Nkid0_5 by 0.502, significant at the 1% level. The IV estimate suggests that increase in Nkid0_5 reduces participation by 6.42 percent significant at the 5% level.

Next, I estimate the average causal response (ACR) weighting function. ACR weighting function can be consistently estimated by comparing the CDF of the endogenous variable (i.e. Nkid0_5) with instrument (noson6plus) switched off and on. The weighted function is normalized by the first stage (Angrist & Pischke, 2008).

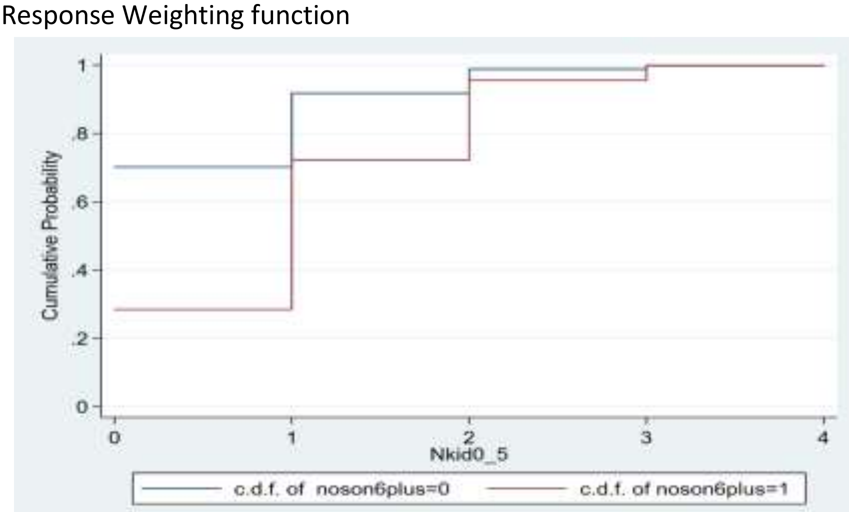
Figure 1 plots the CDF of the number of children aged 0 to 5 years (probability that number of children aged 0 to 5 is less than or equal to the value of Nkid0_5 on the X axis) for mothers with and without a son aged 6+ years. The difference between the CDF normalized by the first stage gives the weights of each value of Nkid0_5 in the 2SLS estimation. The CDF differences decline with number of children aged 0 to 5 and becomes almost 0 at Nkid0_5 equals 3 and 4. The mothers with a son aged 6+ years are 40% more likely to not have a child aged 0 to 5 years. Whereas, mothers without a son aged 6+ are almost 19% more likely to have a child aged 0 to 5 years and 3-4% more likely to have 2 children aged 0 to 5 years. Thus, the 2SLS estimate in this paper is mostly capturing the effect for mothers with 1 and 2 children aged 0 to 5 years on mothers' labour supply.

Table 7:
Number of children aged 0 to 5 years.

Nkid0_5	Freq.	Percent	Cum.
0	4,584	60.69	60.69
1	2,009	26.6	87.29
2	813	10.76	98.05
3	139	1.84	99.89
4	8	0.11	100
Total	7,553	100	

Note: This table reports the number of children 0 to 5 years in the sample of mothers.

Figure 1:
Average Causal Response Weighting function



Note: The figure plots the CDF of the number of children aged 0 to 5 years (Nkid0_5) with the instrument switched off and on, i.e. for noson6plus=0 and noson6plus=1. The difference in the CDF depicts the weights for the range of Nkid0_5.

6.4. More on compliant population

As mentioned before in the paper, IV estimates capture only the LATE for compliers. Compliers are the subgroup of population who change their behavior because of the change in the instrument. In this study, compliers are the mothers who go on to have an additional child if they do not have a son aged 6+ but would not choose to have another child if they already have a boy aged 6+ years.

Following Angrist & Pischke (2008), I say as much as possible about the compliers for the instrument 'noson6plus' used in this paper. I comment on the size of complier group and proportion of compliers in treated and untreated population.

The ingredients for this analysis are reported in table 8. I find that the proportion of compliers in the population, as given by the first-stage is 32.4%. Among the treated population, i.e. mothers with a pre-school aged child, compliers comprise of 19%. These are the mothers who went on to have another child because they did not already have a son aged 6+ years. Compliers, among the untreated population, comprise of 41%. These are the mothers who did not have additional child, because they already had a son aged 6+ years. The results are reported in the table 8. Whilst these shares are large they are well below 1. As a result, in order to assess the generalizability of my results to the entire population, there is a need to understand whether compliers are comparable to the general population.

Table 8:
Counting Compliers

					Compliance Probability	
Endogenous variable (D)	Instrument (Z)	P[D=1]	First stage $P[D_1>D_0]$ Total compliers	P[Z=1]	Pr(C|D=1) Compliers among treated	Pr(C|D=0) Compliers among untreated
kid0_5	noson6plus	0.393	0.324	0.226	0.186	0.413

Notes: This table reports the share of compliers in whole population (as given by first stage) as well as share of compliers among treated (mothers with children aged 0 to 5 years) and untreated population (mothers without children aged 0 to 5 years). Compliers are the sub-population of mothers who are son-preferring and would go on to have another child if they do not have a son aged 6+ years and would not have an additional child if they already have a son aged 6+ years.

I describe the distribution of compliers' characteristics. If compliers are similar to the general population, the case for extrapolation of causal effects to the whole population is stronger. The results are illustrated in table 9. It can be seen that the compliers are positively selected and their population is significantly very different from the general population. For instance, compliers are more likely to be Hindu and less likely to be Muslims and Christians. They are also more likely to be educated, belong to higher caste, have more assets, have more than 2 children aged 6+, have mother-in-law in the household, have at least one daughter in the HH, as compared to the general population.

Table 9:

Complier Characterization.

Characteristics	Ratio	Std Error of ratio	P-val (ratio=1)
Religion			
Hindu	1.072	0.020	0.000
Muslim	0.447	0.143	0.000
Christian	0.435	0.256	0.027
Sikh	1.283	0.238	0.234
Other	0.538	0.431	0.284
Education			
None	0.748	0.061	0.000
Primary	1.168	0.094	0.076
Secondary	1.064	0.060	0.287
Higher Sec	1.207	0.180	0.250
Tertiary	0.719	0.256	0.273
Caste			
General	1.259	0.074	0.001
OBC	0.948	0.055	0.349
SC	0.961	0.085	0.644
ST	0.675	0.135	0.016
Other	0.659	0.405	0.400
Have daughter aged 6+	1.250	0.019	0.000
Mother-in-law in HH	1.141	0.056	0.013
Father-in-law in HH	1.099	0.074	0.183
Joint Family	1.030	0.052	0.567
More than 2 kids 6+	1.259	0.094	0.006
Assets above median	1.089	0.048	0.063
Income above median	0.922	0.047	0.101
Education- Secondary and above	1.070	0.049	0.157

*Notes: This table reports the characteristic distribution of the compliers. Sample consists of mothers from rural India, aged 15-49 years with at least one child aged 6+ years and no child over 18 years. * Indicates statistical significance at 10%. ** Indicates statistical significance at 5%. *** Indicates statistical significance at 1%.*

As discussed in Angrist (2004), the LATE parameter would also generalize to the whole population if complying behaviour was ignorable, that is, if the effect of having children aged 0 to 5 years on mothers' labour force participation is homogenous across compliers, always-takers and never-takers. And, similarly, not having children aged 0 to 5 years produces same effect of mothers' participation across the whole population.

Mathematically, LATE would generalize if:

$$E[Y_i(1)|C] = E[Y_i(1)|AT] = E[Y_i(1)|NT]$$

$$E[Y_i(0)|C] = E[Y_i(0)|AT] = E[Y_i(0)|NT]$$

Two testable implication of ignorability are the following:

$$E[Y_i(1)|D_i = 1, Z_i = 0] = E[Y_i(1)|D_i = 1, Z_i = 1]$$

$$E[Y_i(0)|D_i = 0, Z_i = 1] = E[Y_i(0)|D_i = 0, Z_i = 0]$$

i.e. among treated, treatment effect is not different for always-takers and compliers and among untreated, treatment effect is not different for never-takers and compliers.

So, I compare E(Y| AT and C) vis-à-vis E(Y| AT) and E(Y| NT) vis-à-vis E(Y| NT and C) and find that they are not significantly different. The results are reported in table 10. The effect of having a young child on mothers' participation is homogenous for treated compliers and always-takers and for non-treated compliers and never-takers, which is suggestive of the fact that the LATE could be generalized to entire population.

In summary, the results suggest that even if the compliers are significantly different from the general population in terms of their observable characteristics, the results hold valid for the general population, suggesting that the returns of having a younger child on mothers' participation must be homogenous across different sub-population. This also corroborates why the OLS estimate, that captures the ATE, are not very different from the IV estimate, that captures the LATE and also why the DW Hausman test fails to reject suggesting that the OLS estimate, capturing the ATE for the population, is in fact consistent.

Table 10:
External Validity

VARIABLES	E(Y(1)|D=1,Z=1)- E(Y(1)|D=1,Z=0) E(Y| AT and C)- E(Y| AT)	E(Y(0)|D=0,Z=1)- E(Y(0)|D=0,Z=0) E(Y| NT)- E(Y| NT and C)
Work	-0.025	-0.021
	(0.026)	(0.023)
Observations	2,969	4,584
State fixed effects	Yes	Yes
Control	Yes	Yes

*Notes: This table reports the difference in the average treatment effect for the compliers and always-takers among treated and no-treatment effect for the compliers and never-takers among untreated population. This analysis provides suggestive evidence if the LATE is externally valid. Sample consists of mothers from rural India, aged 15-49 years with at least one child aged 6+ years and no child over 18 years. * Indicates statistical significance at 10%. ** Indicates statistical significance at 5%. *** Indicates statistical significance at 1%. Robust standard errors are in parenthesis.*

6.5. Fathers' labour supply

In this section, I examine the effect of presence of pre-school children aged 0 to 5 years on fathers' labour supply. I analyze the sample of husbands of women aged 15-49 years with at least one child aged 6+ and no child above 18 years. I use not having a son aged 6+ years (noson6plus) as an instrument for presence of children aged 0 to 5 years (kid0_5), conditioning on the number of children aged 6+ years the parents already have. The results are reported in table A9. As expected the fathers' labour participation is unaffected by the presence of children aged 0 to 5 years. Since 95% of the fathers in the sample are working, I also carry out analysis on the hours worked in the last year by the fathers. IV estimates again are insignificant and presence of younger children aged 0 to 5 years does not affect the labour supply of the fathers. These results are suggestive of the fact that fertility is an important contributor to the gender gap in labour market.

6.6. Heterogeneity in the effect of fertility on labour supply

In this section, I examine whether the effect of fertility on mothers' labor-force participation may be sensitive to or driven by certain sub-populations in the sample. It is helpful from a policy perspective to identify the sub-population of mothers with highest response to fertility on their labor force participation. Table 11 reports the IV estimates for the heterogeneity analysis.

Firstly, I carry out heterogeneity analysis of the effect of fertility on mothers' labor supply by mothers' education level. For this analysis, sample is divided into two groups based on the median education level: below or completed primary level (≤ 5^{th} standard) and above primary level (> 5^{th} standard, comprise of secondary, higher secondary and tertiary education). The results indicate that the effect of fertility on mothers' labor supply is negative and statistically significant for women with higher education, but insignificant for women with below median education level. This seems reasonable as women's preference and demand for white-collar and high skilled jobs grows stronger as their education increases, and because these types of formal sector jobs are very scarce in rural India their labour supply responds to fertility more. Moreover, cultural norms restrict the number of jobs that are considered acceptable for women, making it harder for mothers to find a suitable job.

Also, these educated women possibly belong to economically well-off families, and consequently have lesser need to work. While, less educated mothers, on the other hand, who possibly belong to economically backward families, engage in paid work to support the family.

Table 11:
Heterogeneity Analysis

Variables	IV estimates
Education	
Primary and below education	-0.049
	(0.068)
Secondary and above education	-0.154**
	(0.067)
Per-capita Income quartiles	
Lowest Quartile	-0.042
	(0.076)
Second Quartile	-0.086
	(0.095)
Third Quartile	-0.139
	(0.110)
Highest Quartile	-0.228**
	(0.097)
Joint *Family*	
No	-0.129*
	(0.068)
Yes	-0.056
	(0.066)
Controls	YES
State fixed effects	YES

*Notes: This table reports the results obtained from heterogeneity analysis by mothers' own education; per capita income (excluding women's own income) quartiles; and residence in joint family. Sample of mothers aged 15-49 years with at least one child aged 6+ years and no children over 18 years. * Indicates statistical significance at 10%. ** Indicates statistical significance at 5%. *** Indicates statistical significance at 1%. Robust standard errors are in parenthesis.*

Secondly, I explore whether the effect of fertility on mothers' labor-force participation is likely to vary with income of the family excluding women's own income. For this, the sample is divided into quartiles. The IV estimates show that the negative effect of fertility on mothers' labour supply remains insignificant for mothers belonging to bottom three quartiles. It is however highly negative and significant for mothers belonging to the highest income quartile. For these mothers, presence of a young child 0 to 5 years, reduces labour supply by 22.8%, statistically significant at the 5% level. This seems reasonable as mothers belonging to affluent families have lesser need to work compared to mothers belonging to lower income families, to support their families financially. They still bear the primary responsibility for raising children and managing the home. Also, there is evidence that children benefit from being raised by mothers themselves, as mothers simply know better about their children and thus, women who can afford being at home are willing to raise their children by themselves and invest their time towards the children's care, education and development, instead of working for better reasons.

The incentive to work, if any, is worsened by cultural setbacks, unavailability of formal sector jobs in rural India, the absence of child-care facilities at work, inflexible working conditions, gender biases in hiring and promotions, gender wage differentials, and lack of female-friendly offices.

Lastly, I also carry out the heterogeneity analysis by residence in joint family. The results, reported in table 11, indicate that fertility negatively affects labour supply of mothers living in nuclear families. For mothers living in nuclear families, presence of young children reduces mothers' labour supply by 12.9%, which is statistically significant at the 10% level. While the effect is insignificant for mothers residing in joint family. Residing in extended families can help mothers with the sharing of child care responsibilities and is a major source of informal child care in India.

The maximum negative effect of fertility on mothers' labour supply seems to be driven mostly by highly educated cohort of mothers; mothers belonging to high income families and mothers residing in nuclear families. These results are suggestive of the fact that women's labour supply is driven by necessity rather than opportunities. Mothers tend to stay out of the labour market until they have compelling need to work to financially support the family. And lack of opportunities from demand side like unavailability of suitable and respectable jobs as well as from supply side like disproportionate responsibilities associated with childbearing and raising children, and socioeconomic and cultural barriers, makes it harder for mothers to work outside home.

7. CONCLUDING REMARKS

To the best of my knowledge, this paper is the first to estimate the causal effect of having a pre-school child aged 0 to 5 years on mothers' labour force participation in rural India. Fertility and labour force participation decision of the mother are jointly and simultaneously determined, thus, generally resulting in biased OLS estimates. This paper uses instrumental variable technique to deal with this issue of endogeneity. Given a strong son preference in India, parents tend to keep on having additional children until they have at least one son. "Not having at least one male child aged 6+ in the household" is used as an instrument for the presence of children aged 0 to 5 years. Since the sex of the children is plausibly random, the instrument serves as an exogenous source of variation in the fertility decisions.

The results from the first-stage specification suggest that not having a boy aged 6+ years makes the mother 32.4% more likely to have another child aged 0 to 5 years. The IV estimates that presence of young children aged 0 to 5 years reduces the participation of mothers by 9.9%, which is statistically significant at the 5% level. This paper also shows that the LATE estimate, which captures the effect of presence of pre-school children aged 0 to 5 years on labour force participation for compliers, can be generalized to the whole population, i.e. always-takers and never-takers.

Lastly, the findings from the heterogeneity analysis suggest that the labour supply of mothers in India is necessity driven rather than opportunity driven. The negative effect of the presence of children aged 0 to 5 years on labour force participation is driven by mothers with higher education, mothers from families belonging to highest income quartile and mothers residing in nuclear families.

Findings of this paper have important implications in terms of public policy. Policies introducing high skilled and white-collar job opportunities with good remunerations are needed to incentivize mothers in rural India to work outside home. Due to unavailability of suitable jobs and good pay scale in the job market, mothers tend to stay out of the labour market until they have compelling need to work to financially support the family.

Mothers with high education and mothers from high income families prefer to stay at home and manage domestic tasks, such as schooling children and invest time in their development. These mothers understand that their support to children is better for their development than what they could buy as a replacement with the money from work. With higher earnings, these mothers shall be able to substitute their decreased time investment with better and more productive alternatives and compensate for the negative effect of reduced time investment on child's development (Nicoletti, Salvanes, & Tominey (2020) and Agostinelli & Sorrenti (2018)).

In addition to higher pay, availability of quality alternative sources of child care is equally crucial. In India, lack of good formal childcare further discourages mothers to work. Investment in quality and quantity of formal child care facilities, schools and day care facilities, including direct provision of public pre-school and day-care nurseries, are required as a substitute for informal child care facilities to help mothers residing in nuclear families and incentivize mothers who are out of labour force to invest their time on child care and development.

A study from Brazil, a developing country like India, found that implementation of free child-care services in Rio de Janeiro, Brazil almost doubled the employment rate of mothers from 9 per cent to 17 per cent.

In India, government enacted an expansive worker protection program— the Mahatma Gandhi National Rural Employment Guarantee Act, 2005. The program guaranteed 100 days of wage employment in a financial year, to households in rural India whose adult members volunteer to do unskilled manual work. The act reserves one-third of the stipulated work force for women and requires equal wages for men and women and also includes provisions for childcare at work sites. The result was an increase in women's participation in the workforce. About 50% percent of the women who enrolled for jobs in the program’s projects were not in the paid labor force before the initiative took effect (de Mattos & Dasgupta, 2017).

However, this policy specifically targeted poor households willing to do unskilled manual work. These jobs were not suitable for women with higher education and women from high income families. The results from this paper, on the other hand, confirm that fertility majorly affects labour supply of women with higher education and well-off families, who do not have compelling need to work. Consequentially, skilled jobs in formal sector with good pay scale are needed to incentivize these mothers for paid work.

In 2017, the Indian government enacted Maternity Benefit (Amendment) Act, mandating that all employers to offer twenty-six weeks of paid maternity leave to women workers in the organized sector. This act requires establishment with 50 or more workers to provide crèche facility. In rural India, however, due to lack of organized sector this policy has little meaning and not beneficial to promote mothers’ employment.

India’s *anganwadi* program, is a good example of an initiative to raise mothers’ participation. This program was started in 1975 as part of the Integrated Child Development Service Program and aimed to combat child hunger and malnutrition in rural India and provide child care and pre-school facilities to children younger than 6 years. This program also aimed to contribute to female empowerment of women in rural India by enabling mothers of anganwadi going children to undertake paid work during the day. There are more than 1.3 million of these village health centers and employ 2.4 million workers. Further improving their quality and quantity could benefit mothers in rural India by creating jobs opportunities as well as by providing formal day care for younger children.

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APPENDIX

Table A1: Main Specification (Sample- mothers aged <=49 years with at least one child aged 6+ years and no child above 18 years)

	(1)	(2)	(3)	(4)
VARIABLES	OLS	First stage	Reduced Form	IV
kid0_5	-0.060***			-0.099**
	(0.0125)			(0.0467)
noson6plus		0.324***	-0.032**	
		(0.0143)	(0.0152)	
Nkid6plus	0.011*	-0.069***	0.0126*	0.006
	(0.006)	(0.007)	(0.007)	(0.009)
nodaught6plus	-0.002	0.081***	-0.0134	-0.005
	(0.012)	(0.012)	(0.014)	(0.012)
MIL_in_HH	0.009	0.039**	0.006	0.010
	(0.018)	(0.016)	(0.018)	(0.017)
FIL_in_HH	-0.025*	0.028**	-0.027*	-0.024*
	(0.014)	(0.013)	(0.014)	(0.014)
Share of non-working married women	-0.261***	-0.022	-0.259***	-0.262***
	(0.018)	(0.016)	(0.018)	(0.018)
Joint family	0.217***	0.012	0.217***	0.218***
	(0.023)	(0.021)	(0.023)	(0.023)
Fam size excluding own kids	-0.018***	-0.007	-0.018***	-0.0180***
	(0.004)	(0.004)	(0.004)	(0.004)
Age	0.028**	-0.103***	0.034***	0.0234*
	(0.011)	(0.010)	(0.011)	(0.013)
Age sq	-0.0003**	0.001***	-0.0004**	-0.0003
	(0.0002)	(0.0001)	(0.0002)	(0.0002)
Education				
Primary	0.010	-0.020	0.011	0.009
	(0.015)	(0.014)	(0.015)	(0.015)
Secondary	-0.059***	-0.026*	-0.057***	-0.060***
	(0.015)	(0.013)	(0.015)	(0.015)
Higher sec	-0.066**	0.029	-0.068**	-0.065**
	(0.027)	(0.023)	(0.027)	(0.027)
Tertiary	0.112***	0.053*	0.110***	0.115***
	(0.034)	(0.031)	(0.034)	(0.034)
Marital stat = married	0.017	0.081***	0.013	0.021
	(0.024)	(0.023)	(0.024)	(0.024)
Caste				
OBC	0.030**	0.008	0.030**	0.031**
	(0.014)	(0.012)	(0.014)	(0.014)
SC	0.060***	0.084***	0.055***	0.063***

	(0.016)	(0.014)	(0.016)	(0.017)
ST	0.114***	0.073***	0.110***	0.117***
	(0.020)	(0.019)	(0.020)	(0.021)
Other	0.011	0.033	0.009	0.012
	(0.047)	(0.042)	(0.047)	(0.047)
Religion				
Muslim	-0.144***	0.211***	-0.156***	-0.135***
	(0.020)	(0.019)	(0.020)	(0.022)
Christian	0.103**	0.005	0.103**	0.104**
	(0.045)	(0.040)	(0.045)	(0.045)
Sikh	-0.070	-0.055	-0.067	-0.073
	(0.047)	(0.038)	(0.047)	(0.047)
Other	0.017	-0.028	0.018	0.015
	(0.046)	(0.045)	(0.045)	(0.046)
Total household assets (0-33)	-0.017***	-0.025***	-0.015***	-0.018***
	(0.004)	(0.004)	(0.004)	(0.004)
Assets sq	0.0002	0.0006***	0.0002	0.0002*
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Highest male education in HH				
Primary	-0.006	-0.012	-0.006	-0.007
	(0.016)	(0.016)	(0.016)	(0.016)
Secondary	-0.029*	-0.041***	-0.027*	-0.031**
	(0.015)	(0.015)	(0.015)	(0.015)
Higher sec	-0.010	-0.053***	-0.007	-0.012
	(0.021)	(0.019)	(0.021)	(0.021)
Tertiary	-0.038	-0.054**	-0.035	-0.040*
	(0.024)	(0.021)	(0.024)	(0.024)
Per capita inc excl. woman (per 10k)	-0.018***	-0.008***	-0.018***	-0.019***
	(0.003)	(0.002)	(0.003)	(0.003)
Constant	0.360*	2.761***	0.217	
	(0.203)	(0.175)	(0.200)	
Observations	7,553	7,553	7,553	7,553
R-squared	0.252	0.374	0.250	0.120
State FE	Yes	Yes	Yes	Yes
Adjusted R-squared	0.246	0.369	0.244	0.113
First stage F stat:		509.9		
DW Hausman test for endogeneity (p-val):				0.382

*Notes: This table reports the OLS, first-stage, reduced form and 2SLS estimates. The dependent variable of interest is mothers' participation (Work), the endogenous independent variable of interest is- having a kid aged 0 to 5 years (kid0_5) and the instrument is- not having a son aged 6+ years (noson6plus). Sample consists of 7553 mothers from rural India, aged 15-49 years with at least one child aged 6+ years and no child over 18 years. * Indicates statistical significance at 10%. ** Indicates statistical significance at 5%. *** Indicates statistical significance at 1%. Robust standard errors are in parenthesis.*

Table A2: Model Robustness- First Stage results

VARIABLES	(1) i.Nson6plus_cat	(2) i.Nson6plus_cat	(3) i.Nson6plus_cat	(4) noson6plus #nodaught6plus	(5) Nson6plus, Ndaught6plus
Nson6plus_cat = 1, 1	-0.347***	-0.271***	-0.290***		
	(0.015)	(0.015)	(0.015)		
Nson6plus_cat = 2, 2	-0.610***	-0.469***	-0.500***		
	(0.021)	(0.022)	(0.022)		
Nson6plus_cat = 3, 3+	-0.591***	-0.479***	-0.507***		
	(0.035)	(0.035)	(0.035)		
0.noson6plus#0.nodaught6plus				0	
				(0)	
0.noson6plus#1.nodaught6plus				0.0816***	
				(0.0123)	
1.noson6plus#0.nodaught6plus				0.324***	
				(0.014)	
Nson6plus					-0.213***
					(0.008)
Ndaught6plus					-0.062***
					(0.007)
nodaught6plus	0.225***	0.144***	0.158***		
	(0.015)	(0.016)	(0.015)		
Nkid6plus	0.002		-0.241***	-0.0689***	
	(0.008)		(0.023)	(0.007)	
Nkid6plus_cat = 2		-0.199***			
		(0.016)			
Nkid6plus_cat = 3		-0.169***			
		(0.022)			
Nkid6plus_cat = 4+		-0.101***			
		(0.028)			
c.Nkid6plus#c.Nkid6plus			0.040***		
			(0.004)		
Observations	7,553	7,553	7,553	7,553	7,553
R-squared	0.407	0.425	0.420	0.374	0.368
State FE	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.402	0.420	0.415	0.369	0.363
First-stage F stat for instrument relevance	304.2	147	170.8	275.4	420.8

VARIABLES	(6) noson6plus, nodaught6plus	(7) noson6plus #religion	(8) noson6plus #Nkid6plus_cat	(9) noson6plus #Nkid6plus_cat	(10) Nson6plus_cat #Nkid6plus_cat	(11) Nson6plus_cat #Nkid6plus_cat
noson6plus	0.324***					
	(0.014)					
nodaught6plus	0.082***	0.078***	-0.0541***	-0.0545***	-0.0302	-0.0618
	(0.012)	(0.012)	(0.0122)	(0.0122)	(0.0988)	(0.101)
0.noson6plus#1.religion		-0.348***				
		(0.015)				
0.noson6plus#2.religion		-0.149***				
		(0.035)				
0.noson6plus#3.religion		-0.086				
		(0.079)				
0.noson6plus#4.religion		-0.408***				
		(0.066)				
0.noson6plus#5.religion		-0.141				
		(0.099)				
0.noson6plus#1.Nkid6plus_cat			0.223**	-0.021		
			(0.105)	(0.021)		
0.noson6plus#2.Nkid6plus_cat			-0.265***	-0.333***		
			(0.0862)	(0.022)		
0.noson6plus#3.Nkid6plus_cat			-0.374***	-0.403***		
			(0.0728)	(0.039)		
0.noson6plus#4.Nkid6plus_cat			-0.409***	-0.398***		
			(0.0677)	(0.068)		
1.noson6plus#1.Nkid6plus_cat			0.244**			
			(0.105)			
1.noson6plus#2.Nkid6plus_cat			0.0681			
			(0.0881)			
1.noson6plus#3.Nkid6plus_cat			0.0285			
			(0.0815)			
0.Nson6plus_cat#2.Nkid6plus_cat					-0.187***	
					(0.035)	
0.Nson6plus_cat#3.Nkid6plus_cat					-0.237***	
					(0.065)	
0.Nson6plus_cat#4.Nkid6plus_cat					-0.278***	
					(0.105)	
1.Nson6plus_cat#1.Nkid6plus_cat					-0.046	-0.0143
					(0.100)	(0.102)
1.Nson6plus_cat#2.Nkid6plus_cat					-0.515***	-0.328***
					(0.030)	(0.022)
1.Nson6plus_cat#3.Nkid6plus_cat					-0.561***	-0.324***
					(0.055)	(0.041)
1.Nson6plus_cat#4.Nkid6plus_cat					-0.614***	-0.332***
					(0.086)	(0.071)
2.Nson6plus_cat#2.Nkid6plus_cat					-0.550***	-0.332***

					(0.107)	(0.103)
2.Nson6plus_cat#3.Nkid6plus_cat					-0.723***	-0.482***
					(0.0541)	(0.039)
2.Nson6plus_cat#4.Nkid6plus_cat					-0.752***	-0.464***
					(0.0891)	(0.071)
3.Nson6plus_cat#3.Nkid6plus_cat					-0.631***	-0.359***
					(0.122)	(0.111)
3.Nson6plus_cat#4.Nkid6plus_cat					-0.716***	-0.404***
					(0.100)	(0.076)
Nkid6plus	-0.069***	-0.070***	0.058**		0.0678***	
	(0.007)	(0.007)	(0.025)		(0.0253)	
Nkid6plus_cat = 2				-0.120***		-0.121***
				(0.023)		(0.023)
Nkid6plus_cat = 3				-0.104***		-0.109***
				(0.040)		(0.040)
Nkid6plus_cat = 4+				-0.067		-0.069
				(0.068)		(0.068)
Observations	7,553	7,553	7,553	7,553	7,553	7,553
R-squared	0.374	0.378	0.423	0.423	0.429	0.428
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.369	0.373	0.418	0.417	0.424	0.423
First-stage F stat for instrument relevance	275.4	111	146.5	92.12	96.44	52.29

*Notes: This table reports the first-stage estimates of various robustness-check models. Sample consists of mothers from rural India, aged 15-49 years with at least one child aged 6+ years and no child over 18 years. All the specifications include controls. * Indicates statistical significance at 10%. ** Indicates statistical significance at 5%. *** Indicates statistical significance at 1%. Robust standard errors are in parenthesis.*

Table A3: Model Robustness- Second stage results

VARIABLES	(1) i.Nson6plus_cat	(2) i.Nson6plus_cat	(3) i.Nson6plus_cat	(4) noson6plus #nodaught6plus	(5) Nson6plus, Ndaught6plus
kid0_5	-0.108***	-0.075	-0.072	-0.093**	-0.108***
	(0.035)	(0.051)	(0.047)	(0.045)	(0.034)
Nkid6plus	0.005		0.050*	0.007	
	(0.008)		(0.030)	(0.008)	
c.Nkid6plus#c.Nkid6plus			-0.007*		
			(0.004)		
Nkid6plus_cat = 2		0.022			
		(0.024)			
Nkid6plus_cat = 3		0.034			
		(0.030)			
Nkid6plus_cat = 4+		0.037			
		(0.031)			
nodaught6plus	-0.006	-0.0007	-0.0004		
	(0.012)	(0.013)	(0.013)		
Observations	7,553	7,553	7,553	7,553	7,553
R-squared	0.120	0.121	0.122	0.120	0.119
State FE	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.112	0.114	0.114	0.113	0.112
First-stage F statistic	304.2	147	170.8	275.4	420.8
p-val Hansen J stat	0.063	0.050	0.087	0.660	0.176
DW Hausman test for endogeneity (p-val)	0.140	0.604	0.619	0.435	0.181

VARIABLES	(6) noson6plus, nodaught6plus	(7) noson6plus #religion	(8) noson6plus #Nkid6plus_cat	(9) noson6plus #Nkid6plus_cat	(10) Nson6plus_cat #Nkid6plus_cat	(11) Nson6plus_cat #Nkid6plus_cat
kid0_5	-0.093**	-0.118***	-0.117***	-0.0749	-0.118***	-0.0863*
	(0.045)	(0.045)	(0.033)	(0.052)	(0.032)	(0.048)
Nkid6plus	0.007	0.003	0.003		0.003	
	(0.008)	(0.009)	(0.007)		(0.007)	
Nkid6plus_cat = 2				0.022		0.017
				(0.025)		(0.023)
Nkid6plus_cat = 3				0.034		0.029
				(0.030)		(0.029)
Nkid6plus_cat = 4+				0.037		0.032
				(0.032)		(0.031)
nodaught6plus		-0.007	-0.007	-0.001	-0.007	-0.002
		(0.012)	(0.012)	(0.013)	(0.012)	(0.013)
Observations	7,553	7,553	7,553	7,553	7,553	7,553
R-squared	0.120	0.119	0.119	0.121	0.119	0.121
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.113	0.111	0.112	0.114	0.111	0.113
First-stage F statistic	275.4	111	146.5	92.12	96.44	52.29
p-val Hansen J stat	0.660	0.228	0.669	0.961	0.303	0.212
DW Hausman test for endogeneity (p-val)	0.435	0.184	0.0707	0.661	0.0550	0.453

*Notes: This table reports the 2SLS estimates for various models. The first stages are reported in Table A2. Sample consists of mothers from rural India, aged 15-49 years with at least one child aged 6+ years and no child over 18 years. All the specifications include controls. * Indicates statistical significance at 10%. ** Indicates statistical significance at 5%. *** Indicates statistical significance at 1%. Robust standard errors are in parenthesis.*

Table A4: Results including mothers with children aged 18+ years in the analysis: Robustness check

VARIABLES	(1) OLS	(2) First stage	(3) Reduced Form	(4) IV
kid0_5	-0.051***			-0.094**
	(0.010)			(0.039)
noson6plus		0.294***	-0.028**	
		(0.012)	(0.012)	
Observations	14,570	14,570	14,570	14,570
R-squared	0.233	0.398	0.232	0.107
State FE	Yes	Yes	Yes	Yes
Adjusted R-squared	0.230	0.396	0.229	0.104
First-stage F stat		761.8		
DW Hausman test for endogeneity (p-val)				0.2603

*Notes: This table reports the estimation results for the sample of mothers aged 15-49 years with at least one child aged 6+ years. The sample includes also the mothers with children aged above 18 years. All the specifications include controls. * Indicates statistical significance at 10%. ** Indicates statistical significance at 5%. *** Indicates statistical significance at 1%. Robust standard errors are in parenthesis.*

Table A5: Robustness check to account for sex-selective abortions: Sample of mothers with at most 2 children aged 6+ years and no child above 18 years

Panel A: Sex-ratio at first and second order births

First Child	Freq.	Percent	Cum.
Son	3,946	52.24	52.24
Daughter	3,607	47.76	100
Male-Female sex ratio	1.09		

Second Child	Freq.	Percent	Cum.
Son	3,669	52.78	52.78
Daughter	3,283	47.22	100
Male-Female sex ratio	1.11		

Panel B: Statistical test for balancing

Variable	Difference	Std. error
MIL_in_HH	0.009	(0.016)
FIL_in_HH	-0.001	(0.015)
share_nonWK_married	0.004	(0.014)
jointfamily	0.020	(0.016)
famsize_ex_ownkid	0.022	(0.068)
age	-0.469***	(0.148)
education	-0.023	(0.140)
marital_stat	-0.008	(0.008)
ASSETS	-0.413***	(0.171)
HHedu_M years	-0.054	(0.150)
pc_INC_ex_women_per	-0.302***	(0.089)
	Caste	
Forward	-0.012	(0.013)
OBC	0.019	(0.015)
SC	-0.004	(0.013)
ST	-0.005	(0.009)
Other	0.0005	(0.004)
	Religion	
Hindu	-0.013	(0.010)
Muslim	0.016*	(0.009)
Christian	0.0002	(0.004)
Sikh	-0.0006	(0.004)
Other	-0.002	(0.004)
Observation:	5277	

Panel C: Estimation results

VARIABLES	(1) OLS-atmost 2 kids 6+	(2) FS-atmost 2 kids 6+	(3) RF-atmost 2 kids 6+	(4) IV-atmost 2 kids 6+
kid0_5	-0.078***			-0.103**
	(0.014)			(0.042)
noson6plus		0.383***	-0.039**	
		(0.015)	(0.016)	
Observations	5,277	5,277	5,277	5,277
R-squared	0.255	0.380	0.251	0.118
State FE	Yes	Yes	Yes	Yes
Adjusted R-squared	0.246	0.372	0.243	
First-stage F statistic:		675.5		

*Notes: Panel A reports the male-female sex ratio at the first and second birth orders. Panel B reports the balance statistics computed by regressing covariates on the instrument "not having a son aged 6+ years (noson6plus)", controlling for the number of children aged 6+ years and the state fixed effects. Panel C reports the estimation results. Sample includes 5277 mothers aged 15-49 years with at-most two children aged 6+ years and no children over 18 years. This is a robustness check to account for the sex-selective abortions, as the sex-selective abortions are more prevalent at higher order births. All the specifications include controls. * Indicates statistical significance at 10%. ** Indicates statistical significance at 5%. *** Indicates statistical significance at 1%. Robust standard errors are in parenthesis.*

Table A6: Second stage results: Muslim mothers with at least one child aged 6+ years and no child above 18 years. Robustness check to account for sex-selective abortions.

VARIABLES	(1) OLS-Muslim	(2) FS-Muslim	(3) RF-Muslim	(4) IV-Muslim
kid0_5	-0.068*			-0.201
	(0.038)			(0.334)
noson6plus		0.146***	-0.029	
		(0.049)	(0.051)	
Observations	733	733	733	733
R-squared	0.219	0.329	0.216	0.106
State FE	Yes	Yes	Yes	Yes
Weak identification test (Cragg-Donald Wald F statistic)/ first-stage F-stat:				8.751

*Notes: This table reports the estimation results for the sample of Muslim mothers aged 15-49 years with at least one child aged 6+ years and no children over 18 years. This is a robustness check to account for the sex-selective abortions, as the Muslim community has lower evidence for sex-selective abortions. All the specifications include controls. * Indicates statistical significance at 10%. ** Indicates statistical significance at 5%. *** Indicates statistical significance at 1%. Robust standard errors are in parenthesis.*

A7: Oster Test: Checking robustness of estimates to omitted variable bias

Panel A: First stage

	Treatment Effect Estimate		
	Estimate	Sq. Difference from controlled beta	Bias changes direction
Beta	0.349	0.0007	
Alt. Solution	-9.273	92.1	Yes
	Other Inputs		
R_max	0.486		
Delta	1.000		
Unr. Controls	Nkid6plus, i.STATEID		
	Delta Bound Estimate		
Delta	2.327		
	Other Inputs		
R_max	0.486		
Beta	0.000		
Unr. Controls	Nkid6plus, i.STATEID		
	Inputs from Regressions		
	Coeff.	R-Squared	
Uncontrolled	0.311	0.245	
Controlled	0.324	0.374	

Panel B: Reduced form

	Treatment Effect Estimate		
	Estimate	Sq. Difference from controlled beta	Bias changes direction
Beta	-0.054	0.0005	
Alt. Solution	7.793	61.2	Yes
	Other Inputs		
R_max	0.325		
Delta	1.000		
Unr. Controls	Nkid6plus, i.STATEID		
	Delta Bound Estimate		
Delta	-17.106		
	Other Inputs		
R_max	0.325		
Beta	0.000		
Unr. Controls	Nkid6plus, i.STATEID		
	Inputs from Regressions		
	Coeff.	R-Squared	
Uncontrolled	-0.021	0.16	
Controlled	-0.032	0.25	

Notes- Oster test results to evaluate the robustness of the first stage (panel A) and reduced form (panel B) estimates. Where, the controlled model includes all the control variables used in the main instrumental variable model specification, while, the uncontrolled model only has no. of children aged 6+ and state fixed effects as controls.

A8: Effect of number of children aged 0 to 5 years on mothers' participation decision.

VARIABLES	(1) OLS	(2) First Stage	(3) Reduced Form	(4) 2SLS
Nkid0_5	-0.041***			-0.064**
	(0.008)			(0.030)
noson6plus		0.502***	-0.032**	
		(0.023)	(0.015)	
Constant	0.360*	4.292***	0.204	
	(0.205)	(0.281)	(0.202)	
Observations	7,553	7,553	7,553	7,553
R-squared	0.252	0.396	0.250	0.121
State FE	Yes	Yes	Yes	Yes
Adjusted R-squared	0.246	0.391	0.244	0.113
First-stage F statistic		490.1		
DW Hausman test for endogeneity (p-val)				0.428

*Notes: This table reports the OLS, first-stage, reduced form and 2SLS estimates of the effect of number of children aged 0 to 5 (Nkid0_5) on mothers participation (WKANY). The instrument used is noson6plus. Sample consists of 7553 mothers aged 15-49 years with at least one child aged 6+ years and no child over 18 years. All the specifications include controls. * Indicates statistical significance at 10%. ** Indicates statistical significance at 5%. *** Indicates statistical significance at 1%. Robust standard errors are in parenthesis*

A9: Fathers' labour supply

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Fathers' labour force participation			Fathers' hours worked per year		
VARIABLES	First Stage	OLS	RF	IV	OLS	RF	IV
kid0_5		-0.0004		-0.008	25.28		-62.87
		(0.006)		(0.0213)	(26.38)		(94.50)
noson6plus	0.347***		-0.003			-21.84	
	(0.015)		(0.007)			(32.93)	
Constant	1.885***	0.631***	0.634***		803.6**	898.3***	
	(0.152)	(0.107)	(0.106)		(325.0)	(320.9)	
Observations	7,051	7,051	7,051	7,051	7,051	7,051	7,051
R-squared	0.354	0.045	0.045	0.034	0.068	0.068	0.031
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F stat:	105.1	3.983	3.926	4.080	17.63	19.20	8.492
Adjusted R-squared	0.349	0.0370	0.0370	0.0260	0.0605	0.0604	0.0225
First-stage F statistic	525.6						
DW Hausman test for endogeneity (p-val)				0.725			0.328

*Notes: This table reports the OLS, first-stage, reduced form and 2SLS estimates. The dependent variable of interest is fathers' participation decision and fathers' hours worked per year, the endogenous independent variable of interest is- having a kid aged 0 to 5 years (kid0_5) and the instrument is- not having a son aged 6+ years (noson6plus). Sample consists of 7051 husbands of women aged 15-49 years with at least one child aged 6+ years and no child over 18 years. All the specifications include controls. * Indicates statistical significance at 10%. ** Indicates statistical significance at 5%. *** Indicates statistical significance at 1%. Robust standard errors are in parenthesis*

A10: Check for exclusion restriction- potential differential involvement of mothers in the care of sons and daughters

Mothers aged 45+ years in 2011								
	First Stage	Reduced Form (Dep var- WORK)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Pooled	Pooled	Nkid6plus=1	Nkid6plus=2	Nkid6plus=3	Nkid6plus=4	Nkid6plus==5	Nkid6plus==6+
noson6plus	-0.003	0.053	0.003	-0.030	0.060	0.068	-0.086	0.182
	(0.0076)	(.0338)	(0.101)	(0.0669)	(0.074)	(0.084)	(0.140)	(0.150)
Observations	3,238	3,238	166	596	783	653	436	604
First-stage F stat	0.18							

Mothers aged 45+ years and reported infertile/sterilized in 2011								
	First Stage	Reduced Form (Dep var- WORK)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Pooled	Pooled	Nkid6plus=1	Nkid6plus=2	Nkid6plus=3	Nkid6plus=4	Nkid6plus==5	Nkid6plus==6+
noson6plus	0.009	-0.018	0.451	-0.095	-0.059	0.059	-0.103	0.152
	(0.013)	(0.047)	(0.400)	(0.084)	(0.120)	(0.135)	(0.193)	(0.153)
Observations	2,000	2000	57	361	528	421	287	346
First-stage F stat	0.41							

Mothers present in both survey rounds 2005 and 2011, aged 45+ years in 2011 and reported infertile/sterilized in 2005							
	First Stage	Reduced Form (Dep var- WORK)					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	Pooled	Pooled	Nkid6plus=1	Nkid6plus=2	Nkid6plus=3	Nkid6plus=4	Nkid6plus==5+
noson6plus	-0.001	-0.029	-0.125	-0.154	0.097	0.122	-0.129
	(0.005)	(0.100)		(0.257)	(0.182)	(0.264)	(0.187)
Observations	563	563	13	104	154	127	165
First-stage F stat	0.21						

*Notes: Table reports the first stage (noson6plus on kid0_5) and reduced form (noson6plus on WORK) results for sample of mothers who have most likely completed their fertility. All the specifications include controls. * Indicates statistical significance at 10%. ** Indicates statistical significance at 5%. *** Indicates statistical significance at 1%. Robust standard errors are in parenthesis.*

A11: Tolerating defiance

Assumption about monotonicity or absence of defiers is required for the IV estimate to identify the LATE for the compliers. Otherwise, IV estimate is the weighted difference between the effect of the treatment among compliers and defiers. However, recent literature, including Chaisemartin (2017) show that the 2SLS still estimates a LATE if the monotonicity condition is replaced by a weaker condition, which allows the presence of some defiers. Although, given the ubiquity of son-preference in Indian context, assumption about monotonicity seems veristic. However, in this paper, following Chaisemartin (2017), I comment on the number of defiers that can be tolerated and the LATE for defiers, for the IV estimate to identify the LATE for compliers.

1. Ratio of compliers to defiers should be at least 2.079 to identify the LATE for a subset of compliers called surviving-compliers. That is, for each defier in the population (mothers who are girl-preferring), there should be atleast two compliers (mothers who are son-preferring). This seems reasonable in Indian context given the prevalence of the son-preference.

2. The absolute difference between LATE for compliers and defiers should be less than or equal to 5.165% for LATE to be identified which is almost 52% of the wald estimate. So, the LATE for defiers must lie in the range of 4.73% and 15.16%.