Title of Paper: Do Financial Incentives Affect Fertility and Sex Ratio at Birth? An Impact Evaluation of Madhya Pradesh's Ladli Laxmi Yojana

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Abstract: Ladli Laxmi Yojana (LLY) is a CCT scheme implemented in Madhya Pradesh in 2006 to encourage birth of girls without increasing the average family size. The financial incentives are akin to a subsidy which decreases the cost of raising first-born and second-born girls and thus can potentially affect the incremental fertility and sex-selection decisions of women who had less than two children at the time of the program's announcement. I use IHDS-2 data to construct a woman-year panel using the retrospective birth history of women and employ a difference-in-differences strategy to estimate the causal impact of LLY on the probability of a birth and probability of a female. I find that LLY increases the probability of first birth by 6.1 percentage points and succeeds in increasing the probability of a female birth for women who already have one son by 17.8 percent. However, it fails to do the same for women who have a prior daughter, even though the same magnitude of incentives is offered.

Keywords: Conditional Cash Transfer Scheme, Impact Evaluation, Fertility Economics, Sex Ratio at Birth, Son Preference

1. Introduction

Do financial incentives affect fertility and sex ratio at birth[1] (SRB)? I address this question in the context of the Ladli Laxmi Yojana (LLY), a program implemented by the government of Madhya Pradesh in 2006 to encourage the birth of girls without increasing the average family size. Girls can be enrolled under LLY provided they have at most one sibling and are born after January 1, 2006 to income-tax-exempt couples who reside in Madhya Pradesh. Enrolled girls are then eligible to receive monetary payments amounting to approximately Rs. 1,18,300 by the time they turn 21, conditional on their appearance in class 12th examinations and staying unmarried till the age of 18. These incentives can essentially be viewed as a subsidy which decreases the cost of raising first-born and second-born girls. Therefore, LLY can be considered as a large, unanticipated, and exogenous shock to the women of Madhya Pradesh who had less than two children at the time of the program's announcement and can potentially affect their incremental fertility and sex-selection decisions.

Before proceeding, it is crucial to understand the circumstances under which LLY was introduced. India, along with many other countries in East Asia, South Asia, Southeast Asia, Middle East, and North Africa, is characterized by a persistent son preference[2] i.e. a parental desire to have sons rather than daughters (Arnold, 1998). Previous studies (Pande & Astone, 2007; Dreze, 1999) have identified the following reasons for the existence of son preference. Sons are considered an economic asset as they have higher wage-earning prospects and thus add to family wealth, especially in agrarian economies, which require manual labour, while daughters are perceived as economic liabilities because they impose a substantive financial drain through dowries[3] and other marriage-related expenses[4]. In the absence of formal social security institutions, parents expect their sons—but not their daughters—to financially support them in their old age, which further increases their economic value. Religious and sociocultural norms also play a major role in influencing parental preferences. Sons continue the family line while daughters leave their paternal homes after marriage. Inheritance laws, often based on

[1] I define the sex ratio at birth as the number of girls born alive per 100 boys born alive, unless stated otherwise.
[2] Almond and Edlund (2008) and Dubuc and Coleman (2007), among others, find evidence for persistence in son preference among immigrants from these countries to developed nations in Europe and North America.
[3] Although the practice of dowry has been declared illegal since 1961, it is still prevalent amongst poor as well as rich Indian households. Average cash dowry was Rs. 22,421 as per data from IHDS-1.
[4] In India, marriage-related expenses are disproportionately divided between the bride's and the groom's families. According to data from IHDS-1, average wedding expenditure for the bride's and the groom's family was Rs. 90,000 and Rs. 60,000 respectively.

religious tenets, render sons crucial in retaining family property. In Hinduism, the major religion of India, sons are required to perform important roles such as parents' funeral rites. Finally, sons are considered desirable as they can exercise power to defend the family's honour while daughters are considered incapable of defending even themselves.

For centuries, son preference has led to higher fertility rates, lower child sex ratio[5], and gender imbalances in education. Clark (2000) demonstrates that parents in India follow male-biased fertility stopping rules, wherein the birth of a girl causes parents to increase their fertility in the hope of having one or more sons, thereby increasing the overall fertility rate. Further empirical evidence on the positive relationship between son preference and fertility is presented in Arnold (1998) and Larsen, Chung, and Das Gupta (1998). Son preference also leads to higher postnatal discrimination against girls, resulting in (1) higher female infant mortality due to female infanticide and neglect of their health and nutritional needs (Arnold, 1992) and (2) lower investment in their education (Pande and Malhotra, 2003). In the past few decades, however, another phenomenon has been observed. Desired family size has declined but son preference persists. The advent of cheap and easily available prenatal sex-determination (PNSD) technology has thus enabled parents to realize low fertility, without compromising on their desired gender-mix of children, by selectively aborting female fetouses[6]. This is evident from the following statistics: India's total fertility rate[7] (TFR) has declined from 4.5 in 1981 to 2.4 in 2011. The SRB, which normally ranges between 943 and 970, was just 876 in 2005[8].

The Prenatal Diagnostic Techniques (Regulation and Prevention of Misuse) Act, 1994 banned sex-selective abortions in India but its enforcement remains weak since abortion and ultrasound can be legally used for other reasons. Policymakers then established several girl-promotion conditional cash transfer (CCT) programs that discourage sex-selective abortions by providing financial incentives to raise their perceived value. These financial incentives are in the form of income support to parents, subsidies for education and marriage of girls, or both. Programs that seek to increase only the SRB may lead to higher fertility if parents respond by allowing the birth of girls without decreasing their desired number of sons. Thus, there is usually a cap on

[5] Child sex ratio is defined as the number of females per thousand males in the 0-6 age group
[6] Bhalotra and Cochrane (2010) estimate that 0.48 million girls per annum were selectively aborted during 1995-2005.
[7] Total fertility rate is defined as the average number of children born per woman.
[8] Source for TFR: Census of India; Source for SRB: Civil Registration System

the total number of children that parents can have, for them (or their daughters[9]) to be eligible for enrollment in these programs. Some programs also link the payments to the girl's health, education, and marital status. Sekher (2012) summarizes the various girl-promotion programs operational in different states of India.

There are at least two motivations for studying the impact of financial incentives on fertility and SRB. First, the theoretical literature is divided on this issue. The neoclassical theory of fertility — which emerged from Becker's (1960) canonical model — views these outcomes as a result of a couple's optimal decisions regarding their desired family size and composition. Demand for children depends, among other things, on their cost, parental income, and parental preferences; thus, financial incentives that operate through any of these three channels are expected to influence fertility and SRB. (Cigno, 1991). In contrast, traditional demographers consider biological forces and sociocultural norms to be the fundamental determinants of demographic outcomes including fertility and SRB. Consequently, they believe that financial incentives — at least of the magnitude that are provided by governments —are ineffective in influencing fertility decisions (Olsen, 1994).

Second, investigating whether and to what extent financial incentives influence fertility and SRB is important because it has significant policy implications. If son preference is a deep-rooted sociocultural phenomenon, then it is possible that the girl-promotion CCT schemes fail to cause any significant switch in parental behaviour and instead simply reward parents who would not have discriminated against girls even in the absence of financial incentives. In such a scenario, traditional approaches such as increasing awareness through mass media would be a better alternative.[10] Though these CCT schemes have proliferated in recent years and require considerable public investment, attempts to empirically investigate their effectiveness remain scarce. Most of the empirical work that explores the relationship between financial incentives and fertility is confined to studying pronatalist policies in developed countries, and there too, the evidence is divided. To the best of my knowledge, there are only two papers that study CCTs that are broadly similar to LLY. Anukriti (2017) evaluates the performance of Haryana's

[9] Some programs such as Haryana's Devirupak provide cash transfers to parents of a single boy as well.

[10] For example, Jensen and Otter (2009) exploit the differential timing of access to cable television and find that it reduces son preference. This happens due to attitudinal shifts in gender-related issues such as women's autonomy, etc. after watching soap operas that typically feature independent urban women.

Devirupak scheme while Sinha and Yoong (2009) study Haryana's *Apni Beti Apna Dhan* (ABAD) scheme. I discuss these two papers in detail in Section 2.3.

The dataset that I use for examining the impact of LLY is the second round of the Indian Human Development Survey (IHDS), from which I construct a woman-year panel using the retrospective birth history of the interviewed women. I divide the observations in the woman-year panel into the following subsamples based on a woman's number and sex composition of children at the start of a year*: No Child, One Girl, One Boy, and Others.* I then employ a difference-in-differences strategy to estimate the causal impact of LLY on the probability of a birth and probability of a female birth for each of these subsamples separately. Specifically, I compare the change in the outcomes of women belonging to a particular subsample in Madhya Pradesh to their counterparts in similar control states, before and after the implementation of LLY.[11]

My main findings are twofold. First, LLY increases the probability of first birth by 6.1 percentage points, which represents a 39 percent increase from the baseline probability of 0.17. Second, though LLY succeeds in increasing the probability of a female birth for women who already have one son by 17.8 percent (an increase of 8.7 percentage points from the baseline of 0.49), it fails to do the same for women who have a prior daughter, even though the same magnitude of incentives is offered. This indicates that the demand for girls is less responsive to financial benefits when a woman has a higher proportion of daughters, and hence the magnitude of incentives offered to these women should be higher.

The rest of this study is organized as follows. Section 2 briefly reviews the empirical literature on the relationship between financial incentives, fertility, and SRB. Section 3 describes LLY, the scheme under consideration, and presents the theoretical framework to evaluate its impact on the probability of a birth and probability of a female birth. Section 4 provides a description of the dataset used in the analysis. Section 5 details the empirical strategy employed. Section 6 reports the estimation results and interprets the main findings. Section 7 concludes.

[11] 87% of the woman-year observations in my sample lie between 1990 and 2007. For e.g. 1958 has just one observation, 1966 has 12 observations, etc.

2. Literature Review

In this section, I review the existing empirical evidence on the responsiveness of fertility and SRB to financial incentives. Section 2.1 discusses pronatalist policies employed in developed countries; Section 2.2 provides an overview of public policies aimed at promoting family planning in developing countries; Section 2.3 is concerned with policies that try to influence the gender composition of children, often with restrictions on fertility.

2.1. The impact of pronatalist policies on fertility in developed countries

The TFR in many developed countries is currently below or close to below replacement level fertility[12]. Consequently, some of these countries have adopted policies targeted at increasing fertility via direct cash transfers and tax relief to parents with children, child subsidies, and maternity and paternity leave and benefits. A large strand of literature examines the impact of these policies on fertility measures, using either macro-level data or micro-level data.

Studies based on macro-level data typically use TFR as a dependent variable and exploit historical variations (e.g., Walker, 1995; Zhang and Van Meerbergen, 1994; Hyatt and Milne, 1991) or both cross-sectional and historical variations (e.g., Gauthier and Hatzius, 1997; Castles, 2003) in financial benefits. Overall, this literature finds an insignificant, weak, or mixed effect of financial incentives on fertility. Some studies (e.g., Lutz and Skirbekk, 2005) suggest that the effect of these policies tends to be on the timing of births instead. One limitation of these studies is that aggregate measures of fertility such as TFR overlook individual variations in the eligibility criteria of different policies (Gauthier, 2007). Additionally, the identification of policy effects in time-series studies is vulnerable to trends in any unobserved variables that influence fertility (Milligan, 2005).

Several recent and better designed quasi-experimental studies using micro-level data find positive and significant results, which are in accordance with the predictions of the neoclassical economic theory of fertility. Cohen, Dehejia & Romanov (2013) study the effect of child subsidies in Israel by using a woman-year panel spanning 1999 to 2005. They find that a reduction in child subsidy of $34 (which amounts to 2 percent of the average income) leads to

[12] Replacement level fertility is defined as the total fertility rate at which the total population is exactly replicated from one generation to another, in the absence of migration. It is roughly equal to 2.1 children per woman.

a 0.99 percentage points decline in the probability of an incremental birth for women who have at least two children. Milligan (2005) analyses microdata derived from the public-use files of the 1991 and 1996 Canadian Census and employs a difference-in-differences framework to study the impact of the Allowance for Newborn Children, a pronatalist tax policy in Quebec. His findings suggest that fertility is highly responsive to financial incentives; fertility is estimated to increase by 25% for families eligible for the full amount of C$8000. Laroque and Salanie (2008) run simulations on data from the French labor force surveys of 1997, 1998, and 1999. Their results suggest that an increase in the existing child subsidy program of France by 150 euros per month would raise total fertility by 0.3 percentage points.

2.2. The impact of financial incentives used to promote family planning

Family planning programs in countries with a high TFR have used financial incentives to promote attendance at contraceptive education sessions, adoption and continuation of contraceptive methods, and sterilization. Heil, Gaalima and Hermann (2013) review the quasi-experimental studies in this area and conclude that family-planning behaviors are sensitive to incentives. However, they note that the existing research has substantive limitations.

2.3. The impact of financial incentives jointly targeting fertility and SRB

Policy initiatives have been taken in India and China to promote the birth of girls by providing monetary benefits to parents. In order to prevent the TFR from rising, such policies are often accompanied by restrictions on the total number of children that a woman can have. Ebenstein (2011) uses simulations on micro data from the census of China for the year 2000 to demonstrate the effect of hypothetical girl subsidies to parents of a single girl on the SRB (defined here as the number of boys born alive per 100 girls born alive). The study shows that a subsidy worth three months of household income to parents of a single girl reduces the distortion in SRB by 17% from 1.14 to 1.12 without changing the TFR. A subsidy worth twelve months of income further reduces the SRB to 1.08, but also brings down the TFR by 2.2%.

I now discuss two papers that evaluate the performance of girl-promotion CCT schemes in India. Sinha and Yoong (2009) use data from the first three rounds of the National Family Health Survey (NFHS) to study the impact of ABAD, a program that was operational in Haryana from 1994 to 1998. They compare the outcomes of eligible women to that of ineligible women and find that ABAD increased the sex ratio of living children but had inconclusive effects on total desired fertility and ideal sex ratio.

The paper that is directly linked to my work is Anukriti (2017) who studies a girl-promotion CCT scheme in Harayana called Devirupak. Devirupak was initiated in 2003 and provides monthly payments for a period of 20 years to parents of a single child or two girls. To be eligible, the husband and the wife should be income-tax exempt and either one of them should have undergone sterilization. Eligible parents of a single boy or two girls receive Rs. 200 per month while eligible parents of a single girl receive Rs. 500 per month. Using a difference-in-differences strategy on data from the first three rounds of the National Family Health Survey (NFHS) and the second round of the District Level Health Survey (DLHS), she finds that the probability that a couple has one child increases by 0.6 to 1 percentage points. However, this increase is driven by an 11% increase in the probability that a couple has one boy, despite higher financial incentives for having one girl.

3. The Scheme

This section is divided into three subsections. The first subsection introduces LLY, the scheme under consideration. The second subsection presents the theoretical framework for evaluating the impact of LLY on the fertility and sex-selection decisions of women. The third subsection discusses some issues which are not directly related to the scheme but which would turn out to be of importance whilst estimating the impact of LLY.

3.1 Ladli Laxmi Yojana

LLY is a conditional cash transfer scheme instituted by the government of Madhya Pradesh to simultaneously tackle the problems of high fertility and low sex ratio at birth. The program was announced on July 30, 2006 and went into effect in all the districts of the state on April 1, 2007. Girls enrolled in this scheme receive financial benefits amounting to over one lakh rupees by the age of 21. These incentives are contingent on them appearing in class 12th examinations and refraining from marriage before 18 years of age.

The ultimate goal of LLY is to empower girls and increase their social worth and valuation. Two salient aspects of the program's design help in achieving this aim. First, the program discourages female foeticide and infanticide by incentivizing parents to raise girls and view them as assets rather than liabilities. A cap is placed on the number of siblings of a prospective beneficiary, so that the birth of girls is encouraged, but not at the cost of a higher TFR. Second, the monetary payments are linked to the schooling and marital status of the enrolled girls, thereby promoting their education and preventing child marriage.

Girls born after January 1, 2006 to couples with at most one prior surviving child can be enrolled under LLY, provided her parents are permanent residents of Madhya Pradesh and neither of them pay income tax. Parents can thus enrol a maximum of two daughters[13] in this scheme. Enrolment of a girl is allowed up to one year after her birth upon the production of a family planning certificate and other necessary documents[14]. However, first-born girls can be registered within one year of the birth of the second child. The government of Madhya Pradesh issues National Savings Certificates (NSCs) worth Rs. 6,000 each for five consecutive years in the name of the enrolled girl. Thus, a total of Rs. 30,000 is invested on her behalf. Interim payments are made to eligible girls from the proceeds of this investment at the following stages: Rs. 2000 on admission in class 6th, Rs. 4000 on admission in class 9th, Rs. 7500 on admission in class 11th, and Rs. 200 per month during class 11th and 12th. The terminal payment of minimum Rs. one lakh [15]can be claimed by the girl at the age of 21, conditional on her appearance in class 12th examinations and staying unmarried till the age of 18. Altogether, the incentives total Rs. 1,18,300.

3.2 Theoretical framework of the impact of LLY

Given its incentive structure and eligibility criteria, LLY could potentially influence the total number of children born to a woman, SRB, incidence of child marriage, and educational achievements of girls. Studying the impact of LLY on educational achievements such as school-drop-out rates would typically involve comparing the outcomes of girls enrolled in the program to those who are not, but since I do not have data on actual program beneficiaries, I

[13]Technically, a couple can enrol three girls under LLY as well. This is possible under the following two scenarios. If a woman who has no prior children gives birth to triplet girls, then all the three girls would receive LLY's benefits, as long as the other eligibility criteria are met. Similarly, twin girls born to a woman with one prior child can also be registered under LLY, irrespective of the sex of the previous child.

[14] Birth certificate, state-of-domicile certificate, photograph of the girl with her mother, and an undertaking that her parents are not income tax payers.

[15] As per the provisions of the scheme, the exact terminal payment will depend on the market rate of interest but is guaranteed to be not less than Rs. one lakh.

refrain from conducting this analysis.[16] A similar argument follows for evaluating the impact of LLY on the incidence of child marriage. Hence, I will focus my discussion exclusively on the impact of LLY on marginal fertility decisions of women (i.e. childbearing and the use of sex-selection techniques).

I view the marginal fertility decisions of women within the Becker (1960) framework, where children are considered consumption and investment goods and their demand is determined through a cost-benefit analysis. The benefits include contributions of children to present and future family income, domestic labour, and parental happiness. Offsetting these benefits are real and psychic costs of raising children, such as the cost of food, clothing, shelter, time, and various foregone opportunities (Bloom and Grenier, 1983). Subsequent work in the neoclassical economic theory of fertility has incorporated heterogeneity of children along various dimensions. In some analyses (e.g. Becker and Lewis, 1973), heterogeneity is incorporated by introducing child quality as a separate choice variable in the utility function of women. Other analyses capture the notion of heterogeneity by focussing on child traits such as sex (e.g. Portner, 2015; Ebenstein, 2011). Boys and girls are considered imperfect substitutes of each other and in countries with a high degree of son preference such as India, this translates into a higher net marginal benefit of a boy relative to a girl at any given parity.[17]

I now present a very simple model of the marginal fertility decisions of women when PNSD technology is available. A woman of reproductive age [18] is assumed to be a rational agent. Given her budget constraint, the number and sex composition of her existing children, and the marginal cost and benefit of having an additional boy and girl, she takes the following two decisions sequentially. First, she has to decide whether to conceive. Second, conditional on being pregnant, she has to decide whether or not to go for a PNSD; the underlying assumption being that she will always abort a foetus that has been classified female by the PNSD technology. These two decisions are modelled as follows.

Let MB_b be the marginal benefit of a boy, MB_g be the marginal benefit of a girl, MC_b be the marginal cost of a boy, MC_g be the marginal cost of a girl, and C be the cost of an abortion. The probability of conceiving a boy is equal to the probability of conceiving a girl. Thus, the

[16] Intent-to-treat effects on educational attainments and child marriage can possibly be estimated by relying on the statutory eligibility criteria for enrolment of girls in LLY.
[17] Parity is defined as the number of children a woman currently has.
[18] Reproductive age is defined as 15-49 years according to the World Health Organization.

expected net benefit for a pregnant woman if she decides to carry the pregnancy to term without the use of PNSD technology is equal to:

$$\frac{1}{2}(MB_b - MC_b) + \frac{1}{2}(MB_g - MC_g) \tag{1}$$

Now consider the case when she decides to go for a PNSD. Assuming that the PNSD technology always correctly determines the sex of the foetus, the foetus will be detected as a male with a probability of 0.5 and in this scenario, she will continue her pregnancy to term, thereby deriving a net benefit equal to $MB_b - MC_b$. With a probability of 0.5, the foetus will be detected as a female and the woman will abort the foetus and incur the cost *C.* Therefore, her expected net benefit from using PNSD technology is given by:

$$\frac{1}{2}(MB_b - MC_b) + \frac{1}{2}(-C) \tag{2}$$

A woman chooses to go for PNSD if (2) > (1) i.e. if C < $MC_g - MB_g$. (3)

Let *Type 1* be the category of women who choose to go for PNSD and let *Type 2* be the category of women who choose not to use PNSD. Let p be the proportion of *Type 1* women. Now consider the decision-making process of a *Type 1* woman regarding whether to have an additional child. With a probability of 0.5, she conceives a boy and derives a net benefit equal to $MB_b - MC_b$; with a probability of 0.5, she conceives a girl and incurs cost *C.* Thus, her expected net benefit from having an additional child is given by:

$$\frac{1}{2}(MB_b - MC_b) + \frac{1}{2}(-C) \tag{4}$$

Both *Type 1* and *Type 2* women get zero benefit if they choose not to have an additional child, as the opportunity cost of raising a child has already been incorporated in MC_b and MC_g. Thus, a *Type 1* woman will choose to conceive if (4) > 0. Let π_1 be the fraction of *Type 1* women for whom this holds true.

Type 2 women get an expected net expected utility equal to (1) if they have another child. Thus, a *Type 2* woman will choose to conceive if (1) > 0. Let π_2 be the fraction of *Type 2* women for whom this holds true.

Assuming that there are no unplanned pregnancies and an attempt to conceive always results in a child,[19] the observable outcome of the decision to conceive is the birth of a child. Sex-

[19] Apart from cases where a female fetus is deliberately aborted.

selective abortions are not directly observable. Instead, I use sex of the child that has been born as the observable outcome of the decision to use PNSD for the purpose of sex-selective abortions. In the absence of the availability of PNSD technology, sex of the child would be a random variable, with the probability of a male birth being equal to the probability of a female birth. However, in the presence of PNSD in societies with a high degree of son preference, sex of the child can no longer be considered as a random variable and is male biased.

The probability that a woman who is picked up randomly from the sample gives birth is equal to:

$$\pi_1 * p + \pi_2 * (1 - p) \tag{5}$$

This probability can alternatively be viewed as the birth rate (BR).

Now, I compute the probability of a female birth, conditional on a birth taking place. Out of the total sample, only $\pi_1 * p + \pi_2 * (1 - p)$ women give birth, out of which $\frac{\pi_1 * p}{\pi_1 * p + \pi_2 * (1-p)}$ proportion are of *Type 1,* who by definition, never give birth to a girl. The remaining $\frac{\pi_2 * (1-p)}{\pi_1 * p + \pi_2 * (1-p)}$ proportion are of *Type 2* and give birth to a girl with a probability of 0.5.

Thus, Probability (Girl is born| Birth takes place) $= \frac{\pi_2 * (1-p)}{\pi_1 * p + \pi_2 * (1-p)} * 0.5$ (6)

I now discuss the expected impact of financial incentives provided under LLY. LLY can influence the fertility decisions of women through the following two mechanisms. The first and immediate channel is that LLY subsidizes the cost of raising girls who are enrolled in the scheme. The second channel — which is applicable only in the long run — is that LLY could increase the marginal benefit of a girl by positively altering parental attitude towards her birth.

Based on her birth history (i.e. number and sex composition of her surviving children), a woman belongs to one of the following mutually exclusive and exhaustive demographic groups at any point in time: *No child, One girl, One boy, Two girls only, One boy and one girl only, and Others*. Recall that the financial benefits offered under LLY are applicable only to first-born and second-born girls of income-tax-exempt couples who reside in Madhya Pradesh. LLY can therefore be considered as an unanticipated and exogenous shock that differentially alters a woman's incentives for subsequent births and sex-selection, depending on her state of residence and group affiliation at the time of the announcement of the scheme. Women who belong to the first three demographic groups (i.e. *No child, One girl,* and *One boy*) in Madhya Pradesh would be affected by LLY[20], while the rest would be unaffected by LLY.[21]

For the women who are affected by LLY, MC_g in (3) decreases, which implies that p would decrease i.e. some women of *Type 1* would switch to *Type 2*. A decrease in MC_g also implies that (4) > 0 will now hold or a greater proportion of *Type 2* women i.e. π_2 will increase. The fraction of *Type 1* women who give birth (i.e. π_1) remains the same as MC_g doesn't feature in their childbearing decision.

The overall effect of a decrease in MC_g on the probability of a child being born can be determined by taking the total derivative of (5) w.r.t. MC_g:

$$\frac{dBR}{dMCg} = \frac{\partial BR}{\partial \pi_1} * \frac{\partial \pi_1}{\partial MCg} + \frac{\partial BR}{\partial p} * \frac{\partial p}{\partial MCg} + \frac{\partial BR}{\partial \pi_2} * \frac{\partial \pi_2}{\partial MCg}$$

which simplifies into:

$$\frac{dBR}{dMCg} = 0 + (\pi_1 - \pi_2) * (Negative\ term) + (1 - p) * (Positive\ term)$$

Thus, this simple model shows that it is difficult to sign the effect of LLY on the probability of a birth, which further motivates empirical work that tries to ascertain the relationship between girl-subsidies and marginal fertility.

Similarly, the overall effect of a decrease in MC_g on the probability of a female birth (i.e. Probability (Girl is born| Birth takes place)), can be determined by taking the total derivative of (6) w.r.t. MC_g. It can be easily shown the sign of this derivative is unambiguously positive, which implies that LLY is expected to increase the probability of a female birth at the first and second parity.

3.3 Trends in unobservable variables and potentially confounding schemes

Simply comparing the pre-program and the post-program outcomes of the marginal fertility

[20] I exclude considering whether a woman and are husband are income-tax exempt due to data limitations. The identifying strategy is discussed in detail in Section 5.

[21] Another possible way to look at childbearing is in the context of stopping rules. The impact of LLY can then be evaluated by looking at the behavior of women who belong to the *Two girls* and *One boy and one girl* groups after giving birth to at least one girl post 2006. These women (or their husbands) would have a higher probability of stopping i.e. undergoing sterilization because an incremental child would mean the loss of subsidy on the girls who are potentially eligible under LLY. I do not conduct this analysis as my data source, i.e. IHDS-2 does not provide information on the year of sterilization.

and sex-selection decisions of woman in Madhya Pradesh who belong to a particular demographic group (say, *One girl*) cannot identify the causal impact of LLY, as such an identification strategy is vulnerable to trends in unobservable variables. Specifically, if different cohorts of mothers have different unobservable characteristics which are important for these decisions, then relying on just the time-series variation can bias results. Instead, I employ a difference-in-differences approach to estimate the impact of LLY on the probability of a marginal birth and the probability of a female birth. This means that I would, of course, need control states which are roughly similar to Madhya Pradesh, except for the fact that this scheme or any other similar scheme is not effective in these states. I select the neighbouring states of Madhya Pradesh i.e. Orissa, Uttarakhand, Jharkhand, Bihar, Chattisgarh, Rajasthan, Uttar Pradesh, Gujarat, and Maharastra as control states. These states did not have any child subsidy program, at least before 2011,[22] and are well matched to the treated state (i.e. Madhya Pradesh) in basic demographic indicators.[23]

4. Data

I divide this section into four subsections. The first subsection discusses the construction of the dataset and the source of the underlying data. The choice of the control states and the treatment years is explained in the second subsection. The third subsection describes the variables used in the econometric analysis and the fourth subsection presents the summary statistics.

4.1 Construction of the Dataset

The data used in this study come from IHDS-2, which was conducted by the University of Maryland and the National Council of Applied Economic Research during 2011-12. IHDS-2[24] is a nationally representative survey of 42,152 households in 1420 villages and 1042 urban neighbourhoods across India. It encompasses questions on a wide range of socio-economic and demographic characteristics such as household members' age, education, caste, religion, income, employment, consumption, and expenditure. An ever-married woman between the ages of 15 and 49 years[25] is asked additional questions related to health, marriage, fertility, and

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[22] Government of Jharkhand announced the Mukhyamantri Ladli Yojana, a scheme identical to LLY, in 2011
[23] Refer Table 1 in section 4.4
[24] By IHDS-2, I mean the second round of IHDS. Similar interpretation follows for for NHFS-3, NFHS-4, etc. The figure in parenthesis immediately after is the year in which the survey was conducted.
[25] Women interviewed in the first round of IHDS who are no longer eligible i.e. more than 49 years old, have also been re-interviewed in IHDS-2. Thus, a household can have 0, 1,or 2 eligible women. A total of 39,523 eligible women have been interviewed.

gender relations. Of particular importance is the birth history of the interviewed women[26] i.e. the birth order, sex of the child, year of birth, woman's age at birth, and the child's age at death (if the child is deceased).

There are two advantages of using IHDS-2. First, the data are considered to be of a high quality. Second, this is the only publicly available dataset which can be used for the present analysis. Besides IHDS, three other sources of household-level data on fertility exist – NFHS, DLHS and the Annual Health Survey (AHS). NFHS-4 which was conducted during 2014-15 hasn't been released yet, and NFHS-3 (2007-08) contains a very limited number of treatment years[27]. DLHS-3 (2007-08) and DLHS-4 (2012-13) do not report the complete birth histories of interviewed women, but rather collect information only for births after January 1, 2004 and January 1, 2008 respectively. Finally, the AHS dataset cannot be used because even though it records the total number of boys and girls born to a woman, it does not record the year of their birth, which is required for studying the marginal decisions of women.

Following the procedure outlined in Anukriti (2017), I use the retrospective birth histories of interviewed women to construct an unbalanced woman-year panel. A woman enters the panel in the year in which she started living with her (first) husband.[28] She exits the panel at the end of her reproductive years (i.e. at age 50) or in the year of the interview, whichever is earlier. Next, I impose the following sample selection criteria. I exclude women who have had at least one child before marriage, at least one instance of multiple births in a year[29], or at least one child whose birth year is missing. I also drop women whose birth history features at least one deceased child.

4.2 Control States and Treatment Years

As explained in the next section, I use a difference-in-differences framework to estimate the causal impact of LLY on the marginal fertility decisions of women. Since LLY was executed simultaneously in all the districts of Madhya Pradesh, I cannot exploit the within-state geographical variation of the program's implementation in my empirical strategy. Instead, I use Orissa, Uttarakhand, Jharkhand, Bihar, Chattisgarh, Rajasthan, Uttar Pradesh, Gujarat, and

[26] This information is crucial because the number and sex composition of a woman's surviving children would determine her exposure to LLY. I discuss this in detail in Section 4.
[27] Treatment years refer to years after 2006. See section 4.2 for explanation.
[28] Year of (first) marriage, if the year in which the woman started living with her (first) husband is missing.
[29] Multiple births refer to multiple deliveries in a year or more than one child per delivery.

Maharastra as control states. These states are located close to Madhya Pradesh and are thus likely to be similar to the treatment state in terms of patriarchal institutions and socio-cultural norms such as kinship structures, marriage customs, patrilineality, female autonomy, and the organization of the agrarian economy. Such sociocultural norms and patriarchal institutions are difficult to measure but are one of the most important determinants of fertility and son preference.

I now discuss the choice of treatment years. My woman-year panel has data for the years 1958 through 2012. I take 1958-2006 as the pre-treatment period and 2007-2011 as the treatment period. Even though LLY was publicly announced at the the end of July 2006, I consider 2007 as the first treatment year due to the following reason. The observable outcomes of fertility decisions are subsequent births and its sex. Children who were conceived after LLY was announced would therefore be born in 2007, and it is unlikely that the female births that took place in August to December 2006 would have been terminated in the absence of LLY due to the risk involved in late-term abortions.

Why do I choose 2011 as the last year of treatment despite having data for the year 2012? Jharkhand (which is a control state) announced the Mukhyamantri Ladli Laxmi Yojana (MLLY), a scheme very similar to LLY, in late 2011. Any potential impact of MLLY on fertility decisions would thus manifest from 2012 onwards. Therefore, I exclude 2012 from the treatment period to ensure that my results are not biased by the implementation of MLLY.

4.3. Variables

The variables in the woman-year panel can be partitioned into two distinct categories: birth history related variables and socioeconomic variables. The former variables are of primary importance in the present analysis, whereas the latter are covariates to control for confounding factors and thus minimize the omitted variable bias.

4.3.1. Birth History Related Variables

I construct the following variables to completely capture the birth history of a woman: *Birth Dummy, Female Dummy, Group,* and *Age*. Consider woman *i* in year *t*. The variable *Birth Dummy*$_{it}$ takes the value one if woman *i* gave birth in year *t*, and is zero otherwise. *Female Dummy*$_{it}$ is defined only for those women who gave birth in year *t* and indicates the sex of the child born (1 if female, 0 if male). *Birth Dummy* and *Female Dummy* will be the dependant variables in my regressions as they are the observable outcomes of the incremental fertility and sex-selection decisions of women.

The construction of the variable *Group* follows from the discussion in Section 3.2. LLY's incentives are exclusively applicable to women who have at most one child; therefore, it's crucial to divide women into demographic groups on the basis of the number and sex composition of their children. $Group_{it}$ is a categorical variable that records the demographic group to which woman *i* belongs to at the start of year *t*. It takes the following values: 1 if *No child*, 2 if *One girl*, 3 if *One boy*, and 4 if *others*. Age_{it} is the age of woman *i* at the beginning of year *t.*

4.3.2. Socioeconomic Variables

I include the following woman-specific socioeconomic variables which are identified from the existing literature on the determinants of fertility and son preference (Pande & Astone, 2007; Dreze, 1999): *Religion Dummy*$_i$ (1 if woman *i* is Hindu, 0 otherwise), *Upper Caste Dummy*$_i$ (1 if general category, 0 otherwise), *Education*$_i$ (years of education of woman *i*), *Husband's Education*$_i$ (years of education of woman *i*'s husband), *Urban Dummy*$_i$ (1 if woman *i*'s household is located in an urban area, 0 otherwise), and *Consumption*$_i$ (log[30] of the monthly consumption of the household). These variables take values reported at the time of the survey.

4.4. Summary Statistics

In order to present the summary statistics in a more meaningful way, I aggregate the woman-year data into state-year level cells. Consider a variable *j* in the woman-year panel. The cell entry corresponding to variable j in the state-year panel is thus the (unweighted) average of *j* for all the women belonging to state *s* in year *t*. [31] [32]

In a difference-in-differences analysis, the control states should have roughly similar characteristics as the treatment state in the pre-treatment period. I test this by constructing Table 1 from the state-year panel. Column 1 of Table 1 lists the variables considered; column

[30] The natural logarithm is taken because *Consumption* has a highly skewed distribution.
[31] If *j* is a categorical variable which takes *k* distinct values ($k > 2$), such as *Group,* I first construct indicator variables which take value one if $j = k$ and zero otherwise.
[32] If *j* is a dummy variable, the interpretation of the cell entry will be the fraction of women in state *s* and year *t* who have j=1. For e.g.: Birth Dummy will now be interpreted as the fraction of women in state s who gave birth in year *t*

2 and 3 report the means of these variables for the control states (i.e. Orissa, Uttarakhand, Jharkhand, Bihar, Chattisgarh, Rajasthan, Uttar Pradesh, Gujarat, and Maharastra) and treatment state (i.e. Madhya Pradesh) respectively; column 4 reports the difference in the means and column 5 reports the p-values associated with the t-test for the difference in the means. Table 1 is read as follows. Consider the first row of Table 1. An average of 12% women gave birth per year in the pre-treatment years in the control states, as compared to 11% in the treatment state. As indicated by the high p-value of 0.46, the difference of one percentage point between the two means is not statistically significant at the usual significance levels of 0.1%, 1%, and 5%. The interpretation of other rows of Table 1 follows suit. Notice that in 9 of the 12 variables, the mean of the treatment states and the control states isn't statistically different from each other[33], which lends credence to my choice of the control states.

5. Methodology

The objective of this study is to empirically test whether financial incentives provided under LLY have any impact on the marginal fertility decisions of women, specifically on childbearing and the use of sex-selection techniques. The observable outcomes of these decisions are captured by the variables *Birth Dummy* (whether a woman gave birth in a particular year) and *Female Dummy* (sex of the child born).

I exploit the quasi-experimental nature of LLY's implementation and use a difference-in-differences approach to compare the temporal variation in the outcome variables (i.e. the *Birth Dummy* and the *Male Dummy*) of women affected by the program, relative to those who are not. The following three sources of variation identify a woman's exposure to LLY in year *t*: her state of residence, her birth history, and whether the year being considered falls in the treatment period. Recall that in the previous section, I had specified that the treatment state is Madhya Pradesh and the control states are Orissa, Uttarakhand, Jharkhand, Bihar, Chattisgarh, Rajasthan, Uttar Pradesh, Gujarat, and Maharastra. I had also assigned women to different demographic groups based on the number and sex composition of their previous children: *No child*, *One girl*, *One boy*, and *Others*. Since LLY provides conditional cash transfers only to girls born in families with at most one child, women belonging to the first three groups (i.e. *No child*, *One girl,* and *One boy*) in Madhya Pradesh would, therefore, be affected by LLY while

[33] Any remaining differences across states will be accounted for in my regressions by incorporating state fixed effects, year fixed effects, and state specific linear time trends.

the rest of the women in my sample would be unaffected.

I divide my data into subsamples based on the group affiliation of women at the start of a year and estimate the following regression equation on each subsample separately:

$$y_{ist} = \alpha + \beta(MP_s * Post_t) + \boldsymbol{x'}_{it}\,\boldsymbol{\gamma} + \delta_t + \theta_s + \phi_s * t + \varepsilon_{ist} \quad (7)$$

where y_{ist} is the outcome of interest (i.e. the *Birth Dummy* and *Female Dummy*) of woman *i* in state *s* in year *t; MP_s* takes the value of zero (one) if *s* is a control (treatment) state; $Post_t$ takes the value of one if year *t* is post-treatment, and zero otherwise; $\boldsymbol{x'}_{it}$ is a vector of women specific characteristics such as age, education, husband's education, household's consumption and indicators for her religion, caste, and residence in an urban area; $\phi_s * t$ are state-specific linear time trends; δ_t and θ_s are fixed effects for year and state respectively; ε_{ist} is the error term.

Thus, I run two regressions on each of the four subsamples, one with *Birth Dummy* as the dependent variable and the other with *Female Dummy* as the dependent variable. This means that I run a total of eight regressions. Dividing the sample into subsamples based on a woman's group affiliation at the start of a year allows the treatment effect of LLY to vary across groups. Hence, I have four different treatment-control groups. For example, women in Madhya Pradesh who are childless at the start of a year form a treatment group and women in control states who are childless at the start of the year form the corresponding control group.

A few points regarding the model specification are worth noting here. First, although the outcomes of interest are binary dependent variables, I estimate equation (7) using a linear probability model (LPM), a practice that is common among applied econometricians. The major appeal of using an LPM in lieu of a nonlinear regression model such as logit or probit lies in its simplicity and interpretability of results as the coefficients can directly be interpreted as the marginal effects.

Second, I cluster the standard errors at the state level, which allows for correlation of shocks within a state but assumes error independence across states. Using the default OLS standard errors when data are grouped into clusters can greatly underestimate the standard errors and consequently result in misleadingly large t-statistics, over precision of the estimators, and over rejection of the null hypothesis (Cameron, 2015). This is especially true in a difference-in-differences framework, where the binary-policy regressor is highly serially correlated within a cluster (Bertrand, Duflo and Mullainathan, 2004; Moulton, 1986).

Third, I had mentioned in Section 3.2 that the treatment years span 2007-2011. However, while estimating equation 7, I restrict the sample up to the first year of implementation of LLY i.e. for years before 2008, to deal with the possible endogeneity of the intervention. This ensures that the group affiliation of women in the treatment years is pre-determined and not affected by LLY itself.

The coefficient of interest is the coefficient of the interaction term $(MP_s * Post_t)$ i.e. β, which measures the change in the outcome of interest for women in Madhya Pradesh belonging to a particular demographic group, relative to similar women in control states, before and after 2007. Since the pre-program differences in the treatment-control groups and the time-trends in other variables are already accounted for, β will pick up the differential trend that is attributable to LLY. Thus, β would estimate the impact of LLY on the probability of a birth in regressions where the dependent variable is *Birth Dummy* and on the probability of a female birth in regressions where the dependent variable is *Female Dummy*. β is identified under the assumption that the average outcomes of women in Madhya Pradesh and their counterparts in control states follow parallel paths over time in the absence of LLY.

The failure of this assumption can raise significant concerns about the validity of the difference-in-differences results; thus, it is important to test it before proceeding to estimate the impact of LLY on the probability of a birth and the probability of a female birth. I use the state-year panel that was constructed in Section 4.3 and test this assumption by plotting Figures 1 and 2. Figure 1 plots the time trend of the *Birth Dummy* variable for each of the four treatment-control groups in separate panels. Consider the top left panel of Figure 1, which depicts the percentage of women who were initially childless at the start of year *t* and gave birth to a child during year *t*, separately for residents of the treated state (represented by the solid line) and control states (represented by the dashed line). The vertical line is drawn at the year 2007, which splits the panel into the pre-treatment period and the post-treatment period. Similarly, the remaining three panels of Figure 1 plot the time trend of the *Birth Dummy* variable for the *One girl, One boy, and Others* subsamples. Figure 2 carries out the same exercise for the *Female Dummy* variable. The trends appear broadly parallel in the pre-treatment period in Figures 1 and 2.

I conclude this section with an important caveat. I have imputed the treatment status of a woman based exclusively on her state of residence at the time of the survey and her group affiliation at the start of a year. However, as described in Section 3, one of the eligibility criteria of LLY is that the parents of the prospective girl beneficiary must be non-income taxpayers. Consequently, the fertility decisions of only the non-income tax paying couples would be affected by LLY. Unfortunately, I do not have data on whether a person is income-tax exempt or not. IHDS-2- the underlying source of data- does provide a detailed breakdown of a household's income [34] and its member's employment by different sources[35] , yet the tax-payer status of an individual cannot be ascertained because of the complexities of India's Income Tax Act. Therefore, rather than excluding women based on some subjective cut-off, I estimate equation 1 for the entire sample of women. Another eligibility criterion of LLY is that the parents of the applicant must be permanent residents of Madhya Pradesh. IHDS-2 only reports the state of residence at the time of the survey. However, it is very likely that the state of residence at the time of the survey is the same as the state of domicile because IHDS-2 reinterviews households from the first round of the survey, which was conducted in 2004-05.

6. Results

Table 2 presents the impact of LLY on the probability of a birth and the probability of a female birth by estimating equation (7) for each of the four subsamples of women separately. The subsamples of women are based on the number and sex composition of their children at the start of a year and are classified into *No child, One girl, One boy, and Others*. Column 1 of Table 2 lists the subsample for which the analysis is being conducted. The outcome variable in column 3 is *Birth Dummy*, which is an indicator for whether a woman gave birth in year *t* (1 if birth, 0 otherwise). In Column 4, the observations are restricted to women who gave birth in year *t* and the outcome variable is *Female Dummy*, which is an indicator for whether a girl is born (1 if girl, 0 if boy).

Table 2 is read as follows. Consider the cell formed by the intersection of row 1 and column 3 of Table 2, which I will refer to as cell 1. Cell 1 represents the regression run on the subsample

[34] IHDS-2 disaggregates household income into the following eight categories: Income from agriculture minus expenses, Non-farm business income, Agricultural wages, Non-agricultural daily wages, Salary Income, Remittances, Government Benefits, Others such as income from property.

[35] Within each income section, IHDS asked who in the household participated in this activity and what was their level of participation.

of women who had no child at the beginning of a year, using equation (7), with *Birth Dummy* as the dependent variable, $(MP_s * Post_t)$ as the main independent variable, and socioeconomic covariates of women, state-specific linear trends, and a full set of state dummies and year dummies as the confounding variables. For presentational ease, cell 1 omits the estimates of these confounding variables and focuses solely on the coefficient on the variable $(MP_s * Post_t)$, i.e. β. Cell 1 provides the following statistical information: the estimate of β, the standard error associated with β (which is heteroskedasticity robust and corrected for within-state clustering), and the number of observations on which the regression is estimated.

Now, consider the intersection of the first row and the fourth column of Table 2, which I will refer to as cell 2. Cell 2 has a similar interpretation as Cell 1, except that the dependent variable in the regression here is the *Female Dummy.* Cell 3 is formed by the intersection of the second row and the third column of Table 2, and so on. Thus, each of the eight cells in Table 2 represents a separate regression, which is estimated by using equation (7) and follows the model specification described in Section 5.

I now describe the interpretation of the coefficient on $(MP_s * Post_t)$. All these eight regressions are estimated using OLS, hence β can be directly interpreted as the marginal effect of $(MP_s * Post_t)$, or equivalently LLY[36], on the probability of a birth, in regressions where the dependent variable is *Birth Dummy,* and the probability of a female birth, in regressions where the dependent variable is *Female Dummy*. The sample is restricted to years until 2007, implying that β measures the effect of LLY in the first year of implementation, conditional on the child composition at the start of year *t.*

Recall from the discussion in Section 3 that LLY provides CCTs to only the first-born and second-born girls; therefore, only the following three subsamples of women are going to be affected by the scheme: *No child*, *One girl*, and *One boy.* According to the theoretical predictions, the probability of a female birth for these women increases due to LLY while the effect on the probability of a birth cannot be signed. This implies that in my difference-in-differences framework, the coefficients in Cell 2, 4, and 6 are expected to be positive and significant. The coefficients in the last row of Table 2 i.e. in Cells 7 and 8 are expected to be insignificant as this subset of women is unaffected by LLY.

[36] Refer Section 5 for explanation.

My results indicate that LLY had a mixed effect on the probability of a birth and the probability of a female birth. LLY increased the probability of a first-born child by 6.1 percentage points (see Cell 1), an increase of 39% from the baseline probability[37] of 0.17. For a woman who already has one son, the probability that her next birth results in a girl increased by 8.7 percentage points due to LLY (see Cell 6) , a 17.8% increase from the baseline probability of 0.49. However, the coefficient in Cell 4 is insignificant, which indicates that the demand for girls is less responsive to financial benefits when a woman has a higher proportion of daughters. The coefficient in Cell 2 is also insignificant, which can be reconciled with the previous literature (Bhalotra and Cochrane, 2010; Portner, 2015; Rosenblum, 2013) that finds no evidence of sex-selection at the first parity.

As expected, the probability of a birth for women who initially had more than one child is unaffected by LLY (see Cell 7). Surprisingly though, the β coefficient in Cell 8 is negative and significant, implying that the *'Other'* category women in Madhya Pradesh are less likely to give birth to a female child relative to their counterparts in the control states after the implementation of LLY, even though their incentives are not altered by the scheme.

As mentioned in Section 2.3, my paper is closely liked to Anukriti (2017), who studies a CCT scheme called Devirupak, which provides monthly payments for a period of 20 years to parents of a single child (single girl: Rs. 500 p.m. and single boy: Rs. 200 p.m.) or two girls (Rs. 200 p.m.) Thus, a couple can have the following composition of children to be eligible under Devirupak: *'One girl', 'One boy'*, and *'Two girls'*. Table 3 provides a comparison of the Present Discounted Value (PDV) of the benefits received per boy and per girl under Devirupak and LLY. Note that under LLY, the P.D.V. of benefits per girl remains the same in all the eligible compositions of children and boys don't receive any benefits irrespective of their birth order or the number of their siblings. However, Devirupak values a girl in a *'Two girls'* family lower than a boy in a *'One boy'* family, who in turn is valued lower than a girl in a *'One girl'* family. The main finding of Anukriti (2017) is that Devirupak decreases fertility but worsens the SRB at the first as well as the second parity. The unintended consequences of Devirupak are likely due to its following two features: (i) it does not allow parents to have children of both

[37] Baseline probability is defined as the pre-treatment mean of the outcome variable in the treated state.

sexes, and (ii) it also rewards parents who have one son and no daughters. LLY relaxes both these features and seems to perform better than Devirupak regarding the impact on SRB.

7. Conclusion

Using a difference-in-differences strategy on a large woman-year panel constructed from IHDS-2, I have evaluated the impact of LLY — a CCT scheme in Madhya Pradesh which subsidises the cost of raising first-born and second-born girls — on incremental fertility and SRB. My findings are twofold. First, LLY increases the probability of marginal birth for childless women by 39 percent. Second, LLY succeeds in increasing the probability of a female birth for women who already have one son by 17.8 percent. However, it fails to significantly influence the probability of a female birth for women who already have one daughter, which suggests that the magnitude of incentives for them should be higher as they are more likely to have a higher degree of son preference.

These findings should be taken with some caution due to the following two reasons. First, the empirical results reflect the effectiveness of LLY only in its first year of implementation. Second, my identification strategy of treated women ignores additional eligibility conditions of LLY (such as whether a woman and her husband pay income tax) due to data limitations.

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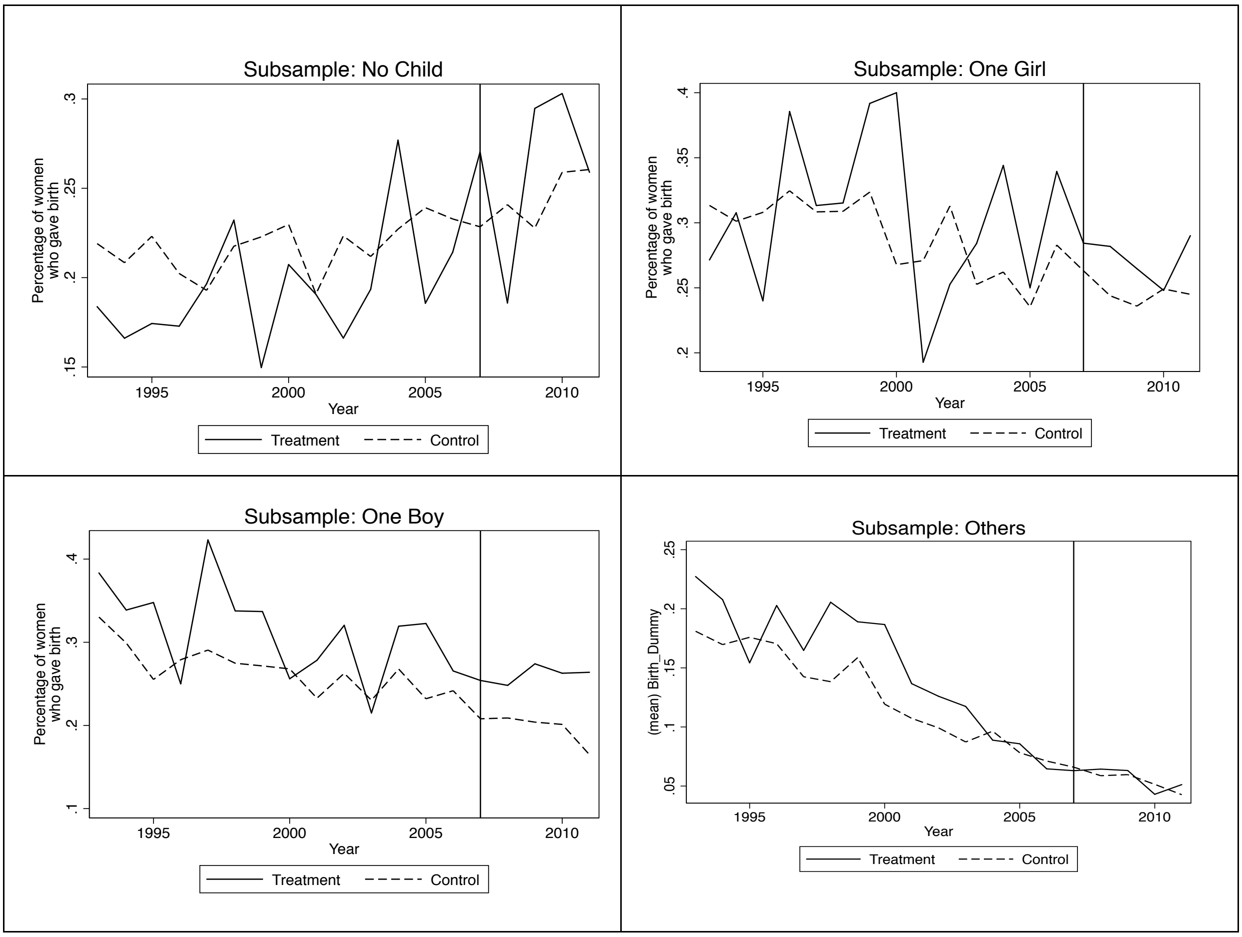
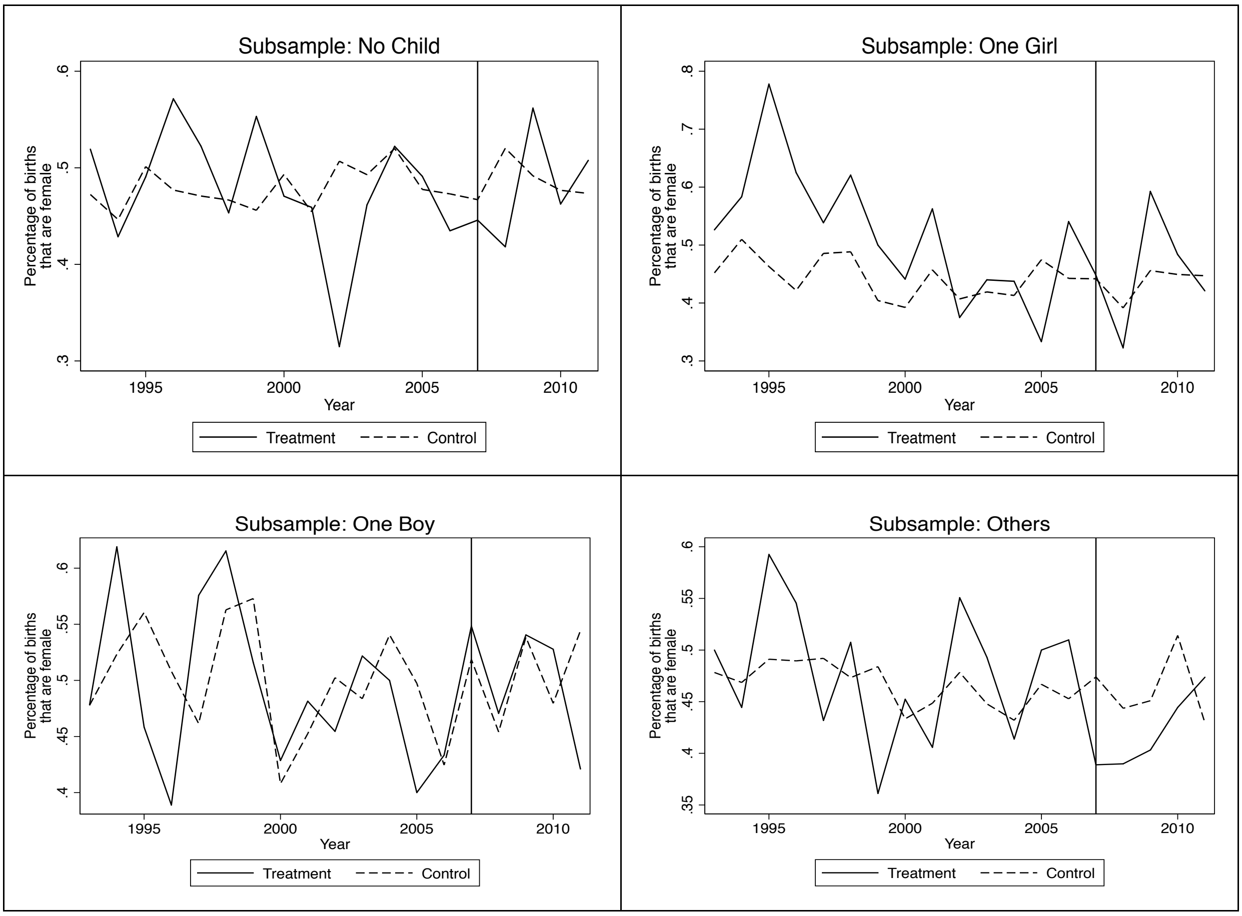
Figure 1: Time Trend of the Variable *Birth Dummy*



Note: Figure 1 plots the mean value of *Birth Dummy* (i.e. the percentage of women who gave birth in a year) against Year. Figure 1 is split into four panels so that the time trend of *Birth Dummy* can be plotted seperately for each of the four subsamples of women: *No child, One girl, One boy,* and *Others*. These subsamples are based on the number and sex composition of a woman's children at the start of a year. Dashed line in every panel represents the time trend for women in control states; solid line represents time trend for women in treatment state. The vertical line at year=2007 divides the panel into the pre-treatment years and the treatment years.

Figure 2: Time Trend of the Variable *Female Dummy*



Note: Figure 1 plots the mean value of *Female Dummy* (i.e. the percentage of births that were female) against Year. Figure 1 is split into four panels so that the time trend of *Female Dummy* can be plotted seperately for each of the four subsamples of women: *No child, One girl, One boy,* and *Others*. These subsamples are based on the number and sex composition of a woman's children at the start of a year. Dashed line in every panel represents the time trend for women in control states; solid line represents time trend for women in treatment state. The vertical line at year=2007 divides the panel into the pre-treatment years and the treatment years.

Table 1: Summary Statistics in the Pre-Treatment Period using State-Year Panel

Variable	Control State	Treatment State	Difference in Means	p-value
Birth Dummy	0.12	0.11	0.01	0.46
Female Dummy	0.5	0.49	0.01	0.72
Dummy for Group=One child	0.67	0.71	-0.04	0.36
Dummy for Group=One girl	0.06	0.06	0	0.77
Dummy for Group=One boy	0.06	0.06	0.01	0.48
Dummy for Group=Others	0.2	0.17	0	0.41
Urban Dummy	0.29	0.16	0.13	0
Religion Dummy	0.86	0.97	-0.11	0
Upper Caste Dummy	0.24	0.22	0.02	0.42
Woman's Education	2.35	1.69	0.66	0.02
Husband's Education	5.56	5.26	0.29	0.36
Household Consumption	0.12	0.11	0.01	0.46
Age	21.6	20.59	1.01	0.13
Number of Observations	398	41		

Note: This table reports the mean values of different variables in the pre-treatment period, separately for the control state (column 2) and the treatment states (column 3). Female dummy is defined only for women who gave birth in year *t*. For a dummy variable, the interpretation of the mean would be the percentage of women who had that dummy variable=1.

Table 2: Estimation Results

Woman's Composition at start of year *t*	Statistic	Outcome in year *t*	
		Birth Dummy	Female Dummy
No child	Coefficient on MP_s*Post_t	0.0611***	0.00349
	(s.e.)	(0.00857)	(0.0185)
	No. of observations	48132	9194
One girl	Coefficient on MP_s*Post_t	0.0245	0.0158
	(s.e.)	(0.0180)	(0.0701)
	No. of observations	11891	3559
One boy	Coefficient on MP_s*Post_t	-0.0126	0.0870**
	(s.e.)	(0.0120)	(0.0227)
	No. of observations	13906	3772
Others	Coefficient on MP_s*Post_t	-0.00930	-0.118**
	(s.e.)	(0.00428)	(0.0249)
	No. of observations	62258	7467

Note: This table reports the beta coefficients estimated using Equation (7), separately for subsamples based on the child composition at the start of year *t*. Each data point is a woman-year combination. Each subsample is restricted to $t < 2008$ i.e. till the first year of implementation of LLY. Each cell corresponds to a different regression. For presentational ease, the table does not report the regression coefficients of other covariates such as socio-economic characteristics of women, state dummies, year dummies, state specific linear trends. Robust standard errors clustered at the state level are given in brackets. *** 0.1%, ** 1%, * 5% level of significance respectively.

Table 3: PDV of benefits per child under LLY and Devirupak

Composition of children in the family	LLY		Devirupak	
	PDV of benefits per girl (in Rs.)	PDV of benefits per boy (in Rs.)	PDV of benefits per girl (in Rs.)	PDV of benefits per boy (in Rs.)
One girl	65,300	-	90,000	-
One boy	-	0	-	35,750
One girl and one boy	65,300	0	0	0
Two girls	65,300	-	17,875	-

Note: This table reports the present discounted value of benefits offered per girl and per boy under LLY (column 2 and 3 respectively) and Devirupak (column 4 and 5 respectively), given the structure of payments under these schemes. A discount rate of 3% p.a. is assumed.