MISSING WOMEN AND INDIA'S RELIGIOUS DEMOGRAPHY

VANI BOROOAH
School of Economics and Politics, University of Ulster

SRIYA IYER
Faculty of Economics and St. Catharine's College, University of Cambridge

Abstract
The interaction between religion and fertility is the subject of intense academic and political debate in developing countries. This paper puts forward a new theory to provide an explanation for larger Muslim, relative to Hindu fertility, in the context of India. It does so by bringing together the literature on 'missing women' with that on religious differences in fertility. Formally, the paper takes the notion of 'son preference' and the complementary concept of 'daughter aversion', and links them directly to religious differences in fertility. Just as sons bring 'benefits' to their parents, daughters impose 'costs' and complementing a desire *to have* sons is a desire *not to have* daughters. Consequently, the desire for sons increases family size while the fear of daughters limits it. A formal model, in which these two countervailing forces act so as to determine equilibrium family size and composition, is developed. Econometric evidence is then presented to test the model by means of Poisson regression models estimated on a range of demographic variables relevant to this issue - the number of living children, the number of infant deaths, the sex ratio, and the demand for contraception - estimated on data from a nationally-representative sample of 10,548 Indian women who had adopted a terminal method of contraception and who had therefore attained their equilibrium family size and composition. The analysis concludes that higher Muslim fertility in India in reality may be related to significantly lower levels of daughter aversion among this community. These findings bring in to focus the hitherto less explored interactions between religion, gender bias, and fertility in poor societies.

JEL classification: C25, J13, J15, O53, Z12

Keywords: Religion, fertility, gender bias, infant mortality, sex ratio, contraception, Poisson regression models

Acknowledgements: We are grateful to the National Council of Applied Economic Research (NCAER) New Delhi, for providing us with unit record data from the 1993-94 NCAER *Human Development Survey*. This paper was revised substantially while Iyer was visiting the Department of Economics at Harvard University and the National Bureau of Economic Research in 2004-05, and she gratefully acknowledges the support of both these institutions. We are also grateful for the helpful comments and suggestions of participants at the 'Religion, Economics and Culture' 2004 Annual Meetings in Kansas City, Missouri.

1. Introduction

There are two demographic features about India that receive particular attention. The first is gender bias - the small number of females compared to males. The number of females per 1000 males is 933 in India, as reported in the 2001 Census, compared to a figure of 1050 for Europe and North America and 1022 for sub-Saharan Africa (Sen 2001). Drèze and Sen (1996) have termed the low sex ratio in India as a 'missing women' phenomenon: on the basis of sub-Saharan ratios, the number of missing women in India is estimated to be between 35 and 37 million (Drèze and Sen 1996; Klasen, 1994).

The second feature is that the fertility rate of Muslim women is considerably higher than that for Hindu women. The latest findings of the National Family Health Survey (NFHS), conducted in 1998-99, show that for India as a whole, the Total Fertility Rate (TFR) was 2.8 for Hindus and 3.6 for Muslims[1] (International Institute for Population Sciences and ORC Macro International, 2000). At its most shrill, the higher fertility of Muslim women is blamed on Indian Muslims for obeying the tenets of Islam - and also being driven by their ambition to 'outnumber' Hindus - in rejecting family planning and embracing polygyny. Indeed in the last few months of 2004, the most serious political controversy in India has been the embattled row over the 2001 Indian Census religion figures, just released, and the supposed extraordinary growth of 36% in Muslim fertility during the decade 1991-2001. Although the validity of these figures has come under intense academic scrutiny, there are politicians, holy men, the Muslim personal law board, and census officials who have all participated in the discussion, expressing their views on the Census numbers. Some leaders have even gone so far as to say, 'It is obvious that Hindus are becoming more and more conscious of the importance of small families. This is going to tilt the population balance in favour of Muslims who are merrily producing more and more children'[2]. In the face of such sentiments, economists too are drawn towards understanding the balance between these two vital factors for India's development – religion and reproduction.

This paper joins together these two demographic features about India - the higher fertility rate of Muslims and gender bias – to provide a plausible alternative economic explanation for higher Muslim fertility in India. In the literature, analysis and debate of these two issues usually proceed independently of each other. The adverse sex ratio is discussed in the context of the preference that many South and East Asian families have for sons over daughters ('son preference') and the impact of such preference on the marriage market, fertility, and dowry ((Edlund 1999; Bhat and Zavier 2003; Sen, 2001; Botticini and Siow 2003). On the other hand, the Muslim fertility issue is discussed usually in terms of the number of children to Muslim families with emphasis on the pronatalist tendencies within Islam, without any

---

[1] However, there were wide regional differences: for example in the state of Andhra Pradesh, the TFR for Muslims was 2.5 which was not significantly different from the Hindu TFR of 2.2.
[2] As cited in *The Telegraph* newspaper, 14 September 2004.

reference to the gender of the children, with the focus of this discussion also being on the low rate of contraceptive use among Muslim women.

Against this background, the first strand of this paper is to extend the notion of *'son preference'* to the complementary concept of *'daughter aversion'* in order to provide an explanation for larger Muslim families. This concept is developed more fully later in this paper. Suffice it to say, here, that one way to think about this is that just as sons bring 'benefits' to their parents, daughters impose 'costs'; consequently, complementing a desire *to have* sons is a desire *not to have* daughters. We argue that the desire for sons tends to increase family size while the fear of daughters limits it. A formal model, in which these two countervailing forces act so as to determine equilibrium family size and composition, is developed in section 2. From this we argue that a reason why Muslims have larger families than Hindus is that, firstly, they may not desire sons as much as Hindus[3] and, secondly, that they are less apprehensive, compared to Hindus, of having daughters. In consequence, not only do Muslims have larger families than Hindus, but they also have relatively more daughters than sons.

We support this theoretical argument using quantitative evidence, based on data for 10,548 Indian women, who had terminated their fertility and who might, therefore, be regarded as having attained their equilibrium family size and composition. Data on these women - of whom, 6,523 were non-Scheduled Caste Hindus, 549 were Muslim, and 3,476 were Scheduled Caste Hindus (or '*Dalits*')[4] - were culled from a larger survey of 33,230 rural households - encompassing over 195,000 individuals - spread over 1,765 villages, in 195 districts, in 16 states of India. This survey - commissioned by the Indian Planning Commission and funded by a consortium of United Nations agencies – was carried out by the National Council of Applied Economic Research (NCAER) over January-June 1994 and most of the data from the survey pertain to the year prior to the survey, i.e. to 1993-94[5]. Using these data, the paper estimates Poisson regression models for the number of living sons and daughters to the women, conditional upon the values of a number of determining variables, and estimates the degrees of 'son preference' and 'daughter aversion' of Hindu and Muslim families. These estimates, which show a much lower degree of 'daughter aversion' for Muslims than for Hindus, then provide a possible explanation for larger Muslim families. This analysis is supported also by more exhaustive econometric analysis of the sex ratio in these sub-populations, and the demand for contraception by contraceptive method type, adopted by these religious groups.

---

[3] In this context, Bhat and Zavier (2003) have commented that Hindus show greater son-preference than Muslims.
[4] Persons belonging to the castes and tribes – also known as Scheduled Castes and Scheduled Tribes - recognised by the Indian Constitution in 1947 as deserving special recognition in respect of education, employment and political representation.
[5] Details of this survey - hereafter referred to as the NCAER Survey - are to be found in Shariff (1999).

It is reasonable to suppose that if Muslim parents are less averse to daughters than Hindus, they would take better care of them than Hindus. In particular, we would expect female infant mortality rates to be lower for Muslim, than for Hindu, families. As argued recently, a demographic feature in India, that has drawn very little academic or popular comment, is that infant mortality among Muslims, at 59 per 1000, is much lower than that among Hindus, at 77 per 1000 (Borooah and Iyer 2005). Similarly child mortality, which is 83 per 1000 for Muslims, is substantially lower than child mortality among Hindus, at 107 per 1000 (IIPS and ORC Macro International 2000). Simply looking at these raw figures suggests that religious differentials in infant mortality need to examined more closely, and that it is possible that Muslim parents, on average, are looking after their offspring better than their Hindu counterparts. This proposition is explored further in this paper by estimating Poisson regression models for infant mortality with separate equations for 'explaining' male and female infant deaths and drawing attention to the importance of the religious and caste background of parents - even after controlling for non-religious factors - in determining these numbers. On the basis of all of this evidence, we argue that higher Muslim fertility in India may well be a consequence of significantly lower levels of daughter aversion among this community. Consequently, we argue that the theory and findings presented in this paper have significant and important implications for the academic discourse on religion and economic demography, both in India and elsewhere.

This paper proceeds as follows: Section 2 presents an overview of India's religious demography. Section 3 presents a model of son preference, daughter aversion and the demand for children. Section 4 outlines the key characteristics of the data. Section 5 presents the main econometric estimations and results from the Poisson regression models explaining the number of living sons and daughters, and infant mortality by gender. Section 6 presents an econometric analysis of the sex ratio. Section 7 presents the econometric analysis of the demand for contraception. Section 8 concludes.

2. Overview of India's 'religious' demography

India today has a total population of just over one billion people. In terms of distribution, Hindus form over 80% of India's population. The Muslims are about 12.5%, constituting for the country the most significant 'minority' population of approximately 120 million people. Fertility rates between Hindus and Muslims differ in India. There is a difference of one child per woman on average, in the Total Fertility Rate (TFR) between Hindus and Muslims at the national level. The Total Fertility Rate for Muslims is 3.6, down from a rate of 4.4 in 1991; and for Hindus it is 2.8, again recording a decrease from 3.3 in 1991 ((International Institute for Population Sciences and ORC Macro International, 2000). Age-specific fertility also shows that Muslims are bearing larger numbers of children at earlier ages than are Hindus, Christians or indeed any other religious group in India. Calculated from data for 1999 provided by the National Council of Applied Economic Research, age-specific fertility rates for the major religious groups in India is shown in Figure 1.

The existing literature has emphasised two main theories to 'explain' these religious differences in fertility. First, that the 'characteristics hypothesis' - poverty and the lack of education among Muslims - may explain the differences in fertility (Iyer 2002). The alternative is the 'particularised theology hypothesis', that the intellectual content of religion affects fertility: in Islam, via religious injunctions in favour of multiple wives, large numbers of children, and bans on the use of contraception, especially abortion. In the case of Hinduism, the Mysore Population Study conducted in 1961, concluded that Hindu religious traditions in Indian society favoured having many offspring (United Nations 1961). One of the more telling quotations from the Mysore study is the blessing for newly-married Indian brides: *'May she bear ten sons, and make of her husband an eleventh!'* which is a good example of the influence of the Hindu religion on fertility. And it is this aspect – son preference - wanting to have sons in preference to daughters, that we suggest provides an alternative, perhaps more benign, explanation for Hindu-Muslim differences in fertility in India today.

But more generally why should the Islamic or the Hindu religion matter for India's demography? There is an existing literature, largely drawn from historical and theological sources, which is relevant to this issue. These include, for Islam, the institutional requirements of the religion as specified in the *Sharia* or Islamic law which is derived from two main sources – the *Koran* and the *Sunnah*[6], as also the writings of the medieval theologian Al Ghazzali, often cited by Muslim clerics, who summarised Sunni and Shia positions on demography-related issues such as birth control. In the case of Hinduism previous work has considered religious texts such as Vedas, and Upanishads; epic poems such as the Ramayana and Mahabharata; social commentaries such as Kautilya's Arthasastra; and verse-poems in praise of Hindu goddesses such as the Lalita-sahasranama and the Sri-sukta in the context of Indian demography (for example, see Iyer 2002 for a detailed discussion of this literature). The distinct bias towards males compared to females in both the Islamic and the Hindu scriptures has been commented upon, but with certain differences between them. For example, in the *Koran*, all Muslim males are encouraged to marry; however, the universal remarriage of widowed and divorced women is also highly encouraged (Qureshi 1980: 564; Youssef 1978: 88, Coulson and Hinchcliffe 1978: 37-38). An Islamic marriage or the *nikah*, is defined not really as a sacrament, but more as a civil contract, which has as its object the procreation of children[7] (Azim 1997). Parents and guardians exercise control over the selection of marriage partners, and a dower or 'bride price' is paid to the bride or her guardian (Youssef 1978: 78). In the specific context of India, this is important for Muslim families as the investments in daughters are in a sense, recoverable in the event of a divorce. A Muslim woman in India can legally have only one husband; otherwise, she is liable for bigamy and the offspring of such a marriage are

[6] These are the interpretations of the words of Mohammad and its application to various situations.

[7] For a Muslim marriage to be legally valid, it needs to meet four conditions: proposal by one party; acceptance by the other; the presence of a sufficient number of witnesses (two in Sunni law); and a formal expression of both the proposal and the acceptance at the same meeting (Azim 1997).

deemed illegitimate (Azim 1997). As in Islam, Hinduism also encourages all Hindus to enter married life. For example Shakuntala, a princess from Hindu mythology tells Dushyanta her beloved that 'when a husband and wife are carrying on smoothly, then only pleasure, prosperity and piety are possible' (Deshpande 1978: 91). Polygyny is tolerated in the Hindu scriptures, but only in the absence of male offspring. Polygyny became illegal for Hindus in India in 1955 with the Hindu Marriage Act legislation, but the theology of Hinduism does encourage the early marriage of women compared to men, and treats men and women differently.[8] For example, although it is illegal, even today Hindu marriages are often accompanied by the giving and taking of dowries. The dowry essentially operates as an economic compensation for the man's family for undertaking the marriage (Rao, 1989). But this implies that investments in daughters may be less recoverable for Hindus compared to Muslims. A large literature has examined gender differentials in marriage in India (Mukhopadhyay 2000; Kapadia 2000) and marriage-related issues such as dowry (Anderson 2003; Sen 1998; Deolalikar and Rao 1998), but there is less discussion of this issue in the context of religion. Gender biases of course have been investigated extensively (Kishor 1993; Krishnaraj, Sudarshan and Shariff 1998; Murthi, Guio and Dreze 1995; Bhat and Zavier, 2003), with particular emphasis on the unequal distribution of food and health-care allocations between sons and daughters, which many commentators observe about contemporary India.

Many historians of India attribute these unequal distributions to the preference for sons compared to daughters in classical Hinduism. For example, in the *Mahabharata,* a Hindu husband has sanction to terminate a marriage if 'a wife… acts as she pleases, is sterile or *gives birth only to daughters* or whose children die young.' (emphasis added; Deshpande, 1978: 93). There is the widely documented emphasis in Hindu philosophy on the role for surviving sons: 'At the end of the (*Sraddha*) death ceremony the performer asks, "Let me, O fathers, have a hero for a son!"' (Radhakrishnan, 1927: 59-60). But son-preference has also been documented in Islamic society which gives men a more prominent place than women within the family. Under Islamic law, sons are given twice as large an inheritance as daughters and a man's testimony in court is worth twice that of a woman (Coulson and Hinchcliffe 1978). For instance, 'Quranic provisions concerning women's status and position were dissipated and largely lost over time. Islamic law has continued to reflect the patriarchal and patrilineal nature of a society based on the male agnatic tie. Within the scheme of family law which developed in this way, woman, whether as daughter, wife, or mother, occupied an inferior position' (Coulson and Hinchcliffe, 1978: 38). According to Obermeyer (1992), women in Islamic societies, regardless of ethnic origin, have been restricted to a

[8] But these differences in the textual theology of Islam and Hinduism on marriage and polygyny need also to be evaluated in the context the Child Marriage Restraint Act of 1978 which sets the legal age at marriage for all women and men at, respectively, 18 and 21 years. When this Act was proposed first in 1929, some Muslim representatives who debated it opposed the Act on the grounds that it was irrelevant since child marriage had no sanction in Islam. Others argued that if Muslims practised child marriage it was because they were following the example of the Hindus. Ultimately everyone voted in favour of the Act, but the dynamics of the process of negotiation cast interesting historical light on these issues (Minault 1998: pp. 302-303).

lifestyle that guaranteed preservation of family honour and prestige.[9] Landes (1998) has also pointed out that gender discrimination, observed particularly in the Arab Muslim nations, restricts the opportunities of women (Landes, 1998: 412).There is evidence of son-preference among Muslim families in India, especially in the increasing acceptance of the dowry system. However, son-preference may not be as unequivocal as it is with Hindus. For instance, early in the 20th century, Maulana Ashraf Ali Thanavi wrote a compendium of useful knowledge for women in which he condemned expressions that bless a Muslim woman by wishing her husband, brother, or children long life, or wishing for her many sons and grandsons[10] (Minault 1998: 62). More recently, some sociological evidence has gestured towards lower daughter aversion among Muslim populations compared to Hindus in India. For example, in his study of 378 Muslim women and men in Mangalore, Azim found that over two-third of respondents in his sample *did not* prefer sons, over daughters (Azim 1997: 187); moreover, a large proportion of those who did were from poor and illiterate households (Azim 1997: 189).

3. Son Preference, Daughter Aversion and the Demand for Children

Let S, D and $N = S + D$ represent, respectively, the number of sons, daughters and children to a family. It is assumed that the family gets positive utility from sons and negative utility from daughters – hereafter, the positive utility associated with sons is referred to as the 'benefits' from sons and the negative utility associated with daughters is referred to as the 'cost' of daughters. Let $B(S)$ and $C(D)$ represent the benefit and cost functions associated with, respectively, S sons and D daughters where:

$$\begin{aligned} &\partial B / \partial S > 0,\ \partial C / \partial D > 0 \\ &\partial^2 B / \partial S^2 < 0,\ \partial^2 C / \partial D^2 > 0 \end{aligned} \qquad (1)$$

A family with S sons and D daughters will then decide in favour of (or against) having another child if the marginal expected utility (EU) associated with another child is positive (or negative) where:

$$EU = \pi B'(S) + (1 - \pi) C'(D) \qquad (2)$$

If it is assumed, for the moment, that π, the probability of having a son, is a half, then the family will decide to have another child if, and only if,

[9] However, in India, the role of the Muslim woman has not always been to observe the veil and be restricted to the home. As Engineer argues, there are instances in Indian history where Muslim women who belonged to the ruling dynasties fought and led battles on the battlefield. Among them are Gul Bahisht against the Raja of Jalore in the time of Alauddin Khalji; Noorjehan (the wife of Jehangir) whose hunting exploits included killing lions and mounting elephants, and are described in the Tuzk-i-Jahangiri; and Chand Khatun (also called Chand Sultana), who defended the kingdom of Ahmednagar against the Mughal emperor Akbar's army. For more on this, see Engineer, 1997: 12.

[10] Thanavi believed that these characteristics were not 'sufficiently' Islamic because to view women blessed in terms of their relation to men and sons devalues their relationship to God and hence goes against the tenet that all are equal in his sight. (Minault 1998: 69).

$B'(S) > C'(D)$ - the marginal benefit of a son outweighs the marginal cost of a daughter - and will decide against another child if, and only if, $B'(S) < C'(D)$ - the marginal benefit of a son is outweighed by the marginal cost of a daughter. An equilibrium number of children is one to which the family does not wish to add.

Figure 2 illustrates the falling marginal benefit (MB) curve for sons and the rising marginal cost (MC) curve for daughters. A horizontal line, across the diagram, represents an equilibrium number of sons and daughters at the points where it, respectively, cuts the MB and MC curves: at these points, the marginal benefit of a son is exactly outweighed by the marginal cost of a daughter. From the set of equilibrium son-daughter configurations two special cases may be distinguished. First, the point X in the diagram represents a *no son equilibrium*: a family with no sons and D_X daughters will not want to increase its family size, in the hope of a son, because the marginal cost, in the event of a daughter, would exceed the marginal benefit from a son. Second, the point Z in the diagram represents a *parity equilibrium*: a family with an equal number of sons and daughters ($S_Z=D_Z$) will not want to increase its family size. By contrast, all other equilibrium points - a family of S_Y sons and D_Y daughters ($S_Y< D_Y$), or S_W sons and D_W daughters ($S_W> D_W$) - represent *non parity equilibria*.

Two concepts may be defined: *son preference* and *daughter aversion*. In Figure 3, the marginal cost curve OH represents a higher degree of 'daughter aversion' than the curve OM since, for a given number of daughters, the marginal cost of daughters is higher for OH than for OM. Then the 'no son equilibrium' will be greater with a lower degree of daughter aversion: $D_M>D_H$. Equally, the parity equilibrium will be greater with a lower degree of daughter aversion: $D^*_M>D^*_H$. Lastly, with a given number of sons in the family, S^{**}, the equilibrium number of daughters will be greater with a lower degree of daughter aversion: $D^{**}_M>D^{**}_H$.

In Figure 4, the marginal benefit curve BH represents a higher degree of 'son preference' than the curve BM since, for a given number of sons, the marginal benefit of sons is higher for OH than for OM. The 'no son equilibrium' is the same with a lower degree of son preference: $D_M=D_H$. However, the parity equilibrium will be greater with a higher degree of son preference: $S^*_H>S^*_M$. Lastly, with a given number of daughters in the family, D^{**}, the equilibrium number of sons will be greater with a higher degree of son preference: $S^{**}_H>S^{**}_M$.

Suppose now that there are two groups, Hindus and Muslims, such that Muslims have the same degree of son preference as Hindus, but a lower degree of daughter aversion. Then by Figure 3, Muslims will always have an equilibrium family size larger than that of Hindus. On the other hand, if Muslims have the same degree of daughter aversion as Hindus, but a lower degree of son preference then, by Figure 4, Muslims will always have an equilibrium family size smaller than that of Hindus.

It is possible to see this more clearly in Figure 5. The line HH′ in Figure 5 represents the *equilibrium locus*: all points on HH' represent son-daughter combinations at which the family is in equilibrium (in the sense of not seeking an increase in its size). The equilibrium locus slopes downwards reflecting the fact that, as the number of sons increases, the marginal utility of sons falls; to be in equilibrium the marginal cost of daughters must also fall for which a smaller number of daughters is required. The 'no-son equilibrium' is attained with OH daughters and the 'parity equilibrium' is attained at X where the equilibrium locus intersects the 45^0 line through the origin. A 'no-daughter' equilibrium is attained with OH' sons: the family does not seek an increase in its size even though it has only sons because the marginal utility of sons has fallen to zero.

Suppose HH′ represents the equilibrium locus for Hindus. Suppose also that Muslims have the same degree of 'son preference', but a lower degree of 'daughter aversion', than Hindus. Then, as Figure 3 shows, Muslims will have a *larger* no-son, and a *larger* parity, equilibrium than Hindus; but, because Muslims have the same degree of son preference, they will have the *same* no-daughter equilibrium as Hindus. Consequently, the Muslim equilibrium locus will be represented by MH′ in Figure 5 and, in equilibrium, Muslims will have *larger* families than Hindus.

On the other hand, suppose that Muslims have the same degree of 'daughter aversion', but a lower degree of 'son preference', than Hindus. Then, as Figure 4 shows, Muslims will have a *smaller* no-daughter, and a *smaller* parity, equilibrium than Hindus; but, because Muslims have the same degree of daughter aversion, they will have the *same* no-son equilibrium as Hindus. Consequently, the Muslim equilibrium locus will be represented by HM' in Figure 5 and, in equilibrium, Muslims will have *smaller* families than Hindus.

4. Data and Characteristics

In order to support this theoretical argument, we use quantitative evidence, based on data for 10,548 Indian women, who had terminated their fertility and who might, therefore, be regarded as having attained their equilibrium family size and composition. Data on these women - of whom, 6,523 were non-Scheduled Caste Hindus, 549 were Muslim, and 3,476 were Scheduled Caste Hindus (or 'Dalits') - are culled from a larger survey of 33,230 rural households - encompassing over 195,000 individuals - spread over 1,765 villages, in 195 districts, in 16 states of India. This survey - commissioned by the Indian Planning Commission and funded by a consortium of United Nations agencies – was carried out by the National Council of Applied Economic Research (NCAER) over January-June 1994 and most of the data from the survey pertain to the year prior to the survey, i.e. to 1993-94. The salient features of these data are set out in this section. The data from the NCAER survey are organised as a number of reference files, with each file focusing on specific subgroups of individuals. However, the fact that in every file an individual is identified by a household number and, then, by an identity number within the household, means that the reference files can be joined to form larger files. So, for example, the fertility, infant mortality and contraceptive choice equations (presented below) were estimated on data from the 'individual' file which gave information on the 194,473 individuals in the sample. From this file, data were extracted for 10, 548 women on fertility-related variables and associated with this information was data on: the educational attainments and occupation of the women; the income and size of the household to which the woman belonged; the state, district and village in which she lived; her caste/tribe (scheduled or non-scheduled only); her religion and so forth. The 'village file' contained data relating to the existence of infrastructure in, and around, each of the 1,765 villages over which the survey was conducted. This file gave information as to whether *inter alia* a village: had *anganwadi* schools (informal village schooling institutions), primary schools, middle schools and high schools and, if it did not, what was the nature of access to such institutions. The village file could be joined to the individual file so that for each individual there was information not just on individual, family and household circumstances but also on the quality of the educational facilities – and general infrastructure - in the village in which the individual lived.

The sample of individuals was distinguished by three mutually exclusive subgroups: Dalits[11]; Muslims; and Hindus. In effect, the Hindu/Muslim/Dalit distinction made in this paper is a distinction between: non-Dalit Hindus; Muslims; and Hindus from the Dalit community. These subgroups are, hereafter, referred to as 'communities'. Because of the small number of Christians and persons of other religions in the Survey, the analysis reported in this paper was confined to Hindus, Muslims and Dalits. The Survey contained information for each of sixteen states. In this study, the states were aggregated to form five regions: the *Central* region consisting of Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh; the *South* consisting of Andhra Pradesh, Karnataka, Kerala and Tamilnadu; the *West* consisting of Maharashtra and Gujarat; the *East* consisting of Assam, Bengal and Orissa; and the *North* consisting of Haryana, Himachal Pradesh and Punjab.

5. Econometric Evidence on Fertility and Infant Mortality

The 10,548 currently married women in the sample, who had terminated their fertility by adopting a terminal method of contraception, were, in terms of family size and composition, in equilibrium. For such women, indexed *i=1…10,548*, $S_i \geq 0$ and $D_i \geq 0$ represented their number of (living) sons and daughters. Tables 1 and 2 show, respectively, the number of living sons and daughters to these women: 4.6% of Hindu, compared to 5.1% of Muslim, women terminated their fertility without having any sons. On the other hand, 19.6% of Hindu women, compared to 13.4% of Muslim, women terminated their fertility without any daughters.

[11] Those castes and tribes – also known as Scheduled Castes/Tribes - recognised by the Indian Constitution as deserving special recognition in respect of education, employment and political representation.

A plausible measure of the degree of 'son preference' is 1 – the proportion of women who terminated their fertility without any sons and the corresponding measure of the degree of 'daughter aversion' is the proportion of women who terminated their fertility without any daughters. On these measures, as Table 1 shows, the degree of son preference was lower for Muslims (0.949) than for Hindus (0.954): however, this difference was not statistically significant[12]. On the other hand, the degree of daughter aversion was greater for Hindus (0.196) than for Muslims (0.134) and this difference was statistically significant. Consequently, one may conclude from Table 1, that Muslims had statistically the same degree of son preference as Hindus but a significantly lower degree of daughter aversion. These facts are, as the preceding analysis showed, sufficient to result in a larger average equilibrium family size for Muslims than for Hindus.

5.1. Explaining the Number of Living Sons and Daughters

The thrust of the econometric equations was to explain the number of sons and daughters to these women in terms of their personal and household characteristics. Since the two dependent variables (S_i and D_i) were 'count' variables, in that they assumed nonnegative integer values, an appropriate estimation method is the Poisson Regression Model (PRM)[13]. The PRM assumes that each observation on the dependent variable (say, s_i) is drawn from a Poisson distribution with parameter λ_i, where this parameter is related to a vector of regressors, $\mathbf{x_i}$. The primary equation of this model is:

$$\Pr\left(S_i = s_i \mid \mathbf{x_i}\right) = \frac{e^{-\lambda_i}\lambda_i^{s_i}}{s_i!} \qquad (3)$$

and the most common formulation for λ_i is the loglinear formulation:

$$\log \lambda_i = \sum_{k=1}^{K} x_{ik} \qquad (4)$$

where x_{ik} is the observation, for the i[th] woman, on the k[th] regressor (*k=1…K)*.

The PRM estimates for the number of sons and daughters, to women who had terminated their fertility, are shown in Table 7. Also shown in Table 7, alongside the column of coefficient estimates, are the associated marginal effects. These effects show the increase or decrease in the expected number of sons ('sons' equation) or daughters ('daughters' equation) when the value of the relevant variable is increased by one unit, the values of all the other variables being set to their, respective, means.

[12] Z-value of 0.53

[13] Linear Regression methods will lead to inefficient and inconsistent estimates (Long and Freese, 2001).

Since, all the variables (except for the 'age at marriage' variable) were binary variables, taking 0/1 values, a unit increase in a variable implied a shift from one category to another. Thus, Table 7, shows that, *in equilibrium*, a Muslim woman would, on average, have 0.27 more sons and 0.34 more daughters - while a Dalit woman, would have 0.08 more sons and 0.07 more daughters - than a Hindu woman *ceteris paribus*. Similarly, women who were literate would, in equilibrium, have 0.22 fewer sons and 0.11 fewer daughters than women who, along with their husbands, were illiterate.

In addition to the influence of literacy and community, the number of sons and daughters, to women who had terminated their fertility, also depended on the region in which the women lived and on whether they worked and, if they did, the occupation in which they were employed. Living in the South, the East and the West resulted in a smaller number of sons than living in the North (the default region) or in the Central region. Women who worked as labourers or as cultivators had, in equilibrium, a smaller number of sons, but a larger number of daughters, than women who worked in non-manual occupations or women who did not work.

5.2. Explaining the Number of Male and Female Infant Deaths

Another clue to differences between Hindus and Muslims in their differing degrees of son preference and daughter aversion is provided by infant mortality rates, as shown in Table 8. The male infant mortality rate (male infant deaths as a proportion of male live births) was not very different between the Hindu (4.5%) and Muslim (4.7%) women who had terminated their fertility and, indeed, the difference between the Hindu and Muslim male infant mortality rates was not statistically significant. However, the female infant mortality rate (female infant deaths as a proportion of female live births) was considerably higher for the Hindu (6.3%) than for the Muslim (4.6%) mothers and this difference was statistically significant. Indeed, it is noteworthy that there was hardly any gender difference in the Muslim infant mortality rates but that there was a considerable gender gap in the Hindu infant mortality rates.

Table 9 shows the PRM estimates (along with the marginal effects) for the number of male and female infant deaths to all currently married women who had had one or more live births, whether or not they had terminated their fertility. The sample size in this instance is therefore now over approximately 25,000 women. The important point to emerge from these results is that, after controlling for other factors, Muslim women had a smaller number of both male and female infant deaths compared to Hindus. *Ceteris paribus* being Muslim, instead of Hindu, would have reduced the number of male deaths per woman by 0.038, a reduction of 23% from the mean number of male infant deaths per woman (computed over all the 25,796 currently married women who had had male live births) of 0.168: as a consequence, the male mortality rate would have fallen from its observed value of 6.8% to its 'all Muslim' value of 4.4%. By similar token, being Muslim, instead of Hindu, would have reduced the number of female infant deaths per woman by 0.017, a reduction of 10% from the mean number of female infant deaths per woman (computed over all the 23,646 currently married women who had had female live births) of 0.171: as a consequence, the female mortality rate would have fallen from its observed value of 7.4% to its 'all Muslim' value of 6.2%.

The number of male and female infant deaths was significantly affected by village-level infrastructure: safe drinking water[14] in villages was predicted to reduce the average number of male and female infant deaths per woman by, respectively, 4% and 8% and the presence of *anganwadi* schools[15] in villages was predicted to reduce the mean number of male and female infant deaths by, respectively, 5% and 7%. The number of male and female infant deaths was also affected by the quality of housing conditions and by the occupation of the mother: poor housing conditions[16] were predicted to increase the mean number of male and female infant deaths by, respectively, 7% and 15%, while women who worked as labourers were predicted to have, on average, 15% more male infant deaths and 9% more female deaths than the sample averages.

Overarching these factors was the importance of mothers' (and, to a lesser extent, fathers') literacy in reducing the number of male and female infant deaths. Literate mothers were predicted to have, on average, 17% fewer male infant deaths and 23% fewer female infant deaths than the sample means; by contrast, paternal literacy (in the face of maternal illiteracy) would lead to reductions of only 4% and 7%, respectively, in the average number of male and female infant deaths.

6. Econometric Evidence on the Sex Ratio

The analysis of living children, and of infant deaths, is supported by an analysis of the sex ratio in this population. The sex ratio is the number of girls per thousand boys. The differences in the sex ratio by religion in this sample population are extremely large. Table 10 shows the sex ratio at birth by community for all currently married women in the sample who had terminated their fertility. The sex ratio at birth is 976 for Hindus and 1026 for Muslims. For all currently living children, the sex ratio is 948 for Hindus and 1047 for Muslims.

Table 11 shows the OLS estimates for the equations pertaining to the sex ratio for women who had terminated their fertility. In equation 1, the

---

[14] The NCAER Survey gave details of the main source of drinking water for each of the 1,758 villages covered. The water supply of a village was defined as being 'safe' if the main source was one of: protected wells; tanker truck; piped water; hand pump. It was defined as being 'unsafe' if the main source was one of: ponds; dug wells; running streams/canals. It must be emphasised that the terms 'safe' and 'unsafe' are defined entirely in terms of the source of drinking water and not in terms of any inherent standard of purity.

[15] *Anganwadis* are village-based early childhood development centres. They were devised in the early 1970s as a baseline village health centre, their role being to: provide government-funded food supplements to pregnant women and children under five; work as an immunisation outreach agent; provide information about nutrition and balanced feeding and provide vitamin supplements; run adolescent girls' and women's groups; and monitor the growth, and promote the educational development, of children in a village.

[16] These were described in this study as 'poor' if there was: (a) no ventilation; *and* (b) no separate kitchen; *and* (c) food was cooked on a charcoal-fired stove (*chula*).

dependent variable is the sex ratio at birth while, in equation 2, it is the sex ratio of currently living children. A positive (negative) coefficient estimate implies that the sex ratio increases (decreases) with an increase in the value of the associated variable. The sex ratio equations are estimated as reduced form equations underpinned by the structural equations (Table 7) relating to the number of male and female children.

The specification shown in Table 11 takes account of: the literacy status of the women and their husbands; the region of residence; the occupations of the women and their husbands[17]; the level of village development[18]; and the prosperity of the households in which the women lived. The coefficient on each of these variables was allowed to vary according as to the community to which the women belonged (Muslim, Dalit, Hindu[19]). Consequently, if X_i represents the value of an explanatory variable for woman *i*, the equation was specified as:

$$(sex\ ratio)_i = \alpha X_i + \beta(X_i \times ms_i) + \gamma(X_i \times dl_i) + \varepsilon_i$$

where: $ms_i=1$, if the woman is a Muslim and $dl_i=1$, if the woman is a Dalit. The α coefficient in the above equation represents the 'Hindu coefficient' ($ms_i= dl_i=0$) and the β and γ coefficients represent the additional effects (of the explanatory variable) stemming from the women being Muslim ($ms_i=1$) or Dalit ($dl_i=1$), respectively.

The specification shown in Table 11 pertains to the one obtained when variables whose associated coefficients had *t*-values less than unity (i.e. those which did not make a positive contribution to the explanatory power of the equation) were dropped from the estimated equation. The χ^2 values at the foot of Table 11 report the likelihood ratio results from testing the joint hypothesis that the coefficients on the excluded variables take the value zero.

Household prosperity was measured by the logarithm of per-capita household income (i.e. total household income divided by the number of persons in the household). The square of the log of per-capita household income was also included to incorporate non-linear effects. There were no differences between Hindus, Muslims and Dalits in the effects of prosperity upon the sex ratio. If ϕ and φ are the coefficients on these variables then, for woman i:

$$\frac{\partial sexratio_i}{\partial \log\ (income_i)} = \phi + 2\varphi \log(income_i)$$

The fact that the coefficient estimates associated with household, and the square of household, income are, respectively, negative and positive (Table 11, equations 1 and 2) implies that the sex ratio – both at birth and for

[17] The residual occupations for men and women were, respectively, 'non-manual' and 'unoccupied'.
[18] On the basis of their general level of facilities, the 1,758 villages in the NCAER Survey were classified as (a) low-development villages; (b) medium-development villages; (c) high-development villages.
[19] Hindus being the residual category.

currently living children – falls as household prosperity increases, but at a diminishing rate.

If one abstracted from income inequality - by setting each woman's income to the mean household per capita income (computed over all the women under analysis) of Rs. 4,910 per year - the sex ratio at birth was predicted to fall from its observed (sample) value of 984 to 949 and the sex ratio of currently living children was predicted to fall from its observed (sample) value of 958 to 920. The fact that income was unequally distributed - with some women living in households whose incomes were above, and others living in households whose incomes were below mean income - added, therefore, around 35 points to both the sex ratios.

In addition to household prosperity, the sex ratio to the women was influenced by whether their husbands were literate. *Ceteris paribus* the sex ratio at birth was higher by 47 points, and the sex ratio of currently living children was higher by 32 points, for Hindu women with literate husbands compared to Hindu women with illiterate husbands. It should be emphasised that, after the literacy of the husbands had been controlled for, the literacy of the women had no effect on the sex ratios. In addition to literacy, the sex ratio was influenced by the occupations of the parents. Families in which the husband worked as a labourer had *ceteris paribus* a lower sex ratio (by 72 points at birth and 103 points for currently living children) than families in which the father worked in a non-labouring occupation. On the other hand, families in which the mother worked - either as a cultivator or as a labourer - had a higher sex ratio than women who were unoccupied[20]. Some of these occupational effects were significantly different across the two equations[21]: the null hypothesis that the husband being a labourer - compared to being in a non-labouring occupation - reduced the sex ratio at birth by as much as it did the sex ratio of currently living children was not accepted ($\chi^2(1)=5.74$). However, the null hypotheses that the woman being a cultivator or a labourer - compared to being unoccupied - raised the sex ratio at birth by as much as it did the sex ratio of currently living children could not be rejected[22]. Similarly, the null hypothesis that the positive effects on the sex ratio (at birth and of currently living children) were the same for women who were cultivators and labourers could not be rejected.

The observed sex ratios at birth for the different regions were: 1,014 for the South; 1,002 for the East; 976 for the West; 968 for the Central region; and 957 for the North. Some of these differences were undoubtedly due to inter-regional differences in prosperity. For example, the mean annual per-capita household income of women in the North was Rs. 5,140 compared to Rs.

[20] The sex ratio at birth was higher by 64 points and the sex ratio of currently living children was higher 80 points for women cultivators. For women labourers, the corresponding figures were 77 and 67 points.

[21] The cross-equation hypotheses were tested by estimating the equations as Zellner's (1962) Seemingly Unrelated Regression Equations (SURE). Although the Breusch-Pagan test statistic (Breusch and Pagan, 1980) decisively rejected the null hypothesis that the error terms associated with the two sex ratio equations were independently distributed, the OLS and the SURE estimates were very similar and, hence, the latter estimates are not reported.

[22] $\chi^2(1)=0.96$ for cultivators and $\chi^2(1)=0.14$ for labourers.

3,387 of women in the East and this would go some way towards explaining why the sex ratio was lower in the North than in the East. If one abstracted from differences in prosperity between the regions by setting every region's mean household per-capita income to the all-India mean value[23], then the predicted (at birth) sex ratios were: 1,018 for the South; 990 for the West; 975 for the East; 960 for the North; and 958 for the Central region.

Similarly, the observed sex ratios for currently living children for the different regions were: 1,005 for the East; 997 for the South; 959 for the West; 930 for the North; and 916 for the Central region. If, as before, one abstracted from differences in prosperity between the regions by setting every region's mean household per-capita income to the all-India mean value then the predicted (currently living) sex ratios were: 1,000 for the South; 976 for the East; 973 for the West; 933 for the North; and 907 for the Central region.

6.1. Decomposition of Community Effects on the Sex Ratio

Table 11 shows that the community to which a woman belonged exerted its influence on the sex ratio of her children (at birth or of living children) through a single channel: the effect of the husband's literacy status on the sex ratios of their children depended upon whether the family was Hindu, Muslim or Dalit. Although the fact of a husband being literate served to lift the sex ratio (both at birth and of currently living children) for all the women, this effect was smallest for Hindus, larger for Dalits, and largest for Muslims. A Hindu husband being literate added 47 points to the sex ratio at birth and 32 points to the sex ratio of living children; by contrast, the corresponding increments for Muslim husbands were 131 and 121 points, respectively.

These observations raise the question of how much of the difference between Muslim and Dalit women on the one hand, and Hindu women on the other, in the sex ratios of their children - at birth and currently living - is due to differences in religion or caste, and how much is due to differences between them in the values of their other socio-economic attributes?

In order to answer this question, the difference between the Muslim and Hindu sex ratios ($SR_M - SR_H$) - and between the Dalit and Hindu sex ratios ($SR_D - SR_H$) - was decomposed, using the methodology of Blinder (1973) and Oaxaca (1973), as:

$$SR_M - SR_H = (SR_M - SR_M^H) + (SR_M^H - SR_H) \quad (5)$$

and

$$SR_D - SR_H = (SR_D - SR_D^H) + (SR_D^H - SR_H) \quad (6)$$

where: SR_M^H and SR_D^H are what the Muslim and Dalit sex ratios would have been if their respective attributes had been evaluated using Hindu coefficients.

[23] The incomes of every household in a region were scaled by the factor: all-India mean income / regional mean income.

The first term in equation (1) and equation (2) represents the 'religion effect'. In equation (1), the first term is the difference between the observed Muslim sex ratio and the Muslim sex ratio arising from Muslim attributes being evaluated using Hindu coefficients; in equation (2), the first term is the is the difference between the observed Dalit sex ratio and the Dalit sex ratio arising from Dalit attributes being evaluated using Hindu coefficients. The second term in equation (1) and equation (2) represents the 'attributes effect'. In equation (1), the second term is the difference between the sex ratios when Muslim and Hindu attributes are evaluated using Hindu coefficients while, in equation (2), the second term is the is the difference between the sex ratios when Dalit and Hindu attributes are evaluated using Hindu coefficients. In each equation, the sum of the first and second terms equals the difference in the observed sex ratios between Hindus and Muslims and Hindus and Dalits.

Table 12 shows that, of the total difference of 51 points between the Muslim and Hindu (at birth) sex ratios, 71 per cent (36 points out of 51) could be attributed to differences in community and 29 per cent (15 points out of 51) could be attributed to differences in attributes between the communities. On the other hand, of the total difference of 99 points between the Muslim and Hindu (currently living children) sex ratios, only 46 per cent (46 points out of 99) could be attributed to differences in community and 54 per cent (53 points out of 99) could be attributed to differences in attributes between the communities. The difference between the sex ratios to Hindu and Dalit women was considerably smaller than that to Hindu and Muslim women: the difference between the sex ratios at birth was only 17 points and the difference between the sex ratios of currently living children was only 15 points. A little over half of the difference Dalit and Hindu women in their at birth sex ratios was due to the effect of community while the effect of community explained nearly three-fourths of the difference between them in the sex ratios of currently living children.

7. The Demand for Contraception

It requires effort on the part of a married couple to *not* have children in excess of the desired number. The basic relationship (set out in Becker, 1991) between the number of births (n), the period of exposure to births (E); the average time required to produce a conception resulting in a live birth (C); and the average period of sterility before and after a live birth (S) is:

$$n = \frac{E}{C+S} \qquad (7)$$

where C depends on the probability of conception during any coition (s) and the frequency (r) of coition (Sheps and Menken, 1973):

$$C \cong 1/rs \qquad (8)$$

Women marrying at the age of 20, and not using any contraception, would average eleven live births (Becker, 1991). If $E=288$ months (that is they are fertile till the age of forty-four), the average interval between live births is twenty-six months (*C+S=26*); if *S=17* (Menken and Bongaarts, 1978), then *C=9*. Then the frequency of coition is $r = 1/9s$.

Suppose now that a woman desires to have only four children and, in order to facilitate this: (i) marriage is delayed by four years (so that now *E=240*); (ii) the period of infertility, during and after pregnancy, is extended to twenty months (by extending breast-feeding by three months) so that *S=20*. Then the wait-time to conception would have to rise from *C=9* to *C=40* months in order to accommodate the reduced number of desired children. Even if half the coital acts involved *coitus interruptus* – which reduced the probability of conception by more than 90 per cent - *C=40* from equation (6) implying that $r = 1/22s$: the frequency of coition would have to fall by nearly 60% from its original value of $r = 1/9s$.

Assuming that coition gives positive utility to a couple, it is this enforced abstinence which, in the absence of birth control methods, is viewed as *the cost of restricting family size*. This cost is represented by DD (drawn as a line) in Figure 6. Costs are highest (since the frequency of coition is lowest) when the number of children is restricted to n^f where, n^f is the desired number of children in the absence of restriction costs; thereafter, costs fall as the number of children increases, reaching a value of zero when the number of children is equal to the woman's biological maximum, n^{max}.

On the other hand, exceeding the utility-maximising number of children also imposes costs and the cost of not restricting family size may be represented as a non-negative function of the difference: $U(n^f)-U(n)$. The curve LL in Figure 6 represents this cost which is positive except at $n=n^f$, when it is zero. The point F represents the point of intersection of the LL and DD curves and this yields n^* as the optimal number of children – and $m^*=n^*-n^f$ as the optimal 'overshoot' - in the presence of "restriction costs", when birth control methods are not available.

When birth control methods are available, the degree of abstinence required to attain a given family size falls, the DD curve shifts to the left and the optimal overshoot, m^*, falls. As the effectiveness and the ease of availability of birth control methods improve, information about them spreads, and their price falls, m^* approaches zero. With termination methods of birth control $m^*=0$, if such methods are employed when $n=n^f$. In the context of this model, therefore, contraception reduces the cost of attaining a desired number of children, but does not change the desired number of children.

Within this model, group effects operate through two channels. First, the desired number of children may be higher under peer pressure than under social autarky: $n^s>n^f$ in Figure 6. The strength of this influence depends on the group in question (for example, Hindus or Muslims) and upon the position of the individual within a group (literate versus illiterate; rich versus poor) but its existence reduces the costs of *not* restricting family size by shifting the LL curve in Figure 5 to MM. As this paper has argued, differences between

Hindus and Muslims in their degrees of son preference and daughter aversion could lead to differences between them in their equilibrium family sizes.

Second, there may be 'psychic costs' associated with using contraception stemming from the fact that the group disapproves of some, or all, methods of contraception. Again, the strength of this influence varies by group, and by the position of an individual within the group, but its effect would be to shift the DD curve by very little, if at all: even when birth control methods are easily and freely available, the psychic costs of using contraception replace the abstinence costs of not using contraception. The upshot is that when peer pressure towards larger families is combined with group opposition to contraception, the optimal number of children (n^{**} in Figure 2) is likely to be greater than when these effects do not operate (n^{*}).

7.1. Econometric results for the demand for contraception

The pattern of contraceptive use by the Hindu, Muslim and Dalit women in the sample is shown in Table 13: a much larger proportion of Muslim women, relative to Hindu and Dalit women, did not use any contraception; among the Muslim women who did use contraception, there was, compared to Hindu and Dalit women, relatively greater reliance on spacing than on terminal methods.

The econometric equation to explain contraceptive use attempted to capture some of the above features. The dependent variable for the equation was the variable *CNP* such that $CNP_i = 1$ if woman *i* did not use any contraception; $CNP_i = 2$, if she used spacing methods of contraception; and $CNP_i = 3$, if she had terminated her fertility through a termination method of contraception. Since this variable was ordinal, the appropriate method of estimation was by ordered logit.

The idea behind this model (Borooah, 2002) is that the demand for contraception may be represented by the value of the latent variable, H_i, with higher values of H_i representing higher levels of demand. One may consider this latent variable to be a linear function of *K* regressors whose values for individual *i* are: $X_{ik},\ k = 1...K$. Consequently,

$$H_i = \sum_{k=1}^{K} X_{ik}\beta_k + \varepsilon_i = Z_i + \varepsilon_i \qquad (9)$$

where: β_k is the coefficient associated with the k^{th} variable and $Z_i = \sum_k X_{ik}\beta_k$. An increase in the value of the k^{th} factor will cause demand to rise if $\beta_k < 0$ and to fall if $\beta_k > 0$.

Since the values of H_i are, in principle and in practice, unobservable, equation (7) represents a latent regression which, as it stands, cannot be estimated. However, what is observable is a person's contraceptive use (in this study: no contraceptive use; use of spacing methods; use of termination methods) and the categorisation of persons in the sample in terms of contraceptive use is implicitly based on the values of the latent variable H_i in conjunction with 'threshold values', δ_1 and δ_2 ($\delta_1 < \delta_2$) such that:

$$\begin{aligned} CNP_i &= 1, \text{ if } H_i \leq \delta_1 \\ CNP_i &= 2, \text{ if } \delta_1 < H_i \leq \delta_2 \\ CNP_i &= 3, \text{ if } H_i > \delta_2 \end{aligned} \qquad (10)$$

The δ_1, δ_2 of equation (8) are unknown parameters to be estimated along with the β_k of equation (7).

A woman's classification in terms of her contraceptive use depends upon whether the value of H_i crosses a threshold and the probabilities of a woman being in a particular category of use are:

$$\begin{aligned} \Pr(CNP_i = 1) &= \Pr(\varepsilon_i \leq \delta_1 - Z_i) \\ \Pr(CNP_i = 2) &= \Pr(\delta_1 - Z_i \leq \varepsilon_i < \delta_2 - Z_i) \\ \Pr(CNP_i = 3) &= \Pr(\varepsilon_i \geq \delta_2 - Z_i) \end{aligned} \qquad (11)$$

If it is assumed that the error term ε_i, in equation (7), follows a logistic distribution then equations (7) and (8) collectively constitute an ordered logit model[24] and the estimates from this model permit, through equation (9), the various probabilities to be computed for every person in the sample, conditional upon the values of the determining factors for each person.

The estimation results from the contraceptive use equation are shown in Table 14, under the column 'coefficients'. Also shown in Table 14 are the marginal probabilities of the three outcomes: these numbers show how the probabilities of being in the different categories of contraceptive use changed in response to a change in the value of one of the covariates. For each variable, these probabilities sum to zero across the three outcomes: 'no contraceptive use', 'use of spacing methods', and 'use of termination methods'. For discrete variables, the marginal probabilities refer to changes consequent upon a move from the default category for that variable to the category in question: for example from being Hindu (the default community) to being Muslim or from living in the North (the default region) to living in the South.

The marginal probabilities of Table 14 show that, in terms of changes in the probabilities of the different outcomes, most of the traffic was between 'no contraception' and 'terminal contraception' with hardly any change in the probability of 'spacing contraception'. This was not surprising since – reflecting the fact that the main instrument of family planning policy in India has been sterilisation – as Table 14 shows, of the 29,837 women in the

[24] The assumption that the ε_i are normally distributed results in an ordered probit model.

estimation sample, 57.7% did not use any contraception, 7.1% used spacing methods and 35.2% used terminal methods.

The demand for contraception was hypothesised to depend on family size and composition: the number of daughters and of sons were important determining variables in the contraceptive use equation. Since one of the analytical planks of this paper is inter-community differences in 'son preference'/'daughter aversion', the effect of the number of daughters and of the number of sons on contraceptive use was allowed to vary by community. So, for example, the coefficient estimates in Table 14, associated with the variables 'number of daughters' (0.263) and 'number of sons' (0.740), represent the 'Hindu' coefficient estimates. The coefficient estimates associated with the interaction of the number of daughters (sons) with being Muslim[25] represents the estimated change to these coefficients as a consequence of being Muslim instead of Hindu. So also for the coefficient estimates associated with the interaction of the number of daughters (sons) with being Dalit.

In addition to the effects of community operating through the number of daughters and the number of sons variables, the effect of being Muslim (or Dalit) on the demand for contraception was allowed to vary by community, independently of all other determining variables, through intercept shifts. These effects were represented by the coefficient effects associated with the 'Muslim' and 'Dalit' variables in Table 14.

Table 14 shows that, for Hindu women, each additional daughter, and each additional son, would, on average, reduce the probability of no contraception[26] by, respectively, 6.4 and 17.9 percentage points and increase the probability of terminal contraception by, respectively, 5.8 and 16.4 points. Consequently, for Hindu women, the increased likelihood of terminating fertility after the birth of a son was nearly three times the increased likelihood of terminating fertility after the birth of a daughter. By contrast, the increase in the likelihood of Muslim women terminating their fertility after the birth of a son (4.8 points[27]) - and of terminating their fertility after the birth of a daughter (2.0 points[28]) - was substantially lower than the corresponding values for Hindus. The marginal probabilities for Dalit women lay between that of Hindu and Muslim women: the increase in the probability of Dalit women adopting terminal contraception after the birth of a son (13.6 points) or of a daughter (4.1 points) was smaller than the corresponding Hindu values but larger than the corresponding increases for Muslim women.

The community effect on the demand for contraception operated entirely through differences between Hindu, Muslim and Dalit women in the change in their demand for contraception, following an additional daughter or son.

[25] Number of daughters × Muslim in Table 14.
[26] In the discussion of the results, the probabilities are taken as ranging from 0 to 100.
[27] 0.164-0.116, in Table 14 under the column showing the marginal probabilities of using terminal contraception.
[28] 0.058-0.038, in Table 14 under the column showing the marginal probabilities of using terminal contraception.

There were no significant community effects operating over and above these 'numbers based' effects: neither of the coefficients on the Muslim and the Dalit dummy variables were significantly different from zero.

The higher the infant mortality rate to a woman, the smaller would be probability of her adopting terminal contraception: a point increase in the infant mortality rate would reduce the likelihood of adopting terminal contraception by nearly five points.

There was a strong regional pattern to contraception demand: relative to living in the North (the default region), women in the Central and the Eastern regions would be more likely not use any contraception by, respectively, nearly 19 and 14 points and less likely to use termination methods by, respectively, nearly 17 and 12 points; on the other hand, again relative to living in the North, women in the Southern and the Western regions would be less likely not use any contraception by, respectively, nearly 8 and 9 points and more likely to use termination methods by, respectively, nearly 7 and 8 points. This may have had much to do with the proactive policies of the governments of the Southern and the Western states, these policies being manifest in better access to family planning facilities - coupled with the wider use of the media to promote family planning - in these states. Reinforcing this could have been a more general regional ethos which led to the desired family size in the South being smaller than, say, in the Central region. The collective of family planning facilities and attitudes towards family size in a region then yielded a 'regional effect' on contraception demand.

Table 14 shows also that maternal literacy exercised an important effect on the demand for contraception: compared to the default case, in which both parents were illiterate, a literate mother was less likely not to use contraception (by slightly over 8 points) and more likely to use to use termination methods (by just under 8 points); even an illiterate mother, albeit with a literate husband, was less likely not to use contraception (by slightly under 6 points) and more likely to use to use termination methods (by just over 5 points) than an illiterate mother with an illiterate husband.

Another factor impinging on the demand for contraception was whether or not women worked: relative to women who were unoccupied, or who worked in non-manual occupations, women who worked as labourers or as cultivators were less likely not to use contraception (by 6 points for labourers and nearly 8 points for cultivators) and more likely to use to use termination methods (by just under 6 points for labourers and 7 points for cultivators).

The last factor shown in Table 14 affecting the demand for contraception was the level of village development. On the basis of their general level of facilities[29], the 1,758 villages in the NCAER Survey were classified as (a) low-development villages; (b) medium-development villages; (c) high-development villages. Relative to women in low-development villages, mothers in medium and high development villages were less likely not to use contraception, by

[29] For example: quality of roads; presence of transport, educational, health care, financial and commercial facilities.

just over 5 points for medium, and nearly 7 points for high, development villages; and more likely to use to use terminal methods, by nearly 5 points for medium, and over 6 points for high, development villages.

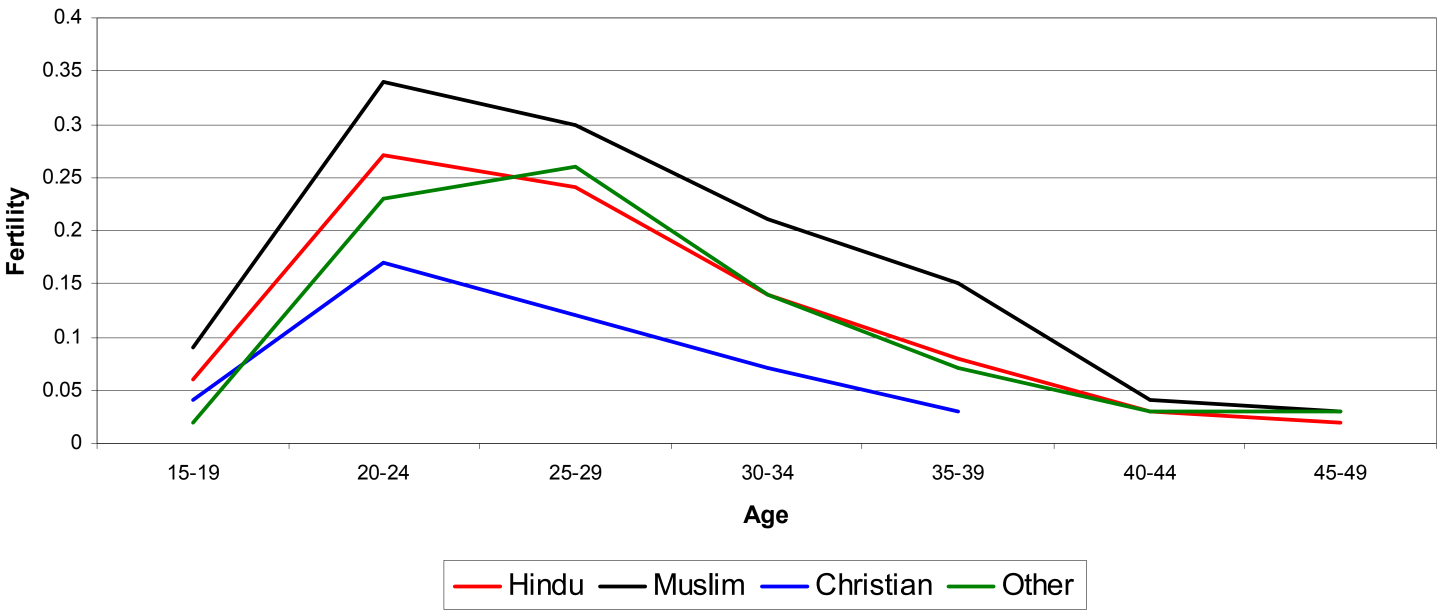
8. Conclusion

The interaction between religion and fertility is the subject of intense academic, economic and political debate in developing countries like India. Discussions of religion and fertility in India have usually dwelt upon the pronatalist tendencies within Islam and their implications for the observed higher fertility of Muslim populations in the subcontinent. However, a curious paradox in Indian economic demography, rarely commented upon, is that while Muslim fertility in India is considerably higher than Hindu fertility, infant mortality among Muslims is considerably lower than among other groups. Motivated by this paradox, this paper put forward a new theory that provides an explanation for larger Muslim, relative to Hindu, fertility. The economics literature on gender bias and son preference was linked directly with the discussion of religion and fertility. This paper argued that bringing together the notion of 'son preference' and the complementary concept of 'daughter aversion' provides insights: just as sons bring 'benefits' to their parents, daughters impose 'costs' and complementing a desire to have sons is a desire not to have daughters. Consequently, the desire for sons increases family size while the fear of daughters limits it. A formal model, in which these two countervailing forces act so as to determine equilibrium family size and composition, was developed. The hypothesis was then tested using quantitative evidence based upon an empirical dataset from India. The data used were a nationally representative sample of 10,548 rural Indian women who had adopted a terminal method of contraception and who had therefore attained their equilibrium family size and composition. A number of Poisson regression models were estimated on the number of living children, the number of infant deaths, and the sex ratio.

The econometric study undertaken here shows that in the sample, Muslims had statistically the same degree of son preference as Hindus but a significantly lower degree of daughter aversion. These facts were shown theoretically to be sufficient to result in a larger average (equilibrium) family size for Muslims than for Hindus. The curious paradox about religion and reproduction in India is that groups that have higher fertility, such as the Muslims, also display lower degrees of daughter aversion. The thrust of the econometric analysis went on to explain the number of sons and daughters to these women in terms of their personal and household characteristics. The analysis showed that after controlling for other factors at the level of the individual, household, the village, and the region, there are differences by religion and caste in the determinants of the numbers of living children. Another important point to emerge from the analysis was that, after controlling for other factors, Muslim women had a smaller number of both male and female infant deaths compared to Hindus. For Hindu women, the increased likelihood of terminating fertility after the birth of a son was nearly three times the increased likelihood of terminating fertility after the birth of a daughter. By contrast, the increase in the likelihood of Muslim women terminating their fertility after the birth of a son or daughter was substantially lower than the corresponding values for Hindus. This suggests empirically as well, that there is lower daughter aversion among Muslims. This was reflected also in the considerable differences by religion in the sex ratio at birth and in the sex ratio for currently living children, between Hindus and Muslims. Other analysis presented in the paper included a logit model of the demand for contraception adopted by the groups under study. The demand for contraception was influenced by a range of economic characteristics. It was shown that the community effect on the demand for contraception operated entirely through differences between Hindu, Muslim and Dalit women in the change in their demand for contraception, following an additional daughter or son. An important finding of the present study is that there were no significant community effects operating over and above these 'numbers based' effects.

Collectively, the findings from the analysis suggest that counter to popular belief that associates higher Muslim fertility with pronatalist tendencies within Islam, higher Muslim fertility in India may in reality be related to gender bias, in particular the significantly lower levels of daughter aversion among this community. The study concludes that notions of son-preference and daughter aversion may be significant in explaining, theoretically and empirically, inter-group differences in fertility by religion and caste in India. Moreover, and paradoxically, the reason for the higher fertility of Muslim, relative to Hindu, women may lie in daughters being more welcome in Muslim than in Hindu families and *ipso facto* in the relatively better treatment that girls receive at the hands of Muslim parents. More research is needed on the complex interactions between religion, gender bias, and fertility behaviour, both in India and elsewhere. But by making a first attempt at testing empirically the links between gender bias and religious differentials in fertility in India, this paper proposes a new way of thinking about economic demography and religion in poor societies, bringing in to sharp focus the complex and hitherto neglected interactions between them.

Figure 1. Age-specific fertility by religion, all-India (1999)



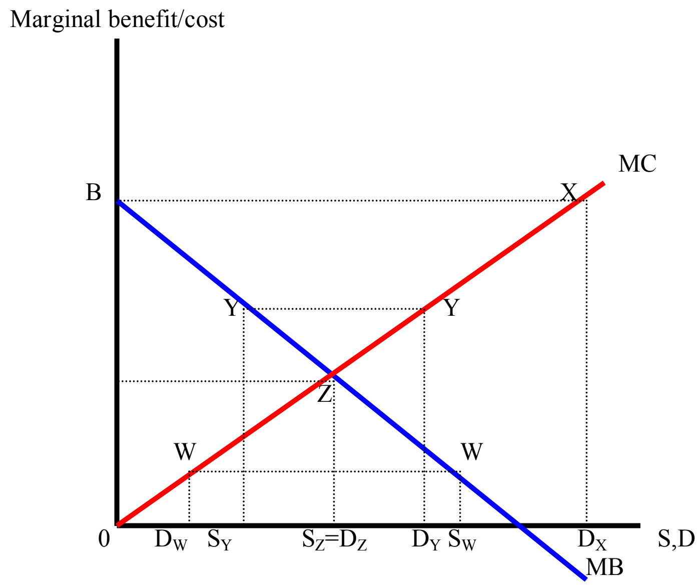


Figure 2

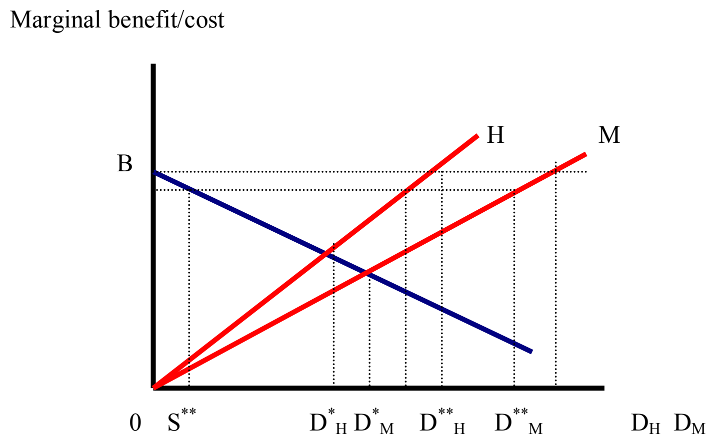


Figure 3

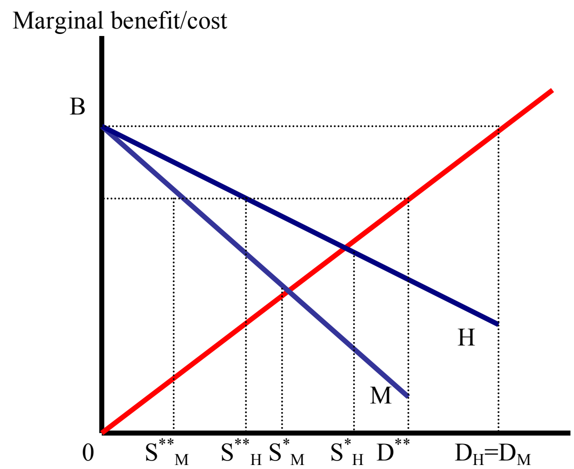


Figure 4

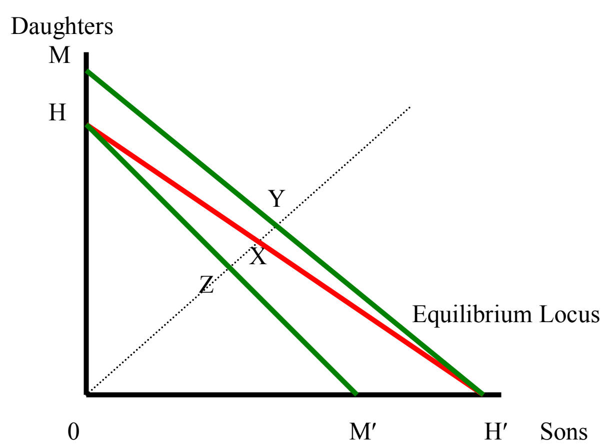


Figure 5

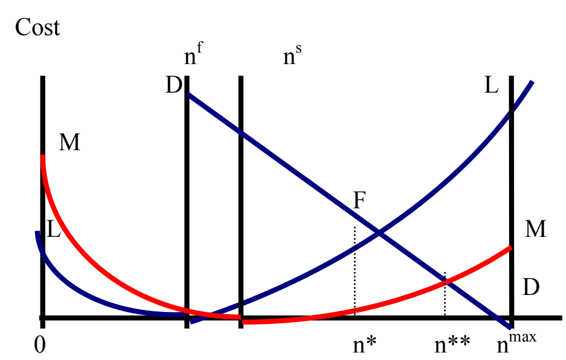


Figure 6
The Demand for Contraception

Table 1
Number of Living Sons of Currently Married Women Who Terminated Their Fertility

Sons	Hindus (%)	*Muslims (%)*	*Dalits (%)*
0	4.6	5.1	4.5
1	29.3	25.4	27.1
2	45.9	40.4	42.1
3	14.9	19.5	19.2
4+	5.3	9.6	7.1
Mean	1.9	2.1	2.0
Median	2	2	2

6,523 Hindu, 549 Muslim and 3,476 Dalit women

Table 2
Number of Living Daughters of Currently Married Women Who Terminated Their Fertility

Daughters	Hindus (%)	*Muslims (%)*	*Dalits (%)*
0	19.6	13.4	17.4
1	39.1	35.8	38.5
2	25.1	25.6	26.2
3	11.0	15.8	12.2
4+	5.2	9.4	5.7
Mean	1.4	1.8	1.5
Median	1	2	1

6,523 Hindu, 549 Muslim and 3,476 Dalit women

Table 3
Number of Living Children of Currently Married Women Who Terminated Their Fertility

Children	Hindus (%)	*Muslims (%)*	*Dalits (%)*
0	0.6	0.8	0.8
1	2.2	1.8	2.6
2	23.4	13.8	18.9
3	35.1	32.1	31.4
4	22.3	25.4	26.1
5+	16.4	26.1	20.2
Mean	3.3	3.8	3.5
Median	3	4	3

6,523 Hindu, 549 Muslim and 3,476 Dalit women

Table 4
Number of Living Daughters of Currently Married Women Who Terminated Their Fertility Without Any Sons:
'No-Son' Equilibrium

Daughters	Hindus (%)	*Muslims (%)*	*Dalits (%)*
0	12.4	15.4	16.7
1	15.3	11.5	21.3
2	37.2	38.5	30.7
3	21.3	11.5	18.7
4+	13.8	23.1	12.6
Mean	2.1	2.2	
Median	2	2	

309 Hindu, 32 Muslim and 162 Dalit women

Table 5
Number of Living Daughters of Currently Married Women Who Terminated Their Fertility With the Same Number of Sons as Daughters
'Parity' Equilibrium

Daughters=Sons	Hindus (%)	*Muslims (%)*	*Dalits (%)*
0	2.4	3.3	3.2
1	48.2	32.3	41.9
2	44.5	48.8	47.0
3	4.7	14.1	7.4
4	0.2	1.5	0.5
Mean	1.5	1.8	1.5
Median	1	2	1

1,585 Hindu, 138 Muslim and 802 Dalit women

Table 6
Number of Living Sons of Currently Married Women Who Terminated Their Fertility Without Any Daughters:
'No-Daughter' Equilibrium

Sons	Hindus (%)	*Muslims (%)*	*Dalits (%)*
0	2.9	5.9	4.3
1	7.5	8.8	9.6
2	51.9	30.9	44.9
3	26.8	44.1	28.3
4+	10.9	10.3	12.9
Mean	2.4	2.5	2.4
Median	2	3	2

1,298 Hindu, 77 Muslim and 615 Dalit women

Table 7
Poisson Regression Model Estimates for the Number of Sons and Daughters to Currently Married Women Who Terminated Their Fertility

	Equation for Sons		*Equation for Daughters*	
Variable	**Coefficient**	***Marginal Effects***	***Coefficient***	***Marginal Effects***
Age of woman at marriage	-0.028 (7.4)	-0.053 (0.01)	-0.029 (6.9)	-0.043 (0.01)
Muslim	0.134 (4.3)	0.271 (0.07)	0.207 (6.1)	0.335 (0.06)
Dalit	0.043 (2.7)	0.083 (0.03)	0.046 (2.5)	0.068 (0.03)
Central region	0.039 (1.7)	0.075 (0.04)	-	-
Southern region	-0.167 (6.8)	-0.307 (0.04)	-	-
Western region	-0.032 (1.28)	-0.061 (0.05)	-0.027 (1.3)	-0.040 (0.03)
Eastern region	-0.061 (2.1)	-0.113 (0.05)	0.037 (1.4)	0.055 (0.04)
Woman literate	-0.119 (6.3)	-0.223 (0.03)	-0.076 (4.1)	-0.111 (0.03)
Woman illiterate/husband literate	-0.034 (2.0)	-0.065 (0.03)	-	-
Woman works as labourer	-0.051 (2.3)	-0.095 (0.04)	0.050 (2.1)	0.076 (0.04)
Woman works as cultivator	-0.053 (2.1)	-0.099 (0.05)	0.052 (1.9)	0.079 (0.04)
Woman works in non-manual occupation	-	-	-	-
Husband works as labourer	-0.052 (2.7)	-0.098 (0.036)	-0.09 (4.2)	-0.130 (0.03)
Husband works as cultivator	-	-	-	-

Notes to Table 7
The equations were estimated on observations for 10,548 currently married women (6,523 Hindus; 549 Muslims; and 3,476 Dalits) who had terminated their fertility by adopting termination methods of contraception.
Figures in parentheses under column 'coefficient' are z-values and under column 'marginal effects' are standard errors.
The marginal effects show the increase/decrease in the expected number of sons/daughters for a unit change in the relevant variables, the values of all other variables being set to their respective mean values.
The LR test statistics for imposing zero restrictions on some of the coefficients were: $\chi^{2(}(2)=0.79$, for the 'sons equation' and $\chi^{2(}(5)=2.4$, for the 'daughters equation'.

Table 8
Average Number of Infant Deaths and Infant Mortality Rates to Currently Married Women

	Hindus	*Muslims*	*Dalits*
Male Infant Deaths	0.132	0.136	0.170
Female Infant Deaths	0.156	0.164	0.194
Total Infant Deaths	0.253	0.229	0.315
Male Infant Deaths as a Percentage of Male Live Births	4.5	4.6	5.4
Female Infant Deaths as a Percentage of Female Live Births	6.2	4.5	7.6
Total Infant Deaths as a Percentage of Total Live Births	5.1	4.5	6.1

Mean Infant Deaths and Infant Mortality Rates were computed over currently married women *who had had at least one live birth*: and who had terminated their fertility: 6,505 Hindu, 545 Muslim and 3,469 Dalit women
Mean *Male* Infant Deaths and Male Infant Mortality Rates were computed over currently married women *who had had at least one male live birth* and who had terminated their fertility: 6,295 Hindu, 523 Muslim and 3,365 Dalit women
Mean *Female* Infant Deaths and Female Infant Mortality Rates were computed over currently married women *who had had at least one female live birth* and who had terminated their fertility: 5,422 Hindu, 489 Muslim and 3,009 Dalit women

Table 9
Poisson Regression Model Estimates for the Number of Male and Female Infant Deaths to Currently Married Women

	Equation for Male Infant Deaths		***Equation for Female Infant Deaths***	
Variable	Coefficient	*Marginal Effects*	*Coefficient*	*Marginal Effects*
Male live births	0.577 (64.6)	0.069 (0.001)	-	-
Female live births	-	-	0.488 (56.6)	0.062 (0.001)
Age of woman at marriage	-0.031 (3.5)	-0.004 (0.001)	-0.040 (4.4)	-0.005 (0.001)
Muslim	-0.371 (6.9)	-0.038 (0.005)	-0.145 (2.7)	-0.017 (0.006)
Dalit	-	-	-	-
Safe water in village	-0.052 (1.6)	-0.006 (0.004)	-0.115 (3.4)	-0.014 (0.004)
Anganwadi in village	-0.066 (2.1)	-0.008 (0.004)	-0.096 (2.9)	-0.012 (0.004)
Hospital within 5km of village	0.052 (1.6)	0.006 (0.004)	-0.103 (3.1)	-0.0133 (0.004)
Midwife in village	0.076 (2.3)	0.009 (0.004)	-	-
Poor housing conditions	0.101 (3.1)	0.012 (0.004)	0.193 (5.7)	0.025 (0.004)
Household assets	-0.036 (5.0)	-0.012 (0.004)	-0.019 (2.6)	-0.002 (0.001)
Woman literate	-0.259 (5.5)	-0.029 (0.005)	-0.336 (6.9)	-0.040 (0.005)
Woman illiterate/husband literate	-0.053 (1.5)	-0.006 (0.004)	-0.099 (2.8)	-0.012 (0.004)
Woman works as labourer	0.194 (4.8)	0.025 (0.006)	0.123 (2.9)	0.016 (0.008)
Woman works as cultivator	-	-	-	-

Notes to Table 9
The male infant deaths equation was estimated on observations for the 25,796 currently married women who had had male live births; the female infant deaths equation was estimated on observations for the 23,646 currently married women who had had female live births.
Figures in parentheses under column ‘coefficient’ are z-values and under column ‘marginal effects’ are standard errors.
The marginal effects show the increase/decrease in the expected number of male/female infant deaths for a unit change in the relevant variables, the values of all other variables being set to their respective mean values.

The LR test statistics for imposing zero restrictions on some of the coefficients were: $\chi^{2(}(2)=2.2$, for the male infant deaths equation and $\chi^{2(}(3)=2.4$ for the female infant deaths equation.

Table 10
Sex Ratios of Children to Currently Married Women Who Have Terminated Their Fertility

	Currently Married Women Who Have Terminated Their Fertility		
	Hindu	Muslim	Dalit
Sex Ratio at birth	976	1026	993
Sex Ratio of currently living children	948	1047	963

Sex Ratio: Number of girls per 1000 boys

Table 11
Regression Estimates for the Sex Ratio to Women who have Terminated Their Fertility

	Equation 1 *Sex Ratio at Birth*	*Equation 2* Sex Ratio of Currently Living Children
Muslim	dropped	dropped
Dalit	dropped	dropped
Wife literate	dropped	dropped
Husband literate	46.58	32.22
	(2.05	(1.41)
Muslim × husband literate	83.99	89.85
	(1.45)	(1.46)
Dalit × husband literate	51.71	54.53
	(1.76)	(1.85)
Log of household income	-338.99	-404.49
per person	(2.43)	(2.88)
(Log of household income	16.49	20.34
per person)^2	(1.93)	(2.37)
South	2573.62	2881.54
	(4.50)	(5.01)
East	2562.56	2883.71
	(4.49)	(5.02)
West	2535.43	2844.75
	(4.33)	(4.94)
Central	2551.73	2810.48
	(4.46)	(4.88)
North	2547.74	2842.88
	(4.45)	(4.93)
Husband cultivator	Dropped	Dropped
Husband labourer	-72.46	-103.00
	(2.71)	(3.74)
Mother cultivator	64.17	79.93
	(1.91)	(2.37)
Mother labourer	76.77	67.33
	(2.55)	(2.22)
Mother in non-manual occupation	Dropped	Dropped
Level of village development: medium	42.96	Dropped
	(1.60)	
Level of village	69.21	32.73
Development: high	(2.35)	(1.52)

Notes to Table 11:

1. The dependent variable in Equation 1 is the sex ratio (number of females per 1,000 males) *at birth* to women who have terminated their fertility (mean=984.4): 10,176 observations
2. The dependent variable in Equation 2 is the sex ratio (number of females per 1,000 males) of *currently living children* to women who have terminated their fertility (mean=957.97): 10,044 observations
3. LR test of zero restrictions in Equation 1 (on dropped variables): $\chi^2(23)=26.0$; $Pr>\chi^2=0.30$
4. LR test of zero restrictions in Equation 2 (on dropped variables): $\chi^2(24)=26.8$; $Pr>\chi^2=0.32$
5. Figures in parentheses are t-values
6. Equation 1: $\overline{R}^2 = 0.508$; F-test that all the coefficients are zero: F(15,10161)=700.8
7. Equation 2: $\overline{R}^2 = 0.495$; F-test that all the coefficients are zero: F(15,10029)=658.1
8. The following interaction terms were dropped from the specification because their associated coefficients had t-values less than unity: Muslim × log(income); Dalit × log(income); Muslim × [log(income)]^2; Dalit × [log(income)]^2; Muslim × (Region); Dalit × (Region); Muslim × (Father's/Mother's Occupation); Dalit × (Father's/Mother's Occupation).

Table 12
The Decomposition of Muslim-Hindu and Dalit-Hindu Differences in the Sex Ratio at Birth and of Currently Living Children

Sex Ratio at Birth					
Sample Average	***Muslim Attributes Evaluated Using Hindu Coefficients***		***Sample Average***	***Dalit Attributes Evaluated Using Hindu Coefficients***	
$SR_M - SR_H$	$SR_M - SR_M^H$	$SR_M^H - S_H$	$SR_D - SR_H$	$SR_D - SR_D^H$	$SR_D^H - S_H$
1027-976=51	**1027-991=36**	**991-976=15**	**993-976=17**	**993-985=8**	**985-976=9**
Sex Ratio of Currently Living Children					
Sample Average	***Muslim Attributes Evaluated Using Hindu Coefficients***		***Sample Average***	***Dalit Attributes Evaluated Using Hindu Coefficients***	
$SR_M - SR_H$	$SR_M - SR_M^H$	$SR_M^H - S_H$	$SR_D - SR_H$	$SR_D - SR_D^H$	$SR_D^H - S_H$
1047-948=99	**1047-1001=46**	**1001-948=53**	**963-948=15**	**963-952=11**	**952-948=4**

Notes to Table 12:

SR_M SR_D SR_H are the sex ratios for, respectively, Muslim, Dalit and Hindu women

SR_M^H is the what the Muslim sex ratio *would have been* if Muslim attributes were evaluated using Hindu coefficients

SR_D^H is the what the Dalit sex ratio *would have been* if Dalit attributes were evaluated using Hindu coefficients

Table 13
Contraception and Currently Married Women

	Hindu	*Muslim*	*Dalit*
Number of Currently Married Women	16,100	2,951	10,786
Percentage not using contraception	53	72	61
Percentage using spacing methods of contraception	7	10	7
Percentage using terminal methods of contraception	40	18	32

Source: NCAER Survey

Table 14
Ordered Logit Estimates for Contraceptive Use by Currently Married Women

	Coefficients	*Marginal Probabilities*		
		No Contraception	*Spacing Contraception*	*Terminal Contraception*
Age at marriage	-0.023	0.006	-0.001	-0.005
	(3.9)	(0.001)	(0.0001)	(0.001)
Number of daughters	0.263	-0.064	0.006	0.058
	(19.1)	(0.003)	(0.0003)	(0.003)
Number of daughters×Muslim	-0.169	0.041	-0.003	-0.038
	(4.8)	(0.009)	(0.001)	(0.008)
Number of daughters×Dalit	-0.075	0.018	-0.001	-0.017
	(4.0)	(0.005)	(0.0004)	(0.004)
Number of sons	0.740	-0.179	0.015	0.164
	(46.9)	(0.004)	(0.001)	(0.004)
Number of sons×Muslim	-0.523	0.127	-0.011	-0.116
	(15.0)	(0.008)	(0.001)	(0.008)
Number of sons×Dalit	-0.126	0.031	-0.003	-0.028
	(7.1)	(0.004)	(0.0004)	(0.004)
Muslim	0.121*	-0.029*	0.002*	0.027*
	(1.3)	(0.023)	(0.002)	(0.021)
Dalit	-	-	-	-
Infant mortality rate	-0.215	0.052	-0.004	-0.048
	(2.5)	(0.021)	(0.002)	(0.019)
Central region	-0.792	0.187	-0.018	-0.169
	(18.3)	(0.010)	(0.001)	(0.009)
Southern region	0.308	-0.076	0.006	0.070
	(6.9)	(0.011)	(0.001)	(0.010)
Western region	0.351	-0.087	0.006	0.081
	(7.2)	(0.012)	(0.001)	(0.012)
Eastern region	-0.588	0.136	-0.016	-0.120
	(12.1)	(0.011)	(0.002)	(0.009)
Woman literate	0.338	-0.083	0.007	0.076
	(10.1)	(0.008)	(0.001)	(0.008)
Woman illiterate/ husband literate	0.238	-0.058	0.004	0.054
	(8.0)	(0.008)	(0.001)	(0.007)
Medium development village	0.211	-0.051	0.004	0.047
	(6.4)	(0.008)	(0.001)	(0.007)
High development village	0.283	-0.069	0.005	0.064
	(7.7)	(0.009)	(0.001)	(0.008)
Woman works as labourer	0.246	-0.060	0.004	0.056
	(6.5)	(0.009)	(0.001)	(0.009)
Woman works as cultivator	0.304	-0.075	0.005	0.070
	(6.2)	(0.012)	(0.001)	(0.012)

Notes to Table 14

The contraceptive use was estimated on observations for 29,837 currently married women of whom: 16,100 were Hindu; 2,951 were Muslim; and 10,786 were Dalit. Figures in parentheses under column ‘coefficient’ are z-values and under column ‘marginal probabilities’ are standard errors

The marginal probabilities show the increase/decrease in the expected probability of contraceptive use for a unit change in the relevant variables, the values of all other variables being set to their respective mean values: the marginal probabilities sum to zero across the three outcomes
An * denotes a coefficient or a marginal probability that was *not* significant at 5% level of significance.

Bibliography

Anderson, S. (2003) 'Why Dowry Payments Declined with Modernization in Europe but Are Rising in India', *Journal of Political Economy*, 111(2), pp. 269-310

Aruga, K. (2003) 'Differences in Characteristics of Religious Groups in India: As Seen from Household Survey Data', *Centre for Energy Policy and Economics Working Paper* 26, Zurich.

Azim, S. (1997) *Muslim Women: Emerging Identity.* New Delhi: Rawat Publications.

Becker G. S. (1991) *A Treatise on the Family: Enlarged Edition.* Harvard University Press, Cambridge, MA.

Bhat, M and Zavier, F (2003), 'Fertility Decline and Gender Bias in Northern India', *Demography*, 40:4, pp. 637- 657.

Borooah, V. (2003) 'Illuminating the Politics of Demography: A Study of Inter Community Fertility Differences in India', *European Journal of Political Economy*.

Borooah, V and S. Iyer (2005), 'Religion, Literacy, and the Female-to-Male Ratio in India', *Economic and Political Weekly,* Special Issue on Religion and Fertility*,* January.

Brien M. J. and Lillard L.A. (1994), 'Education, Marriage and First Conception in Malaysia', *Journal of Human Resources* XXIX.4, pp. 1167-1204.

Caldwell J.C., Reddy P.H. and Caldwell P. (1983), 'The Causes of Marriage Change in South India', *Population Studies* 37 (3), pp. 343-361.

Coulson, N. and Hinchcliffe, D. (1978), 'Women and Law Reform in Contemporary Islam', in *Women in the Muslim World*, edited by L. Beck and N. Keddie, Cambridge: Harvard University Press, pp. 37-49.

Deolalikar, A. B. and Rao V. (1998), 'The Demand for Dowries and Bride Characteristics in Marriage: Empirical Estimates for Rural South-Central India', in *Gender, Population and Development*, edited by Krishnaraj, M., Sudarshan, R. and Shariff, A. Delhi: Oxford University Press, pp. 122-40.

Deshpande, C. R. (1978), *Transmission of the Mahabharata Tradition. Vyasa and Vyasids.* Simla: Institute of Advanced Study.

Dreze J. and Murthi, M. (2001) 'Fertility, Education and Development: Evidence from India', *Population and Development Review* 27(1), pp. 33-63.

Gellner, E. (1981) *Muslim Society.* Cambridge: Cambridge University Press.

Ghallab, M. (1984) 'Population Theory and Policies in the Islamic Model' in *Geography and Population: Approaches and Applications*, edited by J. Clarke, Oxford: Pergamon, pp. 232-241.

Iyer S. (2002) *Demography and Religion in India.* Oxford University Press, Delhi.

Jeffery R. and Jeffery P. (1997), *Population, Gender and Politics: Demographic Change in Rural North India.* Cambridge University Press, Cambridge.

Kapadia, K. (2000) 'Every Blade of Green: Landless Women Labourers, Production and Reproduction in South India. In. Institutions, relations and outcomes: A framework and case studies for gender-aware planning', edited by N. Kabeer and R. Subrahmanian, London and New York: Zed Books, pp. 80-101.

Kinsley, D. R. (1997) *Hindu Goddesses.* Second edition. Berkeley and Los Angeles: University of California Press.

Krishnaraj, M., Sudarshan, R. and Shariff, A. (1998) *Gender, Population and Development*. Delhi: Oxford University Press.

Leung, S. F. (1991), 'A Stochastic Dynamic Analysis of Parental Sex Preferences and Fertility', *Quarterly Journal of Economics,* 106 (4), pp. 1063-1088.

Moulasha, K and Rao, G. R. (1999) 'Religion-Specific Differentials in Fertility and Family Planning', *Economic and Political Weekly,* 34 (42), pp. 3047-51.

Mukhopadhyay, M. (2000) 'Brother, There Are Only Two Jatis--Men and Women: Section 125 Criminal Procedure Code and the Trail of Wifehood.', in *Institutions, Relations and Outcomes: A Framework and Case Studies for Gender-Aware Planning,* edited by N. Kabeer and R. Subrahmanian. London and New York: Zed Books, pp. 147-65.

Murthi, M., Guio, A-C, and Dreze, J. (1995) 'Mortality, Fertility, and Gender Bias in India: A District-Level Analysis', *Population and Development Review*, 21(4), pp. 745-82

Obermeyer C. M. (1992) 'Islam, Women and Politics: The Demography of Arab Countries', *Population and Development Review* 18 (1), pp. 33-60.

Omsted, J. C. (2002) 'Assessing the Impact of Religion on Gender Status', *Feminist Economics* 8(3), pp. 99-111.

Qureshi, S. (1980) 'Islam and Development: The Zia Regime in Pakistan', *World Development* 8, pp. 563-575.

Radhakrishnan, S. (1947) *Religion and Society.* London: George Allen and Unwin.

Ragab, I. A. (1980) 'Islam and Development', *World Development,* 8, pp. 513-521.

Rao V. (1993) 'The Rising Price of Husbands: A Hedonic Analysis of Dowry Increases in Rural India', *Journal of Political Economy* 101, pp. 666-677.

Sen, B. (1998) 'Why Does Dowry Still Persist in India? An Economic Analysis Using Human Capital', in *South Asians and the Dowry Problem*, edited by Menski, W., Trentham Books; London: University of London, School of Oriental and African Studies, pp. 75-95.

Sen, A.K. (2001) 'The Many Faces of Gender Inequality', *Frontline*, vol. 18, October 27- November 9.

Tambiah S. J. (1973) 'Dowry and Bridewealth, and the Property Rights of Women in South Asia' in Goody J., Tambiah S. J. (eds) *Bridewealth and Dowry,* Cambridge: Cambridge University Press, pp. 100-110.

United Nations. (1961) *Mysore Population Study.* Department of Social and Economic Affairs, New York.

Youssef, N. H. (1978) 'The Status and Fertility Patterns of Muslim Women' in *Women in the Muslim World,* edited by L. Beck and N. Keddie, Cambridge: Harvard University Press, pp. 69-99.