First Birth Sex Selection in Delhi, India: The Role of Progressive Gender Attitudes

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Abstract

This paper uses a latent factor model to create an index measuring how progressive (liberal, non-patriarchal) women's attitudes towards gender are. It then assesses the effect of *progressivity* on the sex of the first child and on the duration from marriage to first birth in Delhi, India. In contrast to what previous literature have found by pooling data for the whole of India, Delhi has an unnaturally male biased sex ratio for first order births. This may be due to selective abortions and post-natal neglect of daughters. In this paper, more progressive women are those who decide on their own healthcare, are free to visit the health facility on their own, do not justify wife beating, and think that it is justified to refuse sex to husbands under certain circumstances. The paper finds that: (i) A one-standard deviation increase in the *progressivity* index increases the likelihood of a female firstborn by 5.8 percentage points compared to women who have not yet given birth. (ii) More progressive women do not experience longer first birth intervals which, consistent with the first result, may indicate that they are less inclined to sex-select their first child. These results imply that women should be taught about their human rights and gender equality. More generally, regional governments should introduce interventions aimed at subsidizing and empowering girls.

Keywords: Sex-Selection; India; Unobserved Heterogeneity; Progressive; Multilevel Latent Factor Models; Competing Risks; First Birth Interval; Discrete Duration Data; Mixed Multinomial Logit.

JEL Codes: C25, C35, C38, C41, J13, J16

1 Introduction

While India is expected to be the world's most populous country by 2020 (UN (2011)), millions of baby girls may have been selectively aborted (Jha et al. (2011), Bhalotra and Cochrane (2010)) or passively killed through neglect over the last decades (Chaudhuri (2012), Miller (1997), Fathalla (1998)). In the absence of any interventions 5 percent more boys than girls are born (Ben-Porath and Welsh (1976), Jacobsen et al. (1999)). This is probably mother nature's response to the fact that females are more resilient to disease (Teitelbaum

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(1970)), such that under the same health care and nutritional conditions they have lower mortality rates than males across all age groups (Sen (1992)). The population sex ratio, the number of males for every 100 females, is thus normally between 98 and 100 (Coale (1991)). In India however, the most recent census reported a sex ratio of 106 (Registrar General (2011)), and a child sex ratio, which includes only the population in the age group 0-6 years, of 109 (Registrar General (2011)). The sex ratio at birth, the number of males born per 100 females born, was in turn 112 in 2004-2006, and 110 in 2007-2009 (SRS (2011)).[1] Those figures are much higher than the biologically normal sex ratio of 105 male births per 100 female births, or approximately 48.8 percent females.

The necessity of slowing down population growth was recognized by India's central government since the early years after the independence in 1947 (Haub 2009). In the last decades however, the lower demand for children along with the strong preference for sons and the availability of prenatal sex determination scans gave rise to the phenomenon of female foeticide. Bhalotra and Cochrane (2010) estimate that 0.48 million girls were selectively aborted every year between 1995 and 2005. Likewise, Jha et al. (2011) conclude that 12 million women went 'missing' between 1980 and 2010 due to selective abortions. Even after birth, girls may be actively killed, or passively by denying them food and / or healthcare (Miller (1997), Fathalla (1998)). Chaudhuri (2012) estimates that 58.29 million girls went missing between 1950 and 2010; out of them, 16.3 million were due to sex selective abortion and the rest, 42 million, to postnatal excess mortality within their first year of life.

India is however not homogeneous and girls are valued differently in different regions, such that sex ratios vary widely across states. In 2011, the child sex ratio[2]in the northern states of Punjab and Haryana was 118 and 120 respectively, down from 125 and 122 in 2001. At 115, the respective ratio in Delhi was less biased, but unlike the former states it did not experience any improvement over the last decade, contributing to India's child sex ratio of 109, the highest that the country has ever had since 1947.

In this context, some Indian states have been facing a deficit of women in the marriage market for some time now. The situation has been met by *across-region* marriages, the importing of brides from states with less skewed sex ratios (Kaur (2004)); buying wives in neighbouring countries (Das Gupta and Shuzhuo (1999), Blachet (2005))[3]; and the abduction of girls (Kaur (2004)). These coping strategies further harm women as the risk of being kidnapped encourages parents to marry off their daughters at a younger age (Kaur (2004)). *Across-region* and foreign wives are also generally much younger than their husbands, underage, and more vulnerable to domestic violence (Kaur (2004), Hindin (2002), Rao (1997), Mishra, (2000)). Child brides are not sent to school, have low autonomy levels, and are put under great pressure to become mothers as to prove their fertility; all of which helps to perpetuate poverty (Otoo-Oyortey and Pobi (2003)). Young girls have a higher risk of dying from pregnancy complications or during childbirth (Mayor (2004)), and to give birth

[1]The Indian Sample Registration System (SRS) provides three-year moving averages of national and state-level estimates of the sex ratio at birth based on data that it periodically collects. Annual data is not realised as sampling errors might be large in that case.

[2]Note that due to underreporting of births taking place at home and unwanted children, the child sex ratio is often considered to be a better measure of both, sex selective abortions and infanticide, than the sex ratio at birth. The latter were 120, 118, and 113 in 2007-2009 in Punjab, Haryana, and Delhi respectively (SRS (2011)).

[3]China has also very skewed sex ratios. In 2010 the sex ratio for the overall population was 105.2 and 118 at birth (National Bureau of Statistics (2011)). It has also been estimated that in 2005, there were 32 million 'surplus' men; that is, young, low status, unmarried men, which will be unable to find a partner due to the scarcity of women (Zhu et al (2009)).

prematurely and / or to low birthweight babies (Khashan et al. (2010)), which in turn contributes to a higher risk of neonatal and infant mortality and morbidity (Friede et al. (1987), McCormick, (1985)). In this context, it will be very difficult for India to meet the United Nation's Millennium Development Goals by 2015.[4]

On the other hand, unmarried, low-status, young men may be more prone to abusing drugs (Kaur (2004), Tucker et al. (2005)) and engaging in risky sexual behaviours (Scott et al. (2012)), both of which would lead to an increase in HIV/AIDS infection rates (Tucker et al. (2005)). These 'surplus' men have also been found to increase crime rates (Edlund et al (2007)) and may even pose a threat to international peace should their governments fail to engage them in productive activities at home (Hudson and den Boer (2004)). The later brings the issue of 'missing' women to the international security agenda.

Sex selective abortions and female infanticide are the most serious examples of the gender based violence that is widespread in India. A recent survey, polling 370 gender specialists by the Thomson Reuters Foundation, ranked the country as the worst place to be a woman among the top 19 economies of the world[5](Trustlaw (2012)). Violence against women is due in part to the acceptance and permissiveness of society towards it, in particular when the aggressor is the husband. In 2012, UNICEF's Global Report Card on Adolescents found that 53 percent of girls and 57 percent of boys in India think that wife beating is justified (UNICEF 2012); adults think alike (Jejeebhoy (1998)). These attitudes that justify and condone violence are due to an existing retrograde, deep-rooted mindset that women are inferior (Bhalla 2012) and / or that they should be submissive, and ultimately have their root in patriarchy (Travers (1997)).

This paper investigates whether a newly created index measuring how progressive women are influences demographic outcomes such as the firstborn's gender and the duration to first birth in Delhi, India. Being progressive is defined as having attitudes and perceptions favouring the advancement of women towards better conditions in society. Specifically, progressive women decide on their own healthcare, are free to visit the health facility on their own, do not justify wife beating, and think that it is justified to refuse sex to husbands under certain circumstances. The reason for focusing in Delhi is because it is an union territory that has a significant deficit of women among first order births. The duration from marriage to first birth is also analysed because, whilst a longer first birth interval will negatively affect total fertility (Trussell and Menken (1978)), and could therefore be seen as a progressive attitude, it might be that some of the women who have not yet given birth have relied on abortions to limit their fertility and achieve a desired offspring sex composition.

Previous literature on demographic behaviour in India have generally assumed that women did not try to constrain their fertility prior to first birth (Nath et al. (1999)). This was supported by data from the NFHS-1 (1992-3) where only 3 percent of ever-married women initiated the use of contraception before their first birth. Nonetheless, there is disagreement on whether sex selective abortions are used for the first birth. While Jha et al. (2006) using the Special Fertility and Mortality Survey conclude that the largest number of

[4]The Millennium Development Goals were officially established in the United Nations Millennium Declaration in 2000 and consist of eight goals: eradicating extreme poverty and hunger; achieving universal primary education; promoting gender equality and empowering women; reducing child mortality rates; improving maternal health; combating HIV/AIDS, malaria, and other diseases; ensuring environmental sustainability; and developing a global partnership for development. All United Nations member states and several international organizations agreed to meet these goals by 2015 (see http://www.un.org/millenniumgoals/bkgd.shtml).

[5]This was based on parameters such as quality of health services, threat of physical and sexual violence, level of political voice, and access to property and land rights; and even Saudi Arabia, where women are legally discriminated against, ranked higher (Trustlaw (2012)).

missing girls is for first order births, Retherford and Roy (2003), using the first two rounds of the NFHS (1992-3 and 1998-9), find little evidence of sex selection on first births. More recently, Poertner (2010), using all three rounds of the NFHS, concludes that sex ratios for first births lie within the normal range. The use of pooled data for the whole of India and several rounds of the NFHS allows the latter studies to analyse time-series variation. Nevertheless, aggregate national data on first births may be hiding significant variation at the state level, similar to the one found for child and population sex ratios (Registrar General (2011)). Moreover, the conclusion that most women do not use contraception prior to their first birth does not rule out the possibility of them aborting after getting pregnant and finding out the baby's gender.

Using data from the NFHS-3, this paper first finds out that in Delhi, Punjab and Rajasthan sex ratios for first order births exhibit a significant deficit of females compared to the biologically normal ratio. The paper then constructs an index to measure how progressive women are by estimating a multilevel latent factor model. The latter allows controlling for correlation between observed characteristics that may influence demographic outcomes and any unobserved heterogeneity. Delhi is then taken as a case study and the effect of *progressivity* on the firstborn's gender and the duration to first birth is assessed. Focusing on Delhi is relevant as that territory has shown no improvement in its very skewed child sex ratio over the last decade (Registrar General (2011)). Furthermore, being India's National Capital Territory and mostly urban, Delhi can be thought of as having had sex determination scans available earlier and cheaper than any other Indian state or territory; abortion facilities may equally be more widely available there. Lastly, over the years Delhi has received millions of economic migrants[6], including females, from the rest of India which may be particularly willing to postpone first birth.

The results show that more progressive women are more likely to have a firstborn girl. Specifically, a one-standard deviation increase in the *progressivity*'s level increases the likelihood of a firstborn girl by 5.8 percentage points compared to women who have not yet given birth. The effect is robust to the set of covariates used to create the *progressivity* index and increases if the analysis is restricted to women who married after the introduction of the ultrasound. Furthermore, more progressive women do not experience longer first birth intervals which, together with them being more likely to have a firstborn girl, may indicate that they are less inclined to sex-select their firstborn. The latter however does not mean that they may not sex-select at all.

These results imply that women should be taught about their human rights and gender equality, both in school and through media campaigns. More generally, regional governments, especially those in northern India, should introduce interventions aimed at subsidising and empowering girls. This could be attained by subsidising education and training for girls in order to improve their employment prospects and reduce the cost of dowries.

The remaining of the paper is divided as follows. Section 2 describes the data. Section 3 and 4 present the model and results, respectively. Section 5 concludes.

2 Data

The data come from the third round of the National Family Health Survey (NFHS-3) only. Previous rounds were not used as they do not contain some of the questions that were

[6] In fact, since 1994, the annual population growth in Delhi has increased more due to newly arrived migrants than to the natural population growth (ESD 2008-9).

used to construct the *progressivity* index. The NFHS-3 was conducted in 2005-2006, it is representative at the state level and interviewed a total of 124,385 women aged 15 to 49 years. Table 1 shows the proportion of females among first births by state and the p-value for the null hypothesis H_0; $P = 0.488\, v\, H_1 : P \neq 0.488$, where 0.488 is the biologically normal proportion of females at birth. The sample includes currently or formerly married women who are usual residents in the state where they were interviewed, and whose first birth was a singleton. Although in some states, including Haryana, the sex ratio seems to be female biased, the null hypothesis cannot be rejected. In contrast, at the 10 percent significance level, Punjab, Delhi, Rajasthan, Sikkim, Arunachal Pradesh, Mizoram, and India as a whole exhibit a deficit of females compared to the natural sex ratio.[7] In 2001 each of these states had a lower than normal female to male sex ratio (Census 2001).

This paper focuses on Delhi as it is one of the two states / territories where the null hypothesis is rejected at the 1 percent significance level, it is widely recognized as one of the Indian states / territories having an unnaturally high male to female sex ratio (at birth, in the 0-6 age bracket, and in the overall population), and it has had no improvement in its child sex ratio in the last decade.

The models on the firstborn's gender and on the duration to first birth were thus estimated on a sample of 2032 currently married women who are usual residents in Delhi, have either not yet given birth or gave birth at least nine months after marriage to a singleton, and have married only once. The latter was needed in order to assure that partners' characteristics such as age and education belonged to first husbands, who presumably fathered the firstborns. In order to estimate a nationally representative progressivity index however, the whole Indian sample of 83,556 currently married women who are usual residents in the state where they were interviewed was used.

2.1 *Progressivity* index

Being progressive means favouring or promoting the advancement of society towards better conditions. Progressive ideas and attitudes can be seen as opposed to retrograde, backward thinking and social norms. In India sons are preferred over daughters due to religious, cultural, and economic reasons. Hinduism requires a son to light his parent's funeral pyre in order for them to reach Nirvana, the release from the cycle of reincarnation. Moreover, girls traditionally move to live with their in-laws at marriage and thereby stop providing economic support to their parents, whilst sons remain at home and provide for them. Furthermore, it is uncommon for a girl to marry without her family paying a (theoretically outlawed) dowry to the groom's family. Consequently, a daughter is seen as a burden and a son as an investment.

In addition to this, there are several famous old scriptures that explicitly describe women as being inferior and subordinate to men.[8]In this context, passively or actively killing a

[7]The fact that Haryana does not appear in this list may be surprising but is consistent with Visaria (2005), who in focus group discussions with families in that state (and in Gujarat) was told that they do not attempt sex selection for first births. Furthermore, Haryana's high total fertility rate (2.7 compared to 2 in Punjab, 2.13 in Delhi, and 2.68 in India as a whole (NFHS-3)) may allow families not to sex select their first child, but start doing so at higher parities. In contrast, families in Punjab and Delhi may have to start sex-selecting their offspring already from their first child, as they aim at having smaller families.

[8]Consider for instance the Ramcharitamanas of Tulsidas, a 16th century epic poem which is considered one of the greatest works of Hindu literature and states that: "drums, uncivilized illiterates, lower castes, animals and women are all fit to be beaten". Another example is the Manusmriti, a Hindu law book created at some point between 1500 BCE and 500 AD and prescribing the subservience of women to men.

daughter, before or after birth, may be seen as an affirmation of the patriarchal social order which, from a human rights point of view, is retrograde.

There is some unobserved heterogeneity which will make some women go from preferring sons to (passively or actively, before or after birth) killing / allow others to kill a daughter. This paper hypothesizes that more progressive women, those who favour the advancement of society towards improved conditions, will not sex-select their offspring nor neglect their daughters after birth, such that they are more likely to report having had a female firstborn.[9] This paper thus controls for unobserved heterogeneity in a baby's sex equation and in a duration to first birth model using a measure of women's level of *progressivity*.

Women's level of *progressivity* is a relative and multidimensional latent variable which may potentially influence total fertility and, through sex-selective abortions and strategic negligence, the actual sex composition of the offspring. More progressive women may decide to postpone having their first child as well as not caring about the baby's gender. There are some questions in the NFHS-3 whose answers can tell us something about the underlying level of *progressivity*. In particular, this paper uses wife's attitudes and way of thinking on issues that impact women's health, both physical and / or emotional and including reproductive health, and which entail some gender interaction. There are four such items:

1. Decision making regarding own healthcare.
2. Freedom of movement to visit the health facility.
3. Perceptions towards wife beating due to a number of specific reasons.
4. Perceptions towards women's right to refuse sex within marriage due to a number of specific reasons.

In the case of domestic violence, perceptions are used rather than the actual experience because the latter may be endogenous. More progressive women may experience less violence precisely because they do not tolerate it. The precise wording of the survey questions used to create the *progressivity* index is given below.

1. Who usually makes the following decisions: mainly you, mainly your husband, you and your husband jointly, or someone else?

a. Decisions about health care for yourself?

2. Are you usually allowed (by your husband) to go to the following places alone, only with someone else, or not at all?

a. To the health facility?

3. Sometimes a husband is annoyed or angered by things that his wife does. In your opinion, is a husband justified in hitting or beating his wife in the following situations: [Response options: Yes / No / Do not know]

a. If she goes out without telling him?
b. If she neglects the house or the children?
c. If she argues with him?
d. If she refuses to have sex with him?
e. If she does not cook food properly?
f. If he suspects her of being unfaithful?
g. If she shows disrespect for in-laws?

[9] This addresses the concern that sex ratios at birth might not be as skewed as reported because of a recall problem. That is, it is possible that some women had a firstborn girl, whom they neglected and therefore passed away soon after birth, then they had a second child who was a boy and reported him as the firstborn due to not remembering their firstborn girl. This recall problem however does not affect the results in this paper because the latter hypothesizes that more progressive women will recall a female firstborn accurately, partly because they are less likely to neglect her, and therefore loose her.

4. Please tell me if you think a wife is justified in refusing to have sex with her husband when:

a. She knows her husband has a sexually transmitted disease.

b. She knows her husband has sex with other women.

c. She is tired or not in the mood.

These questions were used to create four fallible measurements ω_q, q=1,...,4 of the true level of *progressivity* of women's attitudes and perceptions regarding gender interaction that affects women's health as follows. Each variable was coded either 1 (more progressive) or 0 (less progressive), so for instance will take the value of 1 if woman i decides alone on her own health care, and 0 otherwise. in turn will be equal to 1 only if woman i believes that a husband is not justified in beating his wife under any circumstance, and 0 otherwise. The definition of each measurement is described with more detail in Section 3.1.1.

3 Model

3.1 Firstborn's gender

Assume all women have access to prenatal sex determination technology and abortion services such that they can choose whether or not to have a child and the sex of the offspring. A multinomial logit model can thus be used to describe each woman's decision making process as follows. Each woman i is assumed to have preferences defined over a set of alternatives C_i= {no child yet, first child is a boy, first child is a girl} and derives utility from her choice. That is,

$$U_i(alternative\, j) = \mathbf{x_i'}\beta_j + \phi progress_i + \upsilon_{ij},\; j = 0, 1, 2$$

Where the individual heterogeneity terms υ_{ij} are assumed to be independently and identically distributed with an extreme value cumulative distribution function $F(\upsilon_j) = \exp(-\exp(-\upsilon_j))$, such that alternative j is chosen if:

$$\Pr(y_i = j) = \Pr(U_{ij} > U_{iq})\forall q \neq j$$

For independent extreme value distributions this probability is given by:

$$\Pr(y_i = j) = \Pr(j|\mathbf{x_i}) = \frac{\exp(\mathbf{x_i'}\beta_\mathbf{j} + \phi progress_i + \upsilon_{ij})}{\sum_{g=0}^{2}\exp(\mathbf{x_i'}\beta_\mathbf{g} + \phi progress_i + \upsilon_{ig})},\; j = 0, 1, 2 \tag{1}$$

Where:

$\mathbf{x}$=Vector of woman i's observed characteristics: age at marriage, age difference between spouses, own and husband's educational attainment, caste, religion, wealth quintile, family structure and rural residence.

progress=Woman i's *progressivity* index, whose estimation is detailed in Section 3.1.1.

3.1.1 *Progressivity* index

Define α_i as woman i's unobserved heterogeneity term which in this paper is referred as the true, latent, level of *progressivity*. α_i is a culturally determined trait which is influenced by some of woman i's observed characteristics, $\mathbf{z_i}$, and it in turn affects her answers to questions regarding issues that affect women's health, both physical and emotional, and including reproductive health. Given that all measurements ω_q, q=1,...,4 are binary, and assuming that at each *progressivity* level the probability that a woman with that level of *progressivity* will answer 'yes' to one of the measurements ω_{iq} is of the logit form, the relationships between α, $\mathbf{z}$, and ω_q can be summarized by the two-equation system below, where equation (2) is known as the measurement model and equation (3) as the true covariate model.

$$\omega^*_{iq} = \lambda_{0q} + \lambda_{1q}\alpha_i + \vartheta_{iq},\ q = 1, ..., 4 \,\text{with}\, \omega_{iq} = \begin{cases} 1 \,\text{if}\, \omega^*_{iq} > 0 \\ 0 \,\text{otherwise} \end{cases} \tag{2}$$

$$\alpha_i = z_i'\gamma + u_i \tag{3}$$

Where:
ω_{iq} =Observed, fallible, measures of α_i. Specifically:
$\omega_{i1} = 1$ if woman i decides alone on her own health care; 0 otherwise.
$\omega_{i2} = 1$ if woman i is allowed (by husband) to go alone to the health facility; 0 otherwise.
$\omega_{i3} = 1$ if woman i believes that a husband is not justified in beating his wife under any of the following seven circumstances. If she: goes out without telling him, neglects the house or the children, argues with him, refuses sex, does not cook properly, shows disrespect for in-laws, or if his husband suspects her of being unfaithful; 0 otherwise
$\omega_{i4} = 1$ if woman i thinks that a wife is justified in refusing sex under each of the following three circumstances: if she is tired or not in the mood, her husband has a sexually transmitted disease, or her husband has other women; 0 otherwise.
λ_{0q} and λ_{1q}, $q = 1, ..., 4$ are the intercepts and factor loadings respectively. The first loading is assumed to be 1 for identification such that the other loadings are estimated with respect to it, and the variance of the *progressivity* trait can be estimated freely.
$\mathbf{z}$ = Vector of woman i's observed characteristics: Age at marriage, current age, age difference between spouses, education, caste, religion, husband's polygamy indicator, wealth quintile, family structure, frequency of media contact, and state indicators.

Equations (2) and (3) were estimated jointly by maximum likelihood using the gllamm routine in Stata under the assumption that the u_is are normally distributed. As women in rural and urban areas may be drawn from different distributions, and therefore behave differently, the joint model was estimated separately by place of residence. In each case, the Bayesian posterior, the estimated posterior conditional mean of the latent variable,$\hat{\hat{\alpha}}_i \equiv E(\alpha_i|z_i, \omega_{iq})$, $q = 1, ..., 4$, was obtained and incorporated as an additional covariate, *progress*, in equation (1) to estimate y_i, the probability that a woman's first child is either a boy (j=1), a girl (j=2), or that she is still childless by the time of the interview (j=0). *Progress* tells us something about the true level of *progressivity* conditional on the observed behaviour. Figure 1 illustrates the relationship among equations (1) to (3).

3.2 Duration from marriage to first birth

The second outcome under investigation is the duration from marriage to first birth. As the dataset records children's births in months and women can exit the childless state by either having a boy or a girl, a competing risk discrete hazard model was used to investigate the number of months m that woman i spends childless nine months after her first marriage (m=9, 10, 11, ...,M). Only those women who had not yet given birth at the time of the interview were treated as censored, so the longest duration to exit, M, is 199 months.

Although long durations may signal infertility, they may also be a consequence of successive abortions, so that no artificial censoring, at for instance 5 years after marriage, was imposed; in any case, only a few women exit after 55 months. Therefore, given that enough observations exiting in each period to each of the two destination states are needed in order to identify each hazard (the one leading to a boy and the one leading to a girl), several months were merged to obtain a time index t=1,2,...,7 as follows. The first period (t=1) combines months 9, 10 and 11 after marriage (m=9,10,11); t=2 includes months, m, 12 to 15; t=3 stands for m=16,...,20; t=4 for m=21,...,26; t=5 for m=27,...,35; t=6 for m=36,...,54; and t=7 for m=55,...,199.

Define T_i as the length of a completed spell (time to first birth) of woman i. This is a discrete non-negative random variable which takes the value of t if the spell ends in the interval $(I_{t-1}, I_t]$ by one of the two destination states. The discrete time hazard rate $h_{ij}(t)$ for the tth interval thus denotes the conditional probability of woman i transiting from the childless state to the destination state j (giving birth to either a boy, j=1 or a girl, j=2) in the tth interval conditional on not having given birth before:

$$h_{ij}(t|\tau_{jt},\, x_i,\, \theta_{ij}) = Pr_j(T_i = t|T_i \geq t;\, \tau_{jt},\, x_i\, \theta_{ij}) \forall j = 1, 2 \tag{4}$$

Where:
τ_{jt}= baseline hazard for outcome j, common to all women.
$\mathbf{x}_i$= Vector of woman i's observed characteristics as outlined in Section 3.1. That is, age at marriage, age difference between spouses, own and husband's educational attainment, wealth quintile, religion, caste, family structure, and rural residence.
θ_{ij}= Unobserved individual effect.

The hazard rate for an exit at time t to any destination j is the sum of the individual destination specific hazard rates:

$$h_i(t|\tau_{jt},\, x_i,\, \theta_{ij}) = \sum_{j=1}^{2} h_{ij}(t|\tau_{jt},\, x_i,\, \theta_{ij}) \tag{5}$$

The survival function, the unconditional probability of remaining childless at the end of the interval t, is given by the product of the probabilities of remaining in a spell in all previous periods up to t:

$$S_i(t|\tau_{jt},\, x_i,\, \theta_{ij}) = \Pr(T_i > t|\tau_{jt},\, x_i,\, \theta_{ij}) = \prod_{k=1}^{t} [1 - h_i(k|\tau_{jk},\, x_i,\, \theta_{ij})] \tag{6}$$

The unconditional probability of transition in period t for woman i into the destination state j is thus given by:

$$Pr_j(T_i = t|\tau_{jt},\, x_i\, \theta_{ij}) = h_{ij}(t|\tau_{jt},\, x_i,\, \theta_{ij}) \prod_{k=1}^{t-1} [1 - h_i(k|\tau_{jk},\, x_i,\, \theta_{ij})] \,\text{for}\, j \,\epsilon\, \{1, 2\} \tag{7}$$

To account for the competing risk nature of the problem, assume the hazard to be a multinomial logit, where the alternatives are "not yet given birth / censored" (j=0), "firstborn is a boy" (j=1), "firstborn is a girl" (j=2). Taking the first alternative as the reference category we have:

$$h_{ij}(t|\tau_{jt},\, x_i,\, progress_i,\, \theta_{ij}) = \frac{\exp(\mathbf{x_i'}\beta_\mathbf{j} + \tau_{jt} + \psi_j progress_i + \theta_{ij})}{1 + \sum_{g=1}^{2} \exp(\mathbf{x_i'}\beta_\mathbf{g} + \tau_{gt} + \psi_g progress_i + \theta_{ig})} \tag{8}$$

This is a discrete time, three choice model as each woman will have multiple observations for the outcome variable. That is, given the recoding of the time variable, each woman has at most 7 observations taking the value of 0 in all periods starting 9 months after marriage until she gives birth, when the outcome variable takes the value of either 1 if the offspring is a boy, or 2 if it is a girl. For instance, a woman exiting the childless state 10 months after marriage due to giving birth to a girl will have only one indicator, taking the value of 2. A woman exiting 37 months after marriage to a boy will have 6 observations, all taking the value of zero except the last one, which will be a 1; and a woman who was interviewed 22 months after marriage but has not yet given birth will have 4 observations, all taking the value of 0. Four different specifications of equation (8) were estimated by consecutively adding covariates. Each specification and the respective results are discussed in Section 4.3.

Given a random sample of women, the sample likelihood function with random intercepts, θ_j,is:

$$L = \prod_{i=1}^{N} \int_{-\infty}^{\infty} \prod_{t=1}^{7} \prod_{j=0}^{2} \left\{ \frac{\exp(\mathbf{x_i'}\beta_\mathbf{j} + \tau_{jt} + \psi_j progress_i + \theta_j)}{1 + \sum_{g=1}^{2} \exp(\mathbf{x_i'}\beta_\mathbf{g} + \tau_{gt} + \psi_g progress_i + \theta_g)} \right\}^{d_{ijt}} f(\theta) d\theta \, \forall \, j = 0, 1, 2 \tag{9}$$

$$\text{where } d_{ijt} = \begin{cases} 1 & \text{if woman } i \text{ makes transition to destination } j \text{ in period } t \\ 0 & \text{otherwise} \end{cases}$$

For simplicity, assume that the unobserved heterogeneity θ is identically and independently distributed over the individuals and follows a multivariate normal distribution with mean a and variance-covariance matrix $\mathbf{W}$. That is, $\theta \sim f(a, \mathbf{W})$, where θ is independent of the explanatory variables $\mathbf{x}_i$. To maximize equation (9), one needs to integrate over the distribution of the unobserved heterogeneity, but there is no analytical solution for that integral. This paper thus approximates it through Gauss-Hermite quadrature using the gllamm routine in Stata. The reference category is "not yet given birth / censored" (j=0), such that β_0 and θ_{i0} in equation (9) are normalized to zero. Assuming that the remaining unobserved heterogeneity terms are different to each other ($\theta_{i1} \neq \theta_{i2}$)but correlated, the distribution of the unobserved heterogeneity can be described by the following bivariate normal distribution: $(\theta_1, \theta_2) \sim f \left\{ \begin{pmatrix} a_1 \\ a_2 \end{pmatrix}, \begin{pmatrix} \sigma^2_{\theta_1} & \sigma_{\theta_1\theta_2} \\ \sigma_{\theta_1\theta_2} & \sigma^2_{\theta_2} \end{pmatrix} \right\}$.

4 Estimation results

4.1 *Progressivity* index

Table 2 reports mean values for each of the four *progressivity* measurements. In general, women in cities are more progressive than women in the country side, but in some spheres only a low proportion of women is progressive. For instance, only about a third of women usually make decisions regarding their own health care. The exact amounts are 31 and 27 percent of urban and rural women respectively. These proportions are very low and are consistent with anecdotic evidence[10] showing that women are often pressed by their

[10] See for instance a BBC report on female foeticide in south-west Delhi (http://www.bbc.co.uk/news/world-south-asia-13264301)

husbands or in-laws to abort female foetuses. In contrast, about 70 percent of women (76 and 68 percent in cities and the country side respectively) think that it is justified for a wife to refuse sex to her husband if she is tired or not in the mood, if her husband has a sexually transmitted disease and if he has other women. Similarly, 67 percent of women in cities are allowed (by their husbands) to go to the health facility on their own, but only half of women in the rural side are allowed to do so. Lastly, only 53 percent of women in cities do not justify wife beating under any circumstance; barely 37 percent of rural women think alike. The latter sphere makes it clear that patriarchal values are very entrenched in the psyche of Indian women, such that in some circumstances wife beating is considered a husband's 'right'.

Table 3 reports the means of each of the covariates $\mathbf{z}$ in the true covariate model (equation (3)) by place of residence. On average, women residing in cities marry one and a half year later than their rural counterparts, at 18.8 versus 17.3 years old. Urban women are also one year older than their rural counterparts (33 versus 31.8 years); but urban and rural women are very similar in terms of the age difference between them and their husbands. Around 55 percent of them (56 in the country side) are between 2 years older and five years younger than their husbands, and only 1 percent of them are more than 2 years older than their partners. In contrast, urban women are on average much more educated than their rural counterparts. Whilst slightly more than a third of women in cities have no formal education or incomplete primary, 61 percent of rural women are in such circumstance. Furthermore, 38 percent of women in cities have some secondary education and 24 percent of them have completed secondary education or more. The respective proportions for rural women are 26 and 5 percent respectively.

Regarding caste, almost half (47 percent) of the women in cities belong to the 'normal' caste or did not provide information on this variable, compared to only 32 percent of women in the country side. In contrast, 17 percent of rural women belong to a scheduled caste, and only 7 percent of women in cities do so. As for religion, Muslims account for a larger proportion of women in cities, 16 percent, compared to only 11 percent in the rural side. The opposite occurs with Sikh women, they account for 3 percent of women in the rural side and only 1 percent in cities. This may be due to the fact that the states where Sikhs reside, e.g. Punjab, have moderate levels of urbanisation. Regarding the wealth quintile, which is an index measuring household asset variables rather than income itself, we see that, while more than half (53 percent) of urban women in the sample belong to the fifth quintile, only 2 percent belong to the lowest quintile, compared to 12 and 21 percent of rural women respectively. Likewise, only 5, 12 and 28 percent of urban women belong to the second, third and fourth wealth quintile compared to 23, 24, and 20 percent of rural women, respectively.

As for family structure, we see that a slightly larger proportion of women live in extended families in the rural side, 49 percent, compared to 44 percent of urban women. Regarding media contact, a similar proportion of urban and rural women, 46 and 43 percent respectively, listen to the radio less than once per week or more. In contrast large differences exist regarding newspaper reading and TV watching. Whilst only one in four rural women reads the newspaper less than once per week or more, 55 percent of urban women do so. This is understandable given the educational attainment figures described above. Similarly, 90 percent of women in cities watch TV once per week or more, compared to 57 percent of women in the country side. This large difference can be explained by the lack of electricity in rural areas. Finally, we see that the state housing the largest proportion (11 percent) of urban women is Maharashtra, followed by Uttar Pradesh which is home to 9 percent of all urban women in the sample, and is in turn where the largest proportion (11 percent) of rural women reside. Another case to note is Delhi, which is mostly urbanised.

The third column of results in Table 3 shows the descriptive statistics for the 2032 women interviewed in Delhi. We see that the average age at marriage is 18.5 years, that 66 percent of women have at list completed primary education, and 36 percent of women belong to a lower caste (either a scheduled caste or tribe or other backward castes). 90 percent of women are either Sikh or Hindu, and only 15 percent of women belong to one of the first three wealth quintiles, whilst the majority, 66 percent, belongs to the richest quintile. Almost 60 percent of women live in a nuclear family and only 7 percent of women reside in rural areas.

The results from estimating the *progressivity* model are reported in Tables 4 and 5. Note that, as the latent trait does not have a well-defined measurement scale, it is only possible to tell whether a certain covariate increases or decreases the level of *progressivity*, but not by how much. The results in Table 4, which relate to the true covariate model (equation (3)), show that most regressors are statistically significant and have the expected sign. Specifically, women who married older are more progressive in cities but less in the rural side. This makes sense as women in urban settings may have more decision making autonomy as to be able to choose to marry at an older age. In contrast, in rural areas it may be more difficult to contradict the family, who often press for an early marriage, such that marrying at an older age may be due to not finding a suitable partner because of some individual characteristics which are not controlled for here (e.g. physical appearance or the number of elder sisters[11]), and which also make women to be less confident and more submissive in all aspects of their life. Similarly, older women were found to be more progressive. This makes sense as women in the sample are aged 15 to 49 years such that older women may have gained people's respect and may thus be more mature, experienced and confident as to know their rights better. Lastly, women who are older than their husbands were found to be less progressive.

Turning to educational and cultural indicators we see that more educated women are more progressive, and the effect increases monotonically with educational attainment. Women from lower castes (the scheduled castes, tribal communities and other backward castes) are less progressive in urban settings but strangely, rural women from schedule castes are more progressive. Compared to Hindu women, Muslim women are less progressive, whilst Christians and those who either have other religion (Jainism, Judaism, Zoroastrianism, Donyi-Poloism, or other), do not practice, or did not answer are more progressive. Lastly, Sikh women in urban areas and Buddhist rural women are more progressive than Hindu women. As for the effect of the household assets index, we find that in cities, women in higher quintiles are more progressive, and the effect increases monotonically with wealth.

Women in nuclear families and those who have some media contact (at least less than once a week) are more progressive regardless of their place of residence. The latter makes sense as the media may give them information which may make them more aware of their human rights. Similarly, women in nuclear families do not have the pressure from their in-laws, such that their way of thinking and living may be less patriarchal and more progressive. Lastly, the state indicators show that urban women in Himachal Pradesh, Delhi, Rajasthan, Uttar Pradesh, West Bengal, Jharkhand, Chhatisgarh and Madhya Pradesh are more progressive than similar women in Maharashtra. On the other hand, rural women in Bihar, Nagaland, Orissa, Chhatisgarh and Karnataka are less progressive than similar women in Uttar Pradesh.

[11] Taking the wealth quintile constant, a family with more daughters will find it more difficult to meet the dowry requirement necessary to marry off their girls, especially the young ones (Kaur (2004)) as they may have already ran out of savings or acquired debt in order to marry off the elder daughters.

Figure 4 plots the estimated *progressivity* index, for the whole of India and for the Delhi subsample. We see that the index is somehow shifted to the right in the subsample, implying that women in Delhi are on average more progressive than in the rest of India.

Table 5 reports the results from equation (2), the measurement model. These estimated intercepts and factor loadings were used to plot Item Characteristic Curves (ICC) for each of the measurements for the rural and urban samples in Figures 2 and 3 respectively. IC curves plot the probability of a measurement taking the value of one against the *progressivity* index. The higher the factor loading the steeper the curve will be, such that small changes in *progressivity* will yield large changes in the probability and so, the better a measurement will be at discriminating between very progressive and less progressive women. The intercept in turn informs about the probability of a measurement taking the value of one given an average *progressivity* index value of 0.

Looking at the slope coefficients in Table 5 and the IC curves in Figures 2 and 3, we see that different measurements have different relative importance depending on women's place of residence. For the rural sample, the most important *progressivity* measurement, the one with the largest factor loading, is number 2, whether a woman enjoys the freedom to go to the health facility on her own. Consequently, Figure 2 shows that the probability of answering 'yes' to that question is indeed of the logit form such that this measurement is able to discriminate between very progressive and less progressive women. The large negative intercept in turns implies that women with a below average *progressivity* level (lower than 0.6) are those having a zero probability of being allowed to go to the health clinic unaccompanied. Women with a *progressivity* index which is one standard deviation away (i.e. 1.6) have a close to 1 probability of having the freedom to go to the health facility on their own.

In contrast, the third measurement, whether wife beating is not justified, has a positive but very low factor loading. Consequently, the respective IC curve in Figure 2 is almost completely flat, such that the predicted probability of answering 'yes' to this question barely vary with the *progressivity* index. A woman with an index of 0 has a predicted probability of not justifying wife beating of 0.365, whilst a woman with a very high index, for instance four standard deviations higher, has a predicted probability of 0.4. The fourth measurement, whether refusing sex is justified, is not much better. Lastly, the first measurement, whether the respondent usually makes decisions regarding her own healthcare, is a bit better such that a 4-standard-deviation increase in the *progressivity* index (from 0 to 4), yields a 34 percentage point increase (from .16 to .5) in the estimated probability of stating that refusing sex to husbands is justified.

In the case of the urban sample, it is the third measurement, whether wife beating is not justified, the one that best discriminates between very progressive and less progressive women due to its high factor loading. In that case, Figure 3 shows that women with lower than average *progressivity* levels have a close to zero probability of agreeing that a husband is not justified in beating his wife, whilst women with a *progressivity* index of five standard deviations have a estimated probability of 0.85 of agreeing with that view. The IC curves corresponding to the second and fourth measurements (whether allowed alone to the health clinic and whether refusing sex to husbands is justified) are also fairly steep such that they are able to discriminate between very progressive and less progressive women, but to a lesser extent than the third measurement does. Finally, whether the respondent usually makes decisions regarding her own health is not such a good measurement for *progressivity*. For instance a ten-standard-deviation increase in the *progressivity* index (from -5 to 5) yields a change in the estimated probability of usually deciding on self healthcare of only about 22 percentage points, from .15 to about .37.

4.2 Firstborn's gender

Table 6 presents the results from estimating equation (1). We see that although several estimated coefficients are statistically significant, the respective marginal effects are not at the 5 percent level, except in the case of the *progressivity* index in the girl equation. Specifically, a one-standard deviation increase in the level of *progressivity* is associated with a 5.8 percentage point increase in the probability of having a firstborn girl compared to women who have not yet given birth *ceteris paribus*.

4.2.1 Robustness checks

Table 7 presents several robustness checks. For instance, one may argue that the *progressivity* index is not accurately measuring the true level of women's progressive thinking at the time of marriage as women's observed characteristics may have changed between that date and the time of the interview. For instance, women may currently have some media contact when they used to have none at the time of marriage; or the other way around, they may have used to have time to read the newspaper, but now that they have children, they do not. Because of this, the *progressivity* index was re-estimated using only "hard" covariates. That is, those which one can expect to have remained constant throughout the years. These are: age at marriage, current age, age difference between spouses, education, religion, caste, and the state indicators. The estimated effect of *progress* obtained from using this new index in equation (1) is shown under Model [2] in Table 7. The effect has now decreased slightly. Specifically, a one-standard deviation increase in the *progressivity* level is now associated with a 5.4 percentage-point increase in the likelihood of having a firstborn girl *ceteris paribus* at the 5 percent significance level.

Furthermore, one could argue that the assumption that all women have access to prenatal sex determination technology is acceptable only after the introduction of the ultrasound in India, which Bhalotra and Cochrane (2010) assumed to be 1985. Because of this, equation (1) was re-estimated using only women who married in or after 1985, and the baseline index. The effect of *progressivity* on the firstborn's gender then increases as shown in Model [3] in Table 7. A one-standard deviation increase in the *progressivity* index is now associated with a 7.6 percentage-point increase in the likelihood of having a firstborn girl at the 5 percent significance level *ceteris paribus*.

One could also argue that women's progressive thinking is unlikely to have remained constant throughout the years. Things in India have changed and women may now think in a more Western, less traditional way, such that their perceptions regarding wife and husband rights may be different now than when they first married. Because of this, equation (1) was re-estimated using only the baseline index and women who married at most 12 years before the NFHS-3 interview. That is, in or after 1994, a time when the ultrasound was also widely available. Model [4] shows that a one-standard deviation increase in the *progressivity* index is associated with a 7.7 percentage-point increase in the likelihood of having a firstborn girl at the 10 percent significance level *ceteris paribus*.

Model [5] shows the results from estimating equation (1) including only women in Delhi whose husband was interviewed. Although men were randomly selected for interview and couples in each state are representative of couples at the state level, the effect of *progressivity* has now almost doubled compared to the baseline specification. That is, a one-standard deviation increase in the *progressivity* index is now associated with a 11.4 percentage-point increase in the likelihood of having a firstborn girl at the 5 percent significance level *ceteris paribus*.

Lastly, given that in some cases the questions used to create the *progressivity* measurements were asked after the first child was born, an OLS equation of *progress* on the sex of the child was estimated to get a sense of whether endogeneity is present. That is, it may be that depending on the sex of the child women become more or less progressive. For instance, those women who have given birth to a boy may become less progressive if the fact of having had a boy helps them to improve the relationship with their husbands such that when asked whether they think that a husband is justified in beating his wife, they answer 'yes' because now they do not get battered and are on their husbands' side. Similarly, it may be that having had a girl makes women become more progressive and stand against patriarchal norms, partly because now they may get battered more often due to not having given birth to a boy. The results are shown in Table A1 in the Appendix. The first column relates to the unadjusted model and the second one to a model that controls for the confounding factors $\mathbf{x}$ which were outlined in section 3.1. We see that the sex of the child is not significant in explaining *progressivity*.

4.3 Time to first birth

The duration model described by equation (8) was estimated for Delhi using the whole sample of 2032 women. The results from estimating the duration model are shown in Table 8. Model [1] relates to the unadjusted model, where the outcome variable (for each woman, a series of up to seven zeros, if she has not yet given birth, or zeros followed by either a 1 or a 2 at the time spell of first childbearing, as explained in section 3.2) was regressed on the *progressivity* index and a constant only. In that case, a one-standard deviation increase in the *progressivity* index is associated with a 2.8 percentage-point increase in the probability of exiting the childless state due to giving birth to a girl. There is no effect on the probability of exiting through giving birth to a boy.

Time spell indicators were then added into the model and the results are shown under Model [2]. A one-standard deviation increase in the *progressivity* index is now associated with a 14.5 percentage-point increase in the probability of exiting due to giving birth to a girl, without affecting the probability of exiting through giving birth to a boy. Model [3] adds the exogenous covariates $\mathbf{x}$ as described after equation 4 in Section 3.2, or equivalently, in Section 3.1 after equation (1). In this case, the effect of *progress* allegedly disappears. Nevertheless, regarding the marginal effects in multinomial logit models, Green (2008) states that "the hypothesis that a variable is not influential in the determination of the choices should be tested at the coefficient level". In that case, a one-standard deviation increase in the level of *progressivity* is associated with a 3.4 percentage point increase in the probability of exiting due to giving birth to a girl, with no effect on the probability of exiting via having a boy.

Lastly, Model [4] adds interactions between *progress* and the time spell indicators. Again, the marginal effects, whose standard errors were calculated using the delta method, lack statistical significance by themselves. However, following Green (2008) and looking instead for significance at the coefficient level we see that controlling for confounding factors, a one-standard deviation increase in the level of *progressivity* is associated with a 7.2 percentage point increase in the probability of exiting due to giving birth to a girl. At the 5 percent significance level there is no effect on the probability of exiting due to having a boy.

In the most complete model, Model [4], we may want to know whether more progressive women are overall more or less likely to exit the childless state. In principle, one would expect them to delay the initiation of childbearing *ceteris paribus*. In the context of Delhi however, a longer first birth interval may be the result of abortions, such that we may see more progressive women exiting earlier for a given baby's gender. On the other hand, if boys' and girls' hazards were compared given a certain *progressivity* level, boys' hazard should be slightly above that of girls simply because it is more likely to give birth to a boy than to a girl. Finding the opposite may be evidence of sex-selective abortions. That is, girls' hazard may be higher than that of boys because women whose firstborn is female did not have a particular preference for boys, so they did not undergo any abortion and exited the childless state at the normal, natural, pace. In contrast, women with a firstborn male are not only those who had a boy by chance but also those who first aborted a girl / girls and then gave birth to a boy such that they exited at a rate slower than normal, making the length of intervals leading to a boy longer than normal.

In order to assess whether the duration model give us any evidence of sex selective abortions and if so, find out how *progressivity* relates to them, the hazard function for each of the two destination states was estimated using three different values of progress. The first one is the "average" *progressivity* level, which was calculated as the sample mean of *progress* ($\bar{X}_{progress}$). The other two values add or subtract one sample standard deviation to the mean to obtain the "high"($\bar{X}_{progress} + s_{progress}$) or "low" *progressivity* level($\bar{X}_{progress} - s_{progress}$). The respective hazards will be referred as "low", "average", and "high". The three boys' hazards are plotted in Figure 5 and those of girls are shown in Figure 6. Each hazard is based on 7 average probabilities, as there are 7 time periods, such that a total of 42 probabilities were estimated for each woman and the average across individuals taken and plotted. Each figure $P_{j\rho t}$, the probability of exiting at time t (t=1,2,...,7) to the destination state j (j=1,2) calculated at *progressivity* level ρ, (ρ= "average"=1, "high"=2, "low"=3) was estimated using equation (8). For instance, P_{213}, the probability of exiting the childless state in the third time spell, t=3, (16 to 20 months after marriage) by giving birth to a girl, j=2, calculated at the average *progressivity* level, $\rho = 1$, is: $P_{213} = \frac{\exp\left(\left(\beta_{02}+\delta_{t_3 2}\right)+\mathbf{x_i}'\beta_{\mathbf{2}}+\left(\psi_2+\delta_{tp_3 2}\right)\bar{X}_{progress_i}\right)}{1+\sum_{g=1}^{2}\exp\left(\left(\beta_{0g}+\delta_{t_3 g}\right)+\mathbf{x_i}'\beta_{\mathbf{g}}+\left(\psi_g+\delta_{tp_3 g}\right)\bar{X}_{progress_i}\right)}$

Figures 5 and 6 show that at early spells (up to 2 years and 2 months after marriage, t=4), the average probability of exiting the childless state for a given baby's gender evaluated at the "high" (one standard deviation above the average) *progressivity* level is higher than the same probability evaluated at lower values of *progressivity*. This is consistent with more progressive women not aborting and so, exiting at the normal, natural pace. Reassuringly enough, the average probability of exiting, for a given baby's gender, evaluated at the average *progressivity* level is in the middle, and the same probability evaluated at one standard deviation below the average is the lowest. At t=5 (27 to 35 months after marriage) however, Figure 6 shows that the average probability of exiting by giving birth to a girl evaluated at the "low" *progressivity* level reaches its maximum, 30 percent, and it is therefore higher or equal than any of the other two hazards. In particular, it is higher than the "high" hazard and equal to the average one, which has also reached its maximum. From then onwards the female "low" hazard drops down, whilst the average hazard remains constant for one period (t=6) and then decreases, the "high" hazard in turn increases at t=6 and then falls down. At the same time, Figure 5 shows that after three years of marriage (t$\geq$6), the average probability of exiting by giving birth to a boy is the highest if evaluated at the "low" *progressivity* level, lower if evaluated at the average *progressivity* level, and the lowest if evaluated at the "high" level of *progressivity*. This is consistent with more progressive women being less prone to abort, as the maximum average probability of exiting by giving birth to a girl is found at a later spell (t=6) than it is in hazards evaluated at lower *progressivity* levels (t=5).

Nevertheless, Figure 5 shows that all hazards leading to a boy, regardless of at what *progressivity* level they are estimated, are increasing. Such a shape would be expected if this was the overall average probability of exiting regardless of destination state. But the plots are only for the average probability of exiting by giving birth to a boy and so, they may be evidence of sex selective abortions. What those plots are telling us is: "if you wait long enough (more than 54 months after marriage, t=7), the average probability of exiting the childless state by giving birth to a boy is about 80 percent". This can only happen if women who wait that long to have their first child are ready to abort female foetuses. It is true however that the average probability of exiting by giving birth to a boy at t=7 is slightly lower, 77 percent, if estimated at one standard deviation above the average *progressivity* level. It is exactly 80 percent if estimated at the average level and 82 percent at the "low" *progressivity* level. Still, as the average probability of being childless after more than 54 months after marriage (t=7) is zero regardless of at what *progressivity* level it is calculated, the average probability of exiting by giving birth to a girl at that point is only around 20 percent. Figure 6 shows that it is exactly 20 percent at the average *progressivity* level, 22 at the "high" level, and only 18 percent at the "low" *progressivity* level; so there is some variation in the way we expected but any of those figures is very far away from the 48.8 percent that we should normally be seeing if the average probability of being childless is zero, as it is at t=7. One could therefore say that sadly, although women who are more progressive than average are less inclined to abort girls, they still may, and seem, to sex-select before birth.

Figures 7 to 9 plot both male and female hazards for a given *progressivity* level. The "average" hazards are plotted in Figure 7, the "low" ones in Figure 8, and the "high" ones in Figure 9. The plots confirm the finding that the least bad situation is found when the hazards are evaluated at the "high" *progressivity* level. Specifically, if evaluated at one standard deviation above the average *progressivity* level, the normal situation, mainly that the male hazard is slightly above the respective female hazard is attained at t=3. In contrast, such a situation is reached only in the fourth period if evaluated at or below the average *progressivity* level. Furthermore, at t=7, when all three male hazards reach their maximum, the smallest difference between each of those hazards and the respective female one is found among the "high" hazards, followed by the "average" ones and lastly, the "low" ones. The exact differences are: 55 percentage points, 60 ppt, and 64 ppt respectively. But again, these differences are huge compared to the natural difference of 2.4 percentage points and thus constitute evidence of sex selective abortions, even among women who are more progressive than average.

5 Conclusions

Using data from the NFHS-3, this paper first finds out that in Delhi, Punjab and Rajasthan the proportion of boys among first births is significantly larger than the biologically normal proportion. The paper then constructs an index to measure women's level of *progressivity*, defined in terms of attitudes and perceptions favouring the advancement of women towards better conditions in society, and assesses the effect of *progressivity* on the firstborn's gender and the first birth interval in Delhi, which was taken as a case study as it has not experienced any improvement in the child sex ration in the last decade.

The results show that more progressive women are more likely to have a firstborn girl. Specifically, a one-standard deviation increase in the level of *progressivity* increases the likelihood of a firstborn girl by 5.8 percentage points compared to women who have not yet given birth. The effect is robust to the set of covariates used to create the *progressivity* index and increases for different subsamples, mainly the ones that shorten the period of study to account for the introduction of the ultrasound. Furthermore, more progressive women do not experience longer first birth intervals. On the contrary, the average probability of exiting the childless for a given baby's gender is higher if evaluated at a *progressivity* level higher than the average one. This, together with the fact that more progressive women are more likely to have a firstborn girl may indicate that they are less inclined to sex-select their firstborn. Nevertheless, this does not mean that they may not sex-select their offspring at all. In fact, plots of the hazard for different levels of *progressivity* shows evidence consistent with more progressive women sex-selecting though at a lower extent than less progressive women. This implies that the whole Indian society has still a lot to learn about human rights and gender equality.

Indian families tend to prefer boys over girls due in part to economic and cultural reasons, regional governments should thus introduce interventions aimed at subsidising and empowering girls. For instance: (i) Given that parents traditionally lose their daughters to in-laws whilst their sons remain at home and provide for them, a pension for the elderly could be launched. (ii) Subsidised education and training for girls could be offered in order to improve their employment prospects and reduce the cost of (theoretically outlawed) dowries. (iii) The whole society should be taught, both in school since early ages and through media campaigns, about women's human rights and gender equality. (iv) Crucially, for female foeticide and infanticide to stop, culture has to change such that a massive media campaign could be launched to promote the idea that dowries and son preference are old-fashioned. (v) Equal-rights rulings and laws protecting women from violence should be passed and strictly applied. Such strategies have successfully worked in South Korea which in the 1990s had a very skewed sex-ratio just as India currently has.

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Table 1: Proportion of females among first births†

State	N	Female	P-value
Jammu and Kashmir	1851	0.493	0.65
Himachal Pradesh	2097	0.499	0.32
Punjab	2440	0.469	0.06
Uttaranchal	1913	0.492	0.70
Haryana	1922	0.502	0.22
Delhi	2189	0.462	**0.01**
Rajasthan	2648	0.464	0.01
Uttar Pradesh	7928	0.483	0.41
Bihar	2478	0.490	0.82
Sikkim	1252	0.462	0.06
Arunachal Pradesh	1057	0.459	0.06
Nagaland	2285	0.498	0.32
Manipur	2593	0.487	0.93
Mizoram	1108	0.458	0.04
Tripura	1248	0.486	0.91
Meghalaya	1228	0.485	0.81
Assam	2487	0.484	0.70
West Bengal	4552	0.491	0.71
Jharkhand	2030	0.496	0.50
Orissa	2931	0.481	0.48
Chhatisgarh	2516	0.483	0.64
Madhya Pradesh	4416	0.482	0.42
Gujarat	2534	0.485	0.73
Maharashtra	5981	0.493	0.45
Andhra Pradesh	4791	0.478	0.16
Karnataka	4008	0.493	0.51
Goa	1849	0.473	0.20
Kerala	2318	0.491	0.81
Tamil Nadu	4024	0.493	0.50
India	80674	0.485	**0.07**

†Source: Own calculation using data from the NHFS-3 (2005-2006). The sample includes ever married women who are usual residents in the state where they were interviewed and whose first birth was a singleton. p-value for the null hypothesis $H_0 : P = 0.488 \, v \, H_1 : P \neq 0.488$, where 0.488 is the biollogically normal proportion of females at birth.

Table 2: Descriptive Statistics: Means of *progressivity* measurements†

Variable	Urban	Rural
ω_1 : Decides on her own health care	0.31	0.27
ω_2 : Allowed alone to the health clinic	0.67	0.5
ω_3 : Wife beating is not justified	0.53	0.37
ω_4 : Refusing sex to husband is justified	0.76	0.68
N	36795	46761

†Source: Own calculation using data from the NHFS-3 (2005-2006). The sample includes currently married women who are usual residents in the state where they were interviewed. Each measurement takes the value of either 0 or 1 such that the means measure the proportion of women answering 'yes' to each of the questions.

Table 3: Descriptive Statistics: True covariate model (Equation(3))†

Variable	Urban	Rural	Delhi
Age at marriage	18.82	17.31	18.49
Current age	33.01	31.79	33.01
Age difference between spouses (husband-wife)			
Difference -2 to 5 years [Base category]	0.55	0.56	0.72
Wife is more than 2 years older than husband	0.01	0.01	0.00
Husband at least 6 years older than wife	0.44	0.43	0.28
Highest Education			
None / incomplete primary [Base category]	0.31	0.61	0.34
Completed primary	0.06	0.07	0.06
Some secondary	0.38	0.26	0.28
Completed secondary	0.24	0.05	0.32
Caste			
Normal / no answer / missing [Base category]	0.47	0.32	0.64
Scheduled caste	0.16	0.18	0.21
Scheduled tribe	0.07	0.17	0.01
Other backward caste	0.31	0.33	0.14
Religion			
Hindu [Base category]	0.72	0.76	0.86
Muslim	0.16	0.11	0.09
Christian	0.07	0.08	0.01
Sikh	0.01	0.03	0.03
Budhist	0.01	0.01	0.00
Other religion / none / no answer	0.02	0.02	0.01
Wealth quintile			
Poorest [Base category]	0.02	0.21	0.00
Poor	0.05	0.23	0.03
Middle	0.12	0.24	0.12
Richer	0.28	0.20	0.19
Richest	0.53	0.12	0.66

†Source: NHFS-3 (2005-2006). Thesample includes currently married women who are usual residents in the state where they were interviewed.

Table 3: Continued - True covariate model†

Variable	Urban	Rural	Delhi
Family structure [Extended]			
Nuclear family	0.56	0.51	0.58
Media contact [No contact / no answer]			
Newspaper: At least less than once p/week	0.55	0.25	0.54
Radio: At least less than once p/week	0.46	0.43	0.59
TV: At least less than once p/week	0.90	0.57	0.91
Place of residence [Urban]			
Rural			0.07
State of residence			
Jammu and Kashmir	0.02	0.03	
Himachal Pradesh	0.02	0.03	
Punjab	0.02	0.03	
Uttaranchal	0.02	0.03	
Haryana	0.01	0.03	
Delhi	0.06	0.00	
Rajasthan	0.03	0.04	
Uttar Pradesh [Base, rural sample]	0.09	0.11	
Bihar	0.03	0.04	
Sikkim	0.01	0.02	
Arunachal Pradesh	0.01	0.02	
Nagaland	0.03	0.02	
Manipur	0.03	0.03	
Mizoram	0.01	0.01	
Tripura	0.01	0.02	
Meghalaya	0.01	0.02	
Assam	0.02	0.04	
West Bengal	0.06	0.05	
Jharkhand	0.02	0.03	
Orissa	0.02	0.05	
Chhatisgarh	0.02	0.04	
Madhya Pradesh	0.06	0.05	
Gujarat	0.03	0.03	
Maharashtra [Base, urban sample]	0.11	0.04	
Andhra Pradesh	0.08	0.04	
Karnataka	0.04	0.05	
Goa	0.03	0.02	
Kerala	0.02	0.03	
Tamil Nadu	0.06	0.04	
N (total=83556)	36795	46761	2032

†Source: NHFS-3 (2005-2006). The sample includes currently married women who are usual residents in the state where they were interviewed.

Table 4: Estimation Results: True covariate model (Equation (3))†

Variable	Urban	Rural
Age at marriage	0.002***	-0.003***
	(0.001)	(0.001)
Current age	0.004***	0.014***
	(0.000)	(0.001)
Age difference between spouses [0-5 years]		
Wife is older than husband	-0.039**	-0.066***
	(0.019)	(.023)
Husband at least 6 years older than wife	-0.001	0.008
	(0.004)	(.006)
Highest Education [None / incomplete primary]		
Completed primary	0.026***	-0.017
	(0.008)	(.011)
Some secondary	0.061***	0.024***
	(.007)	(.009)
Completed secondary	0.165***	0.134***
	(0.013)	(.017)
Caste ['Normal']		
Scheduled caste	-0.041***	0.026***
	(.006)	(.009)
Scheduled tribe	-0.025**	0.003
	(0.010)	(.010)
Other backward caste	-0.032***	-0.008
	(.005)	(.007)
Religion [Hindu]		
Muslim	-0.026***	-0.071***
	(0.005)	(.010)
Christian	0.048***	0.075***
	(.010)	(.015)
Sikh	0.039**	0.012
	(0.017)	(.026)
Budhist	-0.013	0.113***
	(0.015)	(.029)
Other religion / none / no answer	0.042***	0.191***
	(0.015)	(.024)
Wealth quintile [Poorest]		
Poor	0.029*	-0.013
	(.015)	(0.008)
Middle	0.050***	-0.010
	(0.014)	(0.009)
Richer	0.065***	-0.025**
	(0.014)	(0.011)
Richest	0.104***	-0.001
	(0.016)	(0.014)

†Base category in squared parenthesis. Standard errors in parenthesis. Asterisks denote the significance level (double sided) *: 10%, **: 5%, ***: 1%

Table 4: Continued - True covariate model†

Variable	Urban	Rural
Family structure [Extended]		
Nuclear family	0.021***	0.105***
	(0.004)	(0.006)
Media contact [No contact / no answer]		
Newspaper: At least less than once p/week	0.038***	0.059***
	(.006)	(0.009)
Radio: At least less than once p/week	0.009**	0.014**
	(.004)	(0.006)
TV: At least less than once p/week	0.026***	0.076***
	(0.006)	(0.007)
State of residence [urban: Maharashtra][rural: Uttar Pradesh]		
Jammu and Kashmir	-0.053***	0.298***
	(0.015)	(-0.020)
Himachal Pradesh	0.202***	0.403***
	(-0.022)	(-0.021)
Punjab	-0.068***	0.072***
	(-0.014)	(-0.024)
Uttaranchal	0.011	0.119***
	(-0.015)	(-0.018)
Haryana	0.026*	0.076***
	(-0.016)	(-0.018)
Delhi	0.042***	0.260***
	(-0.010)	(-0.047)
Rajasthan	0.069***	0.059***
	(0.013)	(0.015)
Uttar Pradesh	0.128***	
	(0.011)	
Bihar	0.012	-0.002
	(0.012)	(0.016)
Sikkim	-0.046***	0.438***
	(0.016)	(0.028)
Arunachal Pradesh	-0.126***	0.139***
	(0.022)	(0.025)
Nagaland	-0.348***	-0.180***
	(0.029)	(0.025)
Manipur	-0.276***	0.176***
	(0.023)	(0.020)
Mizoram	-0.255***	0.683***
	(0.025)	(0.042)
Tripura	-0.044**	0.064***
	(0.020)	(0.019)
Meghalaya	-0.147***	0.226***

†Base category in squared parenthesis. Standard errors in parenthesis. Asterisks denote the significance level (double sided) *: 10%, **: 5%, ***: 1%

Table 4: Continued - True covariate model†

Variable	Urban	Rural
Assam	-0.021	0.000
	(0.013)	(0.016)
West Bengal	0.148***	0.060***
	(0.013)	(0.014)
Jharkhand	0.135***	0.048***
	(0.016)	(0.017)
Orissa	-0.071***	-0.229***
	(0.014)	(0.017)
Chhatisgarh	0.144***	-0.067***
	(0.016)	(0.017)
Madhya Pradesh	0.152***	-0.012
	(0.013)	(0.014)
Gujarat	-0.047***	0.106***
	(0.011)	(0.017)
Maharashtra		0.127***
		(0.016)
Andhra Pradesh	-0.106***	-0.023
	(0.011)	(0.015)
Karnataka	-0.106***	-0.038***
	(0.013)	(0.014)
Goa	-0.026**	0.249***
	(0.012)	(0.023)
Kerala	-0.227***	0.091***
	(0.020)	(0.018)
Tamil Nadu	-0.120***	0.325***
	(0.012)	(0.018)
Log-Likelihood	-86336.111	-115293.36
N	36795	46761

†Standard errors in parenthesis. Asterisks denote the significance level (double sided) *: 10%, **: 5%, ***: 1%

Table 5: Estimation results: Measurement Model (Equation (2))†

Intercepts (λ_{0q})	Urban	Rural
Constant	-1.185***	-1.676***
	(0.034)	(0.032)
ω_1 :Decides own health care	Base	Base
ω_2 :Allowed alone to the health clinic	1.027***	-6.041***
	(0.051)	(0.556)
ω_3 :Wife beating not justified	-1.003***	1.100***
	(0.114)	(0.035)
ω_4 :Refusing sex justified	1.386***	2.224***
	(0.054)	(0.033)
Slopes (Factor Loadings (λ_{1q}))		
ω_1 :Decides own health care	1	1
ω_2 :Allowed alone to the health clinic	2.628***	12.79***
	(0.185)	(1.012)
ω_3:Wife beating not justified	6.706***	0.099***
	(0.500)	(0.026)
ω_4 :Refusing sex justified	2.993***	0.339***
	(0.226)	(0.028)
Variance of the *progressivity* trait	0.137***	-0.420***
	(0.010)	(0.013)

†Standard errors in parenthesis. Asterisks denote the significance level (double sided) *: 10%, **: 5%, ***: 1%

Table 6: Estimation Results: Firstborn's gender (Equation(1))†

	Coefficient Estimates		Marginal Effects	
Variable	Boys	Girls	Boys	Girls
Progress	1.338***	1.411***	0.029	0.058**
	(0.230)	(0.233)	(0.028)	(0.028)
Age at marriage	-0.166***	-0.169***	-0.005	-0.006
	(0.033)	(0.033)	(0.004)	(0.004)
Age difference	-0.015	-0.003	-0.003	0.002
	(0.032)	(0.032)	(0.004)	(0.004)
Highest Education [None / incomplete primary]				
Woman: Completed primary	-0.355	-0.393	-0.004	-0.020
	(0.295)	(0.298)	(0.034)	(0.034)
Woman: Completed secondary	-1.263***	-1.144***	-0.068	-0.008
	(0.422)	(0.425)	(0.051)	(0.051)
Husband: Completed primary	0.199	-0.019	0.054	-0.048
	(0.295)	(0.297)	(0.034)	(0.033)
Husband: Completed secondary	0.283	-0.034	0.078*	-0.069
	(0.380)	(0.383)	(0.044)	(0.044)
Caste [None]				
Scheduled caste / tribe	0.620**	0.648**	0.015	0.025
	(0.279)	(0.281)	(0.031)	(0.031)
Other backward caste	0.226	0.165	0.021	-0.008
	(0.277)	(0.281)	(0.035)	(0.035)
No sikh / hindu	0.006	0.038	-0.007	0.008
	(0.308)	(0.311)	(0.038)	(0.038)
Wealth quintile [Richest]				
Less than richer	0.496	0.265	0.067	-0.042
	(0.370)	(0.375)	(0.043)	(0.043)
Richer	0.384	0.293	0.033	-0.011
	(0.306)	(0.309)	(0.036)	(0.036)
Nuclear family	0.357*	0.454**	-0.009	0.035
	(0.198)	(0.200)	(0.024)	(0.024)
Rural household	-0.603	-0.338	-0.078	0.047
	(0.367)	(0.367)	(0.058)	(0.057)
Rural*Progress	-0.514	-0.556	-0.008	-0.026
	(0.419)	(0.419)	(0.057)	(0.056)
Constant	4.690***	4.679***		
	(0.721)	(0.726)		
Log-Likelihood	-1767.0283			
N	2032			

†This is the baseline specification. It includes all women in the sample and controls for the baseline progressivity index. That is, the one estimated using all covariates as detailed in Section 3.1.1. Base category in squared parenthesis. Standard errors in parenthesis. Asterisks denote the significance level (double sided) *: 10%, **: 5%, ***: 1%

Table 7: Results summary: Effect of *progressivity* on the firstborn's gender†

Model	Coefficient Estimates		Marginal Effects		Log-Likelihood	N
	Boys	Girls	Boys	Girls		
[0]	0.201*	0.299***	-0.014	0.030**	-1811.4004	2032
	(0.110)	(0.111)	(0.013)	(0.013)		
[1]	1.338***	1.411***	0.029	0.058**	-1767.0283	2032
	(0.230)	(0.233)	(0.028)	(0.028)		
[2]	1.453***	1.495***	0.040	0.054**	-1761.7118	2032
	(0.222)	(0.223)	(0.027)	(0.027)		
[3]	0.958***	1.124***	0.005	0.076**	-1394.4039	1543
	(0.247)	(0.250)	(0.034)	(0.034)		
[4]	0.630**	0.803***	0.010	0.077*	-819.15234	841
	(0.286)	(0.292)	(0.048)	(0.047)		
[5]	1.258***	1.550***	-0.012	0.114**	-483.97018	555
	(0.415)	(0.424)	(0.054)	(0.054)		

†[0] Is the unadjusted model, which estimates the first-born's gender on *progress* and a constant only. [1] Is the adjusted, baseline specification. It includes all women in the sample and controls for all covariates detailed in Section 3.1 and the baseline *progressivity* index. That is, the one estimated using all covariates as detailed in Section 3.1.1. [2] Uses a *progressivity* index estimated using only "hard" covariates. That is: age at marriage, current age, age difference between spouses, education, religion, caste, and state indicators. [3] Uses only the post-ultrasound sample. That is, women who married in or after 1985. [4] Uses only the sample of women who married when the ultrasound was widely available. That is, in or after 1994. [5] Includes only women whose husband was interviewed and uses the baseline *progressivity* index. Asterisks denote the significance level (double sided) *: 10%, **: 5%, ***: 1%

Table 8: Duration to first birth: Unadjusted model†

	[1]			
	Coefficient Estimates		Marginal Effects	
	Boys	Girls	Boys	Girls
Progress	0.141***	0.240***	-0.016	0.028**
	(0.034)	(0.037)	(0.013)	(0.013)
RE	-0.000	-2.81e-09		
	(0.000)	(4.06e-08)		
corr.	-1			
logL	-5612.6875			

†The model was estimated for 2029 women. Robust standard errors for cluster-correlated data (White / Huber / sandwich estimator) in parentheses. Asterisks denote the significance level (double sided) *: 10%, **: 5%, ***: 1%

Table 8: Continued - Duration to first birth: Adjusted models†

	[2]				[3]			
	Coefficient Estimates		Marginal Effects		Coefficient Estimates		Marginal Effects	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Progress	0.516***	1.041***	-0.096	0.145**	0.260	0.367*	-0.014	0.034
	(0.0864)	(0.294)	(0.063)	(0.071)	(0.188)	(0.204)	0.356	0.036
t_2	0.685***	1.718**	-0.200	0.275	1.661***	1.878***	0.009	0.103
	(0.167)	(0.670)	(0.155)	(0.173)	(0.621)	(0.528)	0.187	0.181
t_3	1.218***	2.827***	-0.306	0.432*	2.817***	3.116***	0.031	0.158
	(0.219)	(1.052)	(0.243)	(0.271)	(0.967)	(0.826)	0.287	0.278
t_4	1.944***	4.187***	-0.419	0.610*	4.213***	4.654***	0.047	0.235
	(0.281)	(1.422)	(0.325)	(0.364)	(1.367)	(1.120)	0.389	0.374
t_5	2.918***	5.814***	-0.527	0.800*	5.886***	6.423***	0.083	0.309
	(0.360)	(1.833)	(0.419)	(0.469)	(1.782)	(1.440)	0.501	0.479
t_6	3.929***	7.508***	-0.641	0.999*	7.540***	8.211***	0.110	0.391
	(0.445)	(2.256)	(0.517)	(0.578)	(2.122)	(1.759)	0.606	0.584
t_7	6.677***	11.05***	-0.720	1.2778*	11.50***	12.16***	0.246	0.508
	(0.588)	(2.861)	(0.649)	(0.728)	(2.821)	(2.317)	0.759	0.727
Exog. vars. **x**	No				Yes			
RE	1.729***	2.032***			3.354***	1.294**		
	(0.228)	(0.574)			(0.963)	(0.512)		
corr.	.819				.933			
logL	-5226.6171				-5168.3835			

†The models were estimated for a total of 2029 women. Robust standard errors for cluster-correlated data (White / Huber / sandwich estimator) in parentheses. Asterisks denote the significance level (double sided) *: 10%, **: 5%, ***: 1%

Table 8: Continued - Duration to first birth: Final model†

	[4]			
	Coefficient Estimates		Marginal Effects	
	Boys	Girls	Boys	Girls
age_marr	0.238***	0.183*		
	(0.066)	(0.104)		
age_diff	0.041	0.042*		
	(0.026)	(0.022)		
prim	0.916***	0.673**		
	(0.349)	(0.320)		
rural	-0.935*	-0.529		
	(0.561)	(0.678)		
Progress	0.459	0.695**	-0.036	0.072
	(0.307)	(0.289)	(0.049)	(0.047)
t_2	1.831***	1.539	0.159	-0.059
	(0.544)	(1.037)	(0.208)	(0.231)
t_3	2.987***	2.291	-0.283	-0.121
	(0.771)	(1.599)	(0.309)	(0.378)
t_4	4.430***	3.440	-0.882	-0.151
	(1.068)	(2.281)	(0.509)	(0.522)
t_5	6.314***	4.929	-1.683	-0.186
	(1.399)	(3.036)	(0.705)	(0.678)
t_6	8.053***	6.285*	-2.418	-0.215
	(1.617)	(3.661)	(0.830)	(0.823)
t_7	12.07***	9.588*	-4.118	-0.267
	(2.284)	(5.064)	(1.283)	(1.058)
tp_2	-0.103	-0.465**	0.039	-0.020
	(0.267)	(0.217)	(0.051)	(0.051)
tp_3	0.0742	-0.288	0.045	-0.015
	(0.232)	(0.230)	(0.048)	(0.052)
tp_4	0.0730	-0.300	0.048	-0.018
	(0.241)	(0.254)	(0.063)	(0.069)
tp_5	-0.464*	-0.718***	0.004	-0.005
	(0.248)	(0.219)	(0.048)	(0.050)
tp_6	-0.670*	-0.778***	-0.035	0.025
	(0.381)	(0.299)	(0.056)	(0.043)
tp_7	-0.759*	-0.816**	-0.049	0.035
	(0.402)	(0.346)	(0.062)	(0.049)
RE	3.462***	-0.00267		
	(0.719)	(0.298)		
corr.	1			
logL	-5156.7587			

†The model was estimated for 2029 women. Robust standard errors for cluster-correlated data (White / Huber / sandwich estimator) in parentheses. Asterisks denote the significance level (double sided) *: 10%, **: 5%, ***: 1%

Table A1: *progress* on the firstborn's gender

	[1]	[2]
Girl	0.057	0.007
constant	(0.038)	(0.022)
Adj. R2	0.00	0.687
N	1893	1893

Figures

Figure 1

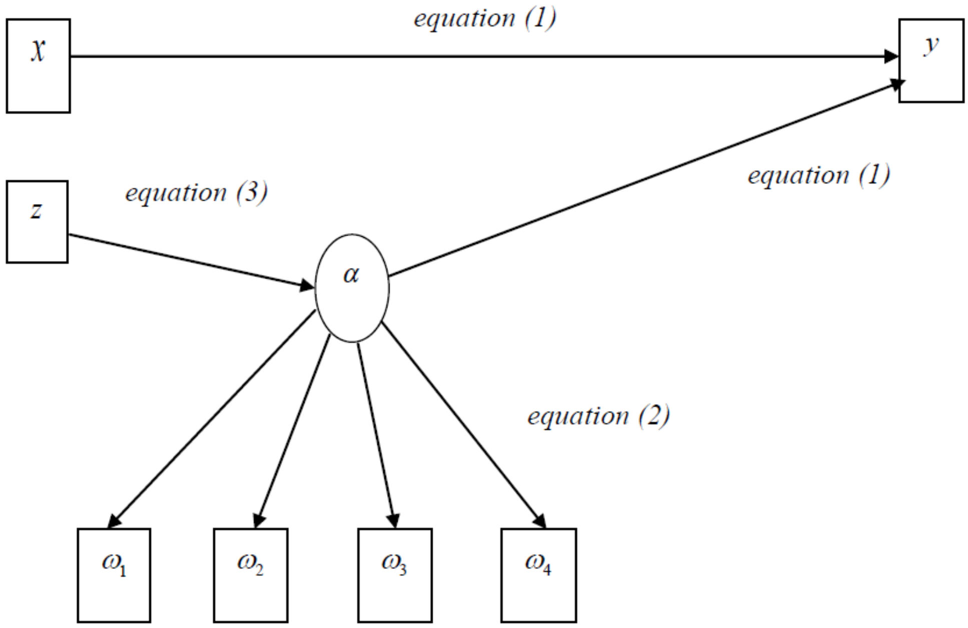

Figure 2: Predicted probabilities - Rural sample

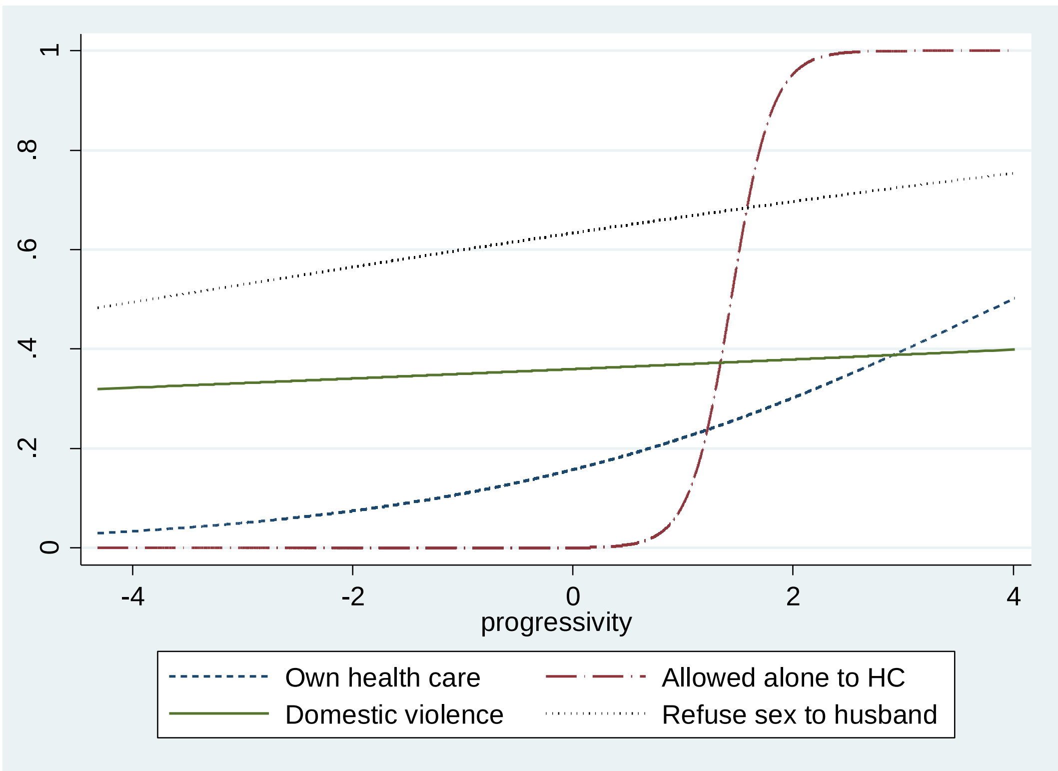

Figure 3: Predicted probabilities - Urban sample

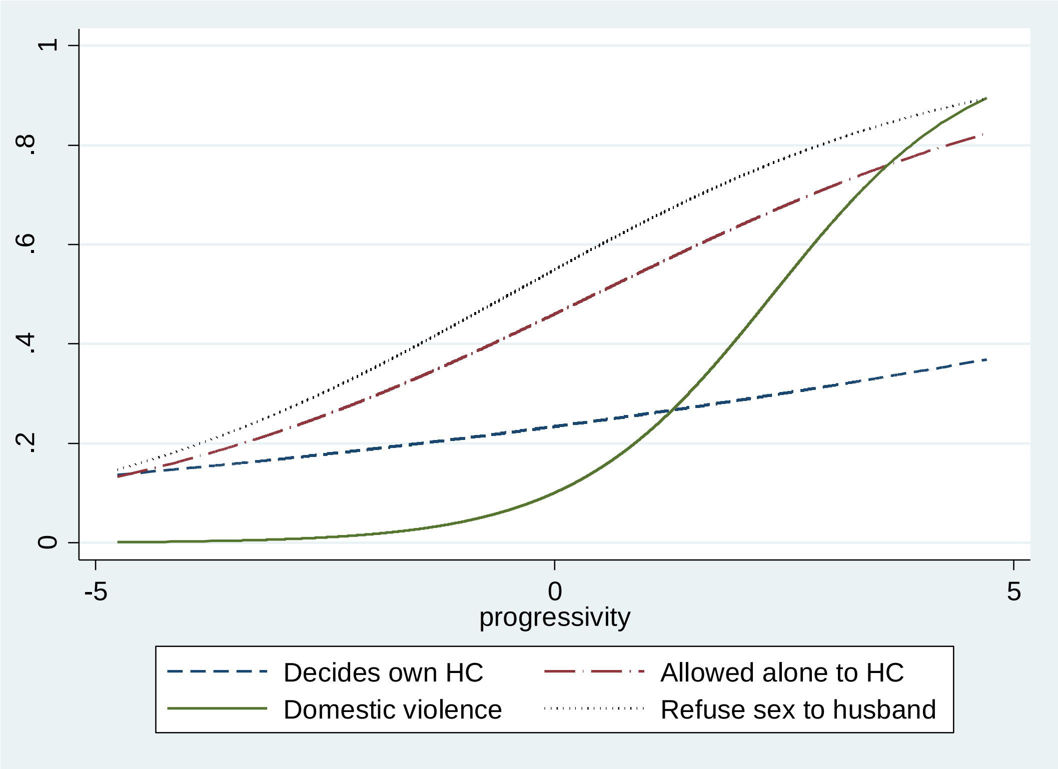

Figure 4: *Progressivity* index: Delhi versus India

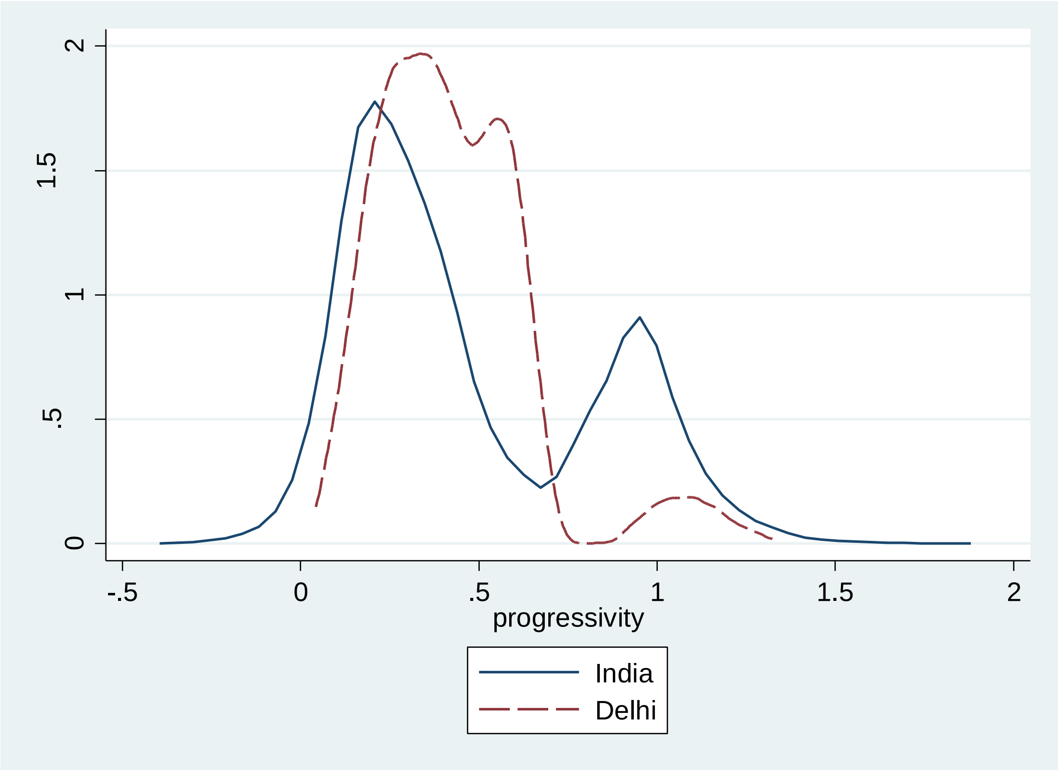

Figure 5: Predicted hazard for firstborn boys at different progressivity levels

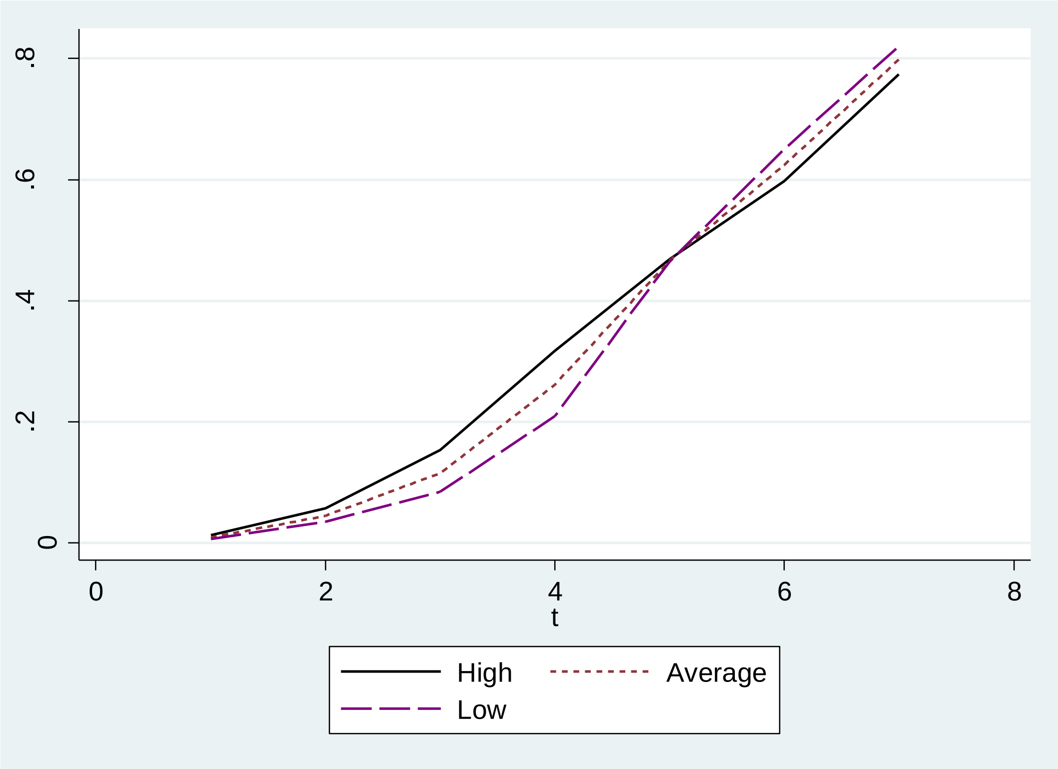

Figure 6: Predicted hazard for firstborn girls at different progressivity levels

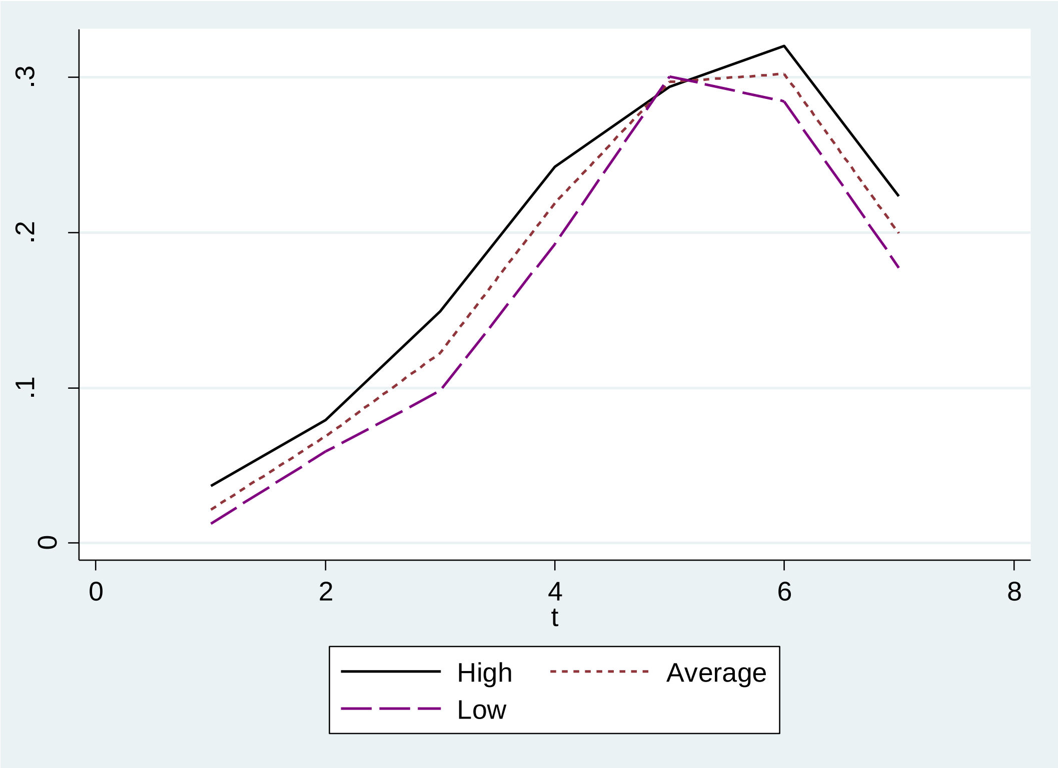

Figure 7: Predicted hazard for firstborns at the average progressivity level

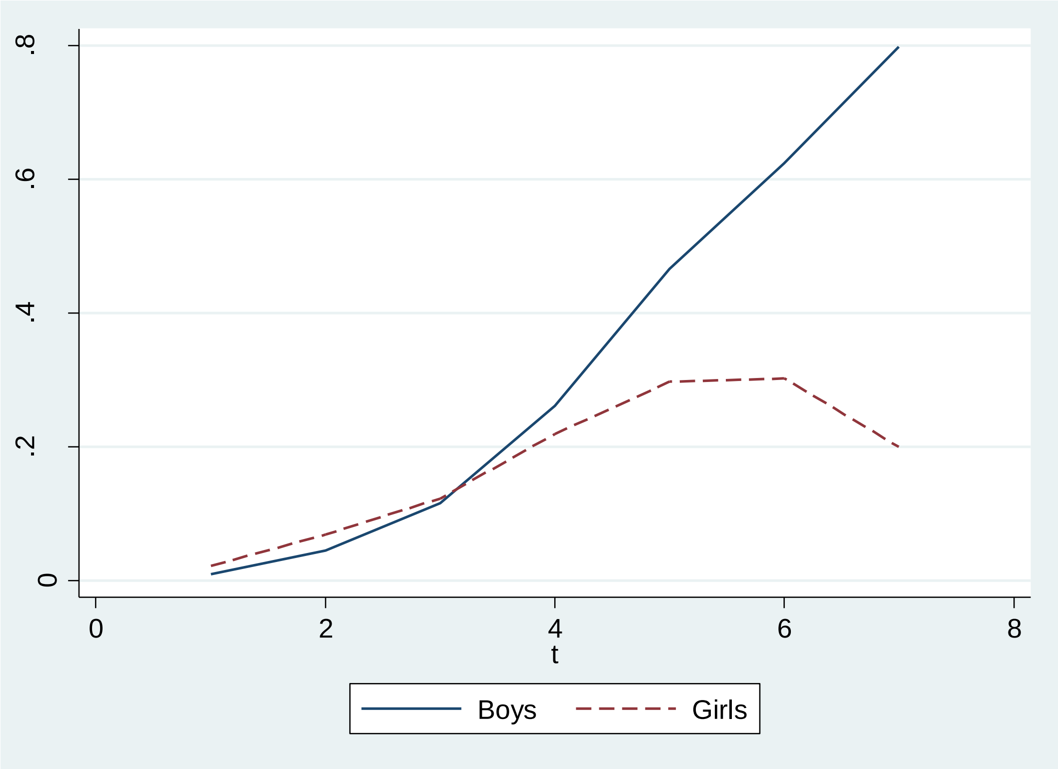

Figure 8: Predicted hazard for firstborns at one-standard deviation lower than the average progressivity level

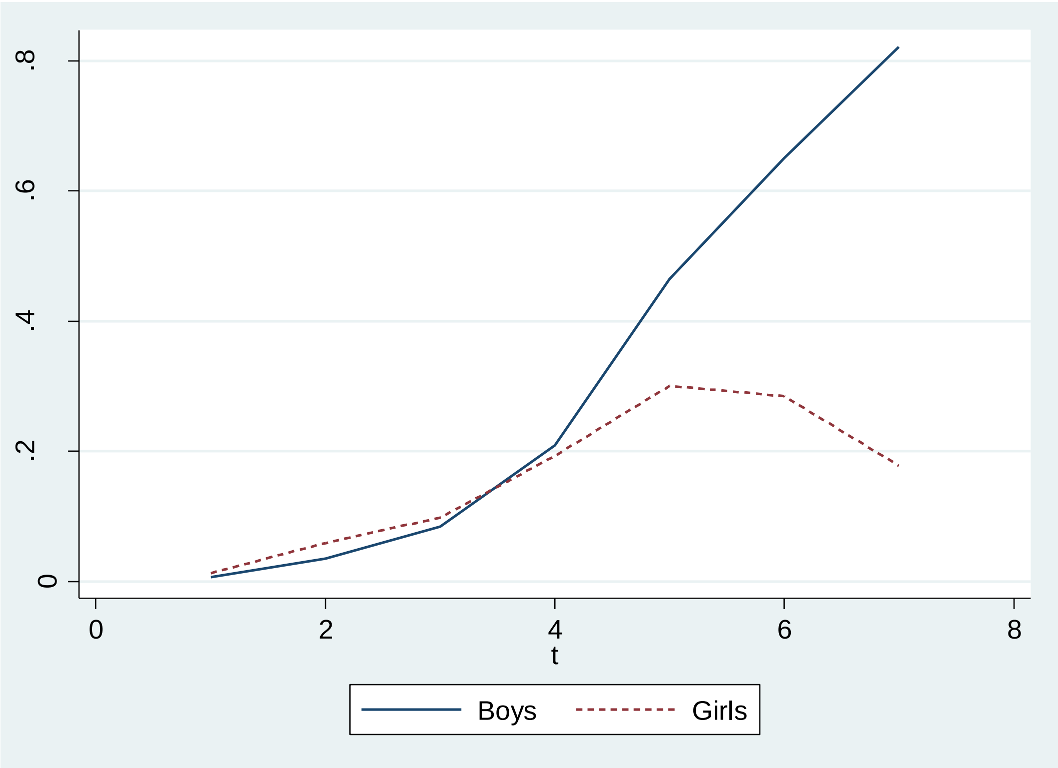

Figure 9: Predicted hazard for firstborns at one-standard deviation higher than the average progressivity level