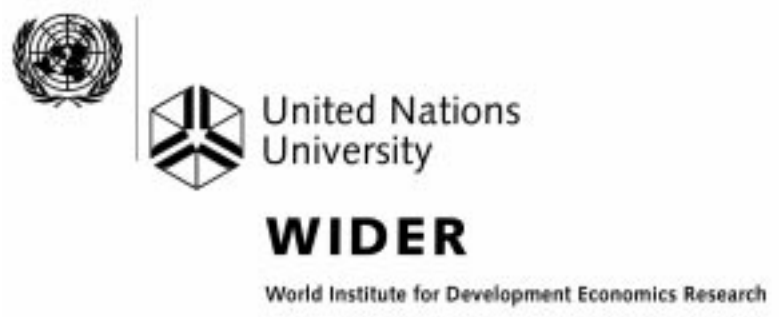

Discussion Paper No. 2001/7

Culture and the Fertility Transition in India

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May 2001

Abstract

The paper examines the evidence for various explanations usually offered for the differences in fertility behaviour across regions and over time in India. Female education has been found in other research to be the single most important factor driving the fall in fertility, but there are wide differences in the level and pace of decline of fertility at the same educational level in different states. The study makes use of two data sets, one deriving from the National Sample Survey and the Sample Registration System, the other using cultural characteristics from the Anthropological Survey of India. It examines the proposition that differences in cultural norms affect fertility behaviour and that these effects operate in counter-intuitive ways through their impact on other economic variables. The results offer strong support for this hypothesis and suggest that the effects of the usual variables like income and human capital investment are mediated through the differences in cultural traits across Indian states. Finally, the results are used to conduct a simulation exercise which examines what the counterfactual increase in the total fertility rate would be if the different regions were endowed with the mean level of literacy or consumption or cultural traits. The exercise demonstrates that if the north had the mean level of cultural traits, total fertility rates would be 6 per cent lower than they are today, while if the south had been held to the dominant norms of the country at large, fertility rates would be 25 per cent higher than they are. It is striking that literacy has a low impact on fertility outcomes relative to the importance of both cultural traits and levels of consumption.

Keywords: fertility, cultural norms

JEL classification: J13, O12

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This study has been prepared within the Short-Term Sabbatical Programme and UNU/WIDER project on Insurance against Poverty, which is directed by Professor Stefan Dercon.

UNU/WIDER gratefully acknowledges the financial contribution to the project from the Ministry of Foreign Affairs of Finland.

Acknowledgements

This research was supported by a grant from the Wellcome Foundation (GA053660) and was pursued while on a sabbatical at the World Institute for Development Economics Research (of the United Nations University), Helsinki, as a contribution to their research programme 'Insurance against Poverty'.

I would like to thank Mr Suresh Patil at the Anthropological Survey of India, Mysore, for his help with the data on cultural traits.

Pramila Krishnan

1 Introduction

The notion that cultural norms matter in explaining differences in fertility across regions has been often advanced but has rarely been the subject of econometric tests. Anthropologists and social demographers[1] have noted the variation in marriage and kinship systems and have remarked on its relationship to decision-making within households. While this in turn is the subject of debate between economists, formal statistical tests of the hypothesis that cultural norms matter in determining fertility behaviour do not exist.

India offers a testing ground for this hypothesis. Not only do cultural traits vary across India but so does fertility behaviour. Furthermore, changes across time in fertility have seemed to follow different paths in the various states of India. Table 1 gives fertility rates, infant mortality and female literacy in 1971 and 1991. There are clear differences between the northern regions (north, Bimaru) and the south in fertility; much of the south is approaching replacement-level fertility and some states like Kerala have already achieved it. There are declines in the north, in the Punjab but in other states such as Bihar, there has been hardly any decline at all. Table 1 also presents a comparison of changes in fertility rates over two decades, the 1970s and the 1980s in India in comparison to changes in infant mortality and female literacy over the same period.

Table 1 confirms that the patterns of decline in fertility exhibit significant variations across the major states of India. Two different hypotheses about the fertility transition have been advanced: the first stresses the role of female education in achieving this outcome. Drèze and Murthi (1999) offer a test, which is based on census data across the districts of India for 1981 and 1991, and provides strong evidence that *controlling for fixed effects and a time trend*, female education is the most important factor explaining fertility differences across regions and over time.

The second hypothesis is that, while both economic growth and female education play a part, diffusion of new knowledge, ideas and aspirations in forming reproductive behaviour might matter more. Its adherents cite, as partial evidence, the fact that women without education in the south are also experiencing declines in fertility compared to similar groups elsewhere.[2]

In this paper, I argue that the difference between the hypotheses is perhaps less marked than suggested. It is striking that the adherents of the 'diffusion' hypothesis rely on data from the south and again, it is clear that regional differences in behaviour whether between the educated and uneducated or between urban and rural populations dominate the evidence. In particular, the fact that most of the decline is left unexplained, and attributed to the 'black box' of fixed effects and time trends suggests that the real story

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1 Basu (1999, 1992) and Dasgupta (2000) have provided some of the most persuasive evidence on this subject. Dyson and Moore (1983) provide a careful and detailed account of the differences in gender relations across regions in India and their impact on demographic outcomes.

2 Arokiasamy, Cassen and McNay (2000) provide evidence from the National Family Health Survey (1992-3), that state-level fertility influences individual fertility as does exposure to media. The Princeton study of fertility decline in Europe in which fertility change appeared to be influenced by the behaviour of communities living in proximity to each other also offers support for this hypothesis. Also see Dasgupta (2000) for a theoretical model of how this might come about.

lies in unpacking these effects. What follows is an attempt to do so. So why might we see persistent differences in fertility across regions?

Perhaps the simplest explanation is that fertility rates differ persistently across regions, because of the concentration in some regions of individuals with personal characteristics (physical and human capital), which inhibit change in fertility. For instance, women with low education levels might be concentrated in the same region. A mechanism by which this might occur is Becker *et al.* (1990). They examine a model in which a high societal level of human capital raises the return to individual investments in human capital. In economies with high levels of human capital, families find it optimal to have few children and provide each with a high level of human capital. Alternatively, stagnation in local growth might also inhibit the lowering of fertility. In another example, this time examining the effects of physical capital accumulation, Galor and Weil (1996) describe a mechanism where increases in capital per worker raise women's relative wages (they assume that capital is more complementary to women's labour than that of men). This in turn lowers fertility by raising the cost of children more than household income. Lower fertility raises capital per worker and this generates a demographic transition.

Table 1
Fertility, infant mortality and literacy

	South	West	Bimaru	North	East
1971					
Fertility	4.5	5.4	6.5	6.4	5.3
Female literacy	27	26	10	20	18
Infant mortality	102	133	158	91	130
1991					
Fertility	2.6	3.3	4.9	3.8	3.5
Female literacy	46	42	20	38	33
Infant mortality	61	71	95	65	96
% change 1971-81					
Fertility	-19	-19	-11	-26	-20
Female literacy	35	44	45	43	30
Infant mortality	-24	-9	-2	-29	-20
% change 1981-91					
Fertility	-29	-20	-14	-20	-23
Female literacy	29	25	45	42	28
Infant mortality	-25	-18	-31	-33	-32

Data: Sample Registration System, Government of India and the Census of India. Fertility is the total fertility rate, female literacy is the percentage of women that can read and write and infant mortality is the number of children that die before their first birthday, per thousand children born alive.

Notes: South = Karnataka, Tamil Nadu, Kerala, Andhra Pradesh;

East = West-Bengal, Orissa, Assam;

Bimaru = Bihar, Madhya Pradesh, Rajasthan, Uttar Pradesh;

North = Haryana, Himachal Pradesh, Punjab;

West = Gujarat, Maharasthra.

A second possibility is that endowments of local public goods (health and education) are very different across regions—and stay so over time.[3] There are a number of mechanisms through which investment in local public goods or alternatively technological progress might lower fertility. In the case of public health, there are direct effects through the provision of contraceptives and general health care, but such provision may also reduce fertility by lowering infant and child mortality. In short, the persistence of poor local and individual endowments and poor growth might all contribute to keeping regional fertility high.

The policy conclusions are clear and uncontroversial. Changes in either policy or individual endowments will change fertility rates. Increases in growth, investment in local health and education and the improved health and higher education of women, in particular, contribute to lowering fertility.

However, if, controlling for differences in both local and individual endowments, we still discover persistent differences in fertility, as demonstrated by Drèze and Murthi and others, there must be other constraints that matter. Fertility behaviour is a social affair—and cultural traits, specific to communities within regions may have a role in determining how fertility evolves over time. So differences in initial conditions, arising from community/state-level cultural norms mean that otherwise identical households (identical in physical and human capital and local endowments) see persistent differences in fertility rates over time. Furthermore, while fertility behaviour is itself regulated by cultural norms, factors that affect fertility (like female education and female labour-force participation) might also be affected by such norms. For instance, it has been suggested that the practice of female seclusion in parts of the north has meant that investment in education has been relatively slow and equally, has kept female labour-force participation at relatively low levels. The argument here is that fertility levels in some states are less likely to be affected by increases in female literacy—and that the effects of physical and human capital endowments (both local and individual) are mediated by cultural traits. If cultural traits can be thought of as initial conditions that mean a lower decline at given rate of female literacy for instance, the argument here is that the impact of increases in incomes and increases in literacy on reductions in fertility rates, given cultural traits, also depends on the traits. In short, traits affect fertility, not merely additively, but also multiplicatively, through increased incomes and female literacy.

Cultural traits range from identification markers used by communities to distinguish themselves, to social and cultural differentiators (such as caste and occupation), and include marriage rules, symbols and payments, rules of inheritance and succession, rituals in birth, death and marriage and mechanisms of social control. This study relies on data on cultural traits collected by The Anthropological Survey of India for the different communities in India which were then reported as an average across communities at the level of the state.[4] More details about the data are provided in

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3 Besley and Burgess (2000) find that public food distribution in India is greater where governments face higher electoral accountability and where local media exposure is high.

4 In this paper, I use the term ‘traits’ to describe the relevant social and cultural characteristics of a community, mainly because the Anthropological Survey of India uses this term.

Section 4. These data allow the construction of measures of cultural variation that might sensibly be thought of as affecting or regulating fertility behaviour.

There is no intention here to suggest a simple causal link between entire aspects of social organization and socioeconomic outcomes but less controversially, to explore those aspects of cultural organization that are correlated with such outcomes. However, there is a considerable literature, which has taken a contrary view and has argued that established customs are a brake on innovation and progress. For instance, Weber (1993) generated a great deal of controversy with the suggestion that Hindu culture and caste-organization have had a dampening effect on economic development.[5] Contemporary accounts such as Landes (1998) and Diamond (1997) offer sophisticated readings of differences in outcomes and aim to explain the evolution of cultural beliefs and institutions by appealing to more basic differences in ecological systems and their interaction with beliefs. However, the thesis pursued here is that over a short horizon, cultural traits can be treated as primitives in their effect on regulating or otherwise affecting economic behaviour. Furthermore it is plausible that even if cultural traits are not subject to change over the short run, so that such traits are held constant, their effects, mediated through changes in the economic environment, change over time. The purpose here is to use a subset of such cultural traits that might be argued to both serve as traditional marks of difference between communities across Indian states and might be thought to regulate fertility behaviour.

The next section provides a detailed discussion of the part that different cultural traits and their variation across Indian communities might play in affecting reproductive behaviour. Section 3 presents a simple model of how cultural norms might affect the demand for children and investment in them. The model concentrates on two particular cultural traits, female seclusion and patrilocal exogamy, together with payments of dowries for girls, to characterize possible effects on the demand for children. This is followed by a discussion of the data and some summary evidence in section 4 and a discussion of the econometric model and the results in section 5. The results can also be used to decompose the differences in fertility and ask how much can be accounted for by the usual suspects of female literacy and incomes in contrast to the differences in cultural traits.

2 Why might cultural traits affect fertility rates?

Fertility is clearly an object of household regulation and is responsive to the costs and incentives faced by households. Since the costs of pregnancy and child-rearing are borne by the mother, her ability to respond to incentives and regulate her fertility matter. In this section, I review some cultural traits that are likely to affect the costs and incentives faced by households and its members, and in this way may well affect fertility. More specifically, I examine cultural traits that have a bearing on well-known

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[5] Weber's views have been re-echoed in later discussions and a summary of can be found in Mandelbaum (1972). Also see Myrdal's (1971) discussion of the imprint of the caste system on the motivation to work. Underlying these arguments is the important issue of the extent to which cultural values shape the development of social institutions or have a direct function in regulating behaviour but have become ineffective or dysfunctional over time.

reasons for lower fertility, such as female autonomy, gender equality, old-age security and mutual insurance.

In households where there is a conflict of interest in this between sexes and in societies where women have little autonomy, it follows that fertility may well be higher than that desired by the wife. If, for instance, one conceives of the household as governed by a dictatorial patriarch, and even if women's welfare is taken into account, it may well be the case that the weights awarded to the woman are relatively low where her outside options are poor and she has little voice in the household. Hence the costs to her well-being of higher fertility may typically not be taken into account.[6] There is a considerable literature on what constitutes female autonomy and how it might be measured. The measures range from autonomy in domestic decision-making, ability to work outside the household, freedom from social seclusion, to measures of literacy and numeracy. There is evidence that there are substantial differences in female autonomy across India. Dyson and Moore (1983), for instance, argue that such differences underlie regional differences in infant mortality by sex. Practices such as *purdah*, which keep women secluded from the male eye and hence limit their participation in society at large, are lower in the south.

In the data from the Anthropological Survey, some straightforward measures that might capture female autonomy within the household can be found. They include: whether women traditionally confine themselves to housework (can be seen as a combination of gender differences in work and female seclusion); whether they have control over family expenditure; whether they contribute to family income (this is directly related to both female seclusion and to participation in paid work) and whether divorce is socially sanctioned (even if legally allowed, social sanctions often affect the ability of women to divorce).

In poor societies where capital markets are non-existent, children offer the only source of support in old age, leading to higher fertility. Certain cultural traits may, however, reinforce the need to have more children. In general, these have to do with favouring boys over girls, typically since norms and customs imply that daughters cannot provide the same old age security as sons. The preference for sons arising out of the need for old-age security can be thought of as a 'safety-first' decision-making process and means higher fertility. This effect is compounded in households where infant mortality rates are high—poor households without access to basic health care will face higher infant mortality rates as well as less likelihood of ensuring old-age security through alternative assets. The discussion below offers some examples of traits that capture son-preference in providing old-age security.

In societies where returns to men are higher than returns to women or female participation in paid work is discouraged, the dependence on sons as a source of old-age security leads to higher fertility. Alternatively, if there is a gender division of labour and sons possess farm- or firm-specific capital that is not easily obtained by sons-in-law, sons might be a better source of old-age security than daughters. Measures of female autonomy such as female seclusion and the acceptability of female participation in paid work may then be seen as linked to higher fertility, via old age security motives.

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6 Dasgupta (1993) argues that such costs might amount to women spending over half their reproductive life in pregnancy or lactation. High maternal mortality rates compound the problem.

There may also be normative reasons for son-preference that might in turn mean higher fertility. Sons might be valued for purely cultural reasons if they play an important role in particular rituals. Among upper-caste Hindus, it is the custom for the eldest son to perform the last rites. Brothers or close male relatives can substitute for sons, but nevertheless, they are seen as an important symbol in the transition to the afterlife. Consequently, sufficient sons are needed to provide this form of security.[7]

A cultural trait that deserves further attention in this context is patrilocal exogamy, which is an important feature of the social organization of India. This refers to the migration of women from their origin villages to those of their husbands. The 1981 Census indicates that almost 69 per cent of women over 15 had left their origin village, compared to less than 18 per cent of men. The main alternative is neo-local exogamy, in which both partners live near their parents, typically implying marriages in the same or in neighbouring villages.[8] Patrilocal exogamy results in sons living near parents, so from the parents' point of view, this custom may well lead to son preference. Relative to neo-local exogamy, it would lead to higher fertility, since it means that girls end up living further away and therefore cannot be relied upon to provide old-age support.

However, one may question this, unless this institution helps to enforce the intergenerational transfers from children to parents. In a series of papers, Edlund (2000) argues that asymmetric timing of bequests to sons and daughters might be one reason for such an institution. Given that bequests are important for marriage, men may have to put off marriage. However, given that delaying marriage comes at a cost, anticipating the inheritance allows him to marry earlier. Patrilocal residence, by providing access to the parents' assets and land while they are still alive, makes it possible to both enforce the claim on inheritance and to provide old-age security. In this way, it contributes to old-age security via son-preference.[9]

There are other cultural traits that influence a woman's incentives or her ability to support her parents in old age, via reinforcing or emulating patrilocal exogamy. They include inheritance laws favouring sons to the exclusion of daughters, 'Gotra' exogamy (which means that parents will typically have to look further for suitable husbands for their daughters)[10] and 'Kanyadan'. The latter denotes the custom of the bride offered as a gift to her future husband during the marriage ceremony, symbolizing the forfeit of her right to return home.

Customary payments at marriage are yet another trait that might affect the regulation of fertility behaviour. It is often argued that marriage payments and whether a bride's family pays a dowry or receives a bride price affects both the status of women and

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7 For a discussion, see Miller (1984: 163-4).

8 The census suggested that there is little matrilocal exogamy, i.e. migration of men from their origin villages to those of their wives or migration of both partners away from their parents.

9 Edlund argues that since women have a much shorter period of fecundity, they cannot wait to claim their inheritance. This in turn might have encouraged the payment of dowries so that it largely substitutes for inheritance. Since this limits the ability of parents to enforce any old-age support even more, it reinforces son-preference.

10 Effectively, this practice requires marriage between specific sub-castes, which, given patrilocal exogamy, makes it harder to find a suitable husband nearby.

investment in them. In particular, if dowries accrue to the bridegroom's family and the wife has no claim on these resources, she may have little bargaining power as a consequence, thus raising fertility. Another interpretation of the payment of dowries is that in societies where there is a gender division of labour and women do not directly contribute to incomes, the positive transfer from the bride's family to that of the bridegroom's is, in effect, a contribution towards her upkeep in the new household. If this is so and the discounted value of the transfers is equal, there is little reason to expect any significant effect of such a custom on fertility across generations. However, since dowries are a pre-mortem inheritance, to the extent that capital markets work poorly, such transfers may well represent a burden on the parental household and serve to reduce fertility, *ceteris paribus*.[11]

Another cultural trait cited as being of some importance is the custom of marriage to near relatives. In the south, the preferred marriage type is that of cross-cousin marriages, uncle-niece marriages and similar alliances. The arguments of Karve (1965) and others suggest that the fact that marriages are between families that are so related allows women a far greater measure of freedom and security within marriage than the strictly affinal marriage.[12] In addition, it is likely that such marriages offer a form of risk-sharing to families in the need to bear sons. Since property can be transferred via such marriages to blood relatives, it might be the case that this system lowers the incentives to higher fertility. It ought to be stressed that greater freedom for women in the south suggested by the lower likelihood of seclusion and greater freedom within marriage do not necessarily mean higher status of women but might mean more freedom to regulate fertility, compared to the north.

3 Cultural traits and the demand for children

In order to clarify the role of cultural traits and their relationship to economic variables that affect fertility, a simple model of demand for children is described below. The model will allow for some of the variation in cultural traits, focusing on the role of patrilocal exogamy, female seclusion and dowry. Patrilocal exogamy implies that daughters leave the household at marriage and henceforth contribute only to their husband's household, compared to neo-local exogamy in which both children could still offer support to the parents. Dowry payments impose a cost on girls. Female seclusion affects the return to females, which in the model also implies an effect on the level of dowries.

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11 However, such transfers might also be associated with the relatively higher mortality of infant girls.

12 Studies of kinship in marriage in India suggest that there are various types of kinship organisation in India that might have a bearing on demographic behaviour. Karve (1953,1965), identifies at least 3 major types of kinship organisation, defined regionally by North, South and East. The central zone in India was identified as intermediate between the northern and southern types, combining features of both. The chief focus of the distinction across kinship systems in her account is that of marriage customs, which she identifies as affecting family relations between men and women. Uberoi (1993) presents work by Dumont (1993), Madan (1993) and Trautmann (1993) that takes a slightly different perspective arguing that there are many aspects of marriage in the North and South that are essentially similar particularly in the importance of affinal marriages.

The model describes the consumption of a family in two periods, youth (or, better productive life) and old age. The father maximizes lifetime utility U given by:

$$U = u(C_1, C_2) \tag{1}$$

where C_i denotes consumption in period i.

Denote by H_b the human capital investment in boys and H_g, the human capital investment in girls, while p denotes the price per unit of such investment, which is assumed the same for boys and girls. I assume that this investment occurs in the first period and has a return in the second period. Let H_w denote the human capital of the wife and H_h denote that of the husband. The human capital of the spouses has a return in both periods. Given the custom of patrilocal exogamy, only the return to boys' labour and human capital accrues to this household. Let n denote the number of children. It is assumed that exactly half of this number is boys. A_0 denotes initial endowments of capital in the first period. In period 1, households can add to capital, which is yielding a return a fixed return r in the next period. For simplicity, all capital is assumed to be liquid, so in the second period all capital is consumed as well. Y_i denotes income generated in period i, determined by the labour and human capital of members of the family participating in work in each period. Households have therefore the choice to provide for themselves in the second period by investing in children (and in their human capital), or to invest in assets, whose return is determined by how well the economy is performing.

The function Δ determines the value of the dowry paid, which is a function of the women's human capital and of (the inverse of) female seclusion θ. Female seclusion is a cultural trait denoting the degree to which women are allowed to participate actively in the labour market with low levels denoting low levels of participation, (and so qualifying the value of the human capital obtained); θ is higher when seclusion is low.[13] It is assumed that dowries decrease with human capital of girls but this is mediated by the degree to which women participate in the local labour market so that where participation is low and hence returns from female investment in human capital is low, dowries are likely to be higher.[14] This interpretation turns on the view that dowries are a form of pre-mortem inheritance to girls in patrilocal societies and further, that human capital investment is an alternative form of pre-mortem transfer.[15]

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13 Note that the assumption of a positive transfer from bride's family to that of the bridegroom's does not exclude the possibility that there are substantial transfers from the groom to the bride or indeed the payment of a brideprice in the other direction. However, positive net transfers in this direction are consistent with patrilocal marriages and this is the feature that the model aims to capture.

14 Rao (1993) and Rosenzweig and Stark (1989) present evidence on the relationship between dowries and the schooling of brides and bridegrooms which suggests that the dowries decrease with higher levels of schooling for girls, ceteris paribus. Behrman et al (2000) find that dowries fall with literacy of brides but do not decrease much further with the acquisition of primary education, motivating the convexity in dowries assumed here.

15 Edlund (2000) argues persuasively that in patrilocal societies in particular, dowries preclude inheritance, and presents arguments why pre-mortem transfers or bequests take the form of dowries rather than inheritance.

In the first period, the household head selects the human capital of his wife, H_w, and obtains a dowry of $\Delta(\theta H_w)$ from her family. Incomes in the first period depend on the human capital endowment of the husband, human capital of the wife and the degree to which the wife is allowed to participate in income-generating work (determined by seclusion). Income is assumed to be increasing in each argument, but at a decreasing rate. In the first period, the household can invest in human capital for both boys and girls, or invest in alternative investments, captured here by a constant stream of returns to assets. The first period's budget constraint can then be written as:

$$C_1 + \frac{np}{2}(H_b + H_g) + A_1 = Y_1(\theta H_w, H_b) + \Delta(\theta H_w) + (1+r)A_0 \qquad (2)$$

in which $\Delta(0) > 0$, $\Delta'_{H_w} < 0, \Delta''_{H_w} > 0$ and $Y'_{1H_j} > 0, Y''_{1H_j} < 0, j = w,h$.

In the second stage, the daughters are married into other households, each paying a sum of $\Delta(\theta H_g)$ in dowry. Given patrilocal exogamy, boys stay on the family farm or enterprise and now contribute to income via their labour and human capital. Hence, the second period budget constraint is:

$$C_2 + \frac{n}{2}\Delta(\theta H_g) = Y_2\left(\frac{n}{2}H_b, \theta H_w, H_h\right) + (1+r)A_1 \qquad (3)$$

with $\Delta(0) > 0$, $\Delta'_{H_g} < 0, \Delta''_{H_g} > 0$ and $Y'_{2H_j} > 0, Y''_{2H_j} < 0, (j = w,h,b)$.

In contrast, neo-local exogamy could simply be introduced in (3) as a reduction in the returns to boys in period 2, or simply putting this return equal to zero.

It is assumed that the father maximizes lifetime utility (1), subject to (2) and (3). The first order optimization conditions obtain the following solution for positive n, the number of children, where Y'_{2n} denotes the second period marginal return to children in terms of income generation, i.e. the first derivative of Y_2 with respect to its first argument, *n*.

$$\frac{H_b Y'_{2n} - \Delta(\theta H_g)}{p(H_b + H_g)} = 1 + r \qquad (4)$$

Since Y'_{2n} is decreasing in n, (4) suggests that increases in returns to assets will be accompanied by lower fertility, since the role of children here is that of an alternative avenue of savings. Patrilocal exogamy increases fertility, relative to neo-local exogamy, since boys will be able to provide for their parents in old age, so that returns to children increase. The presence of dowries will reduce fertility, since they impose a cost on having children. However, (4) also suggests that, *ceteris paribus*, areas of high seclusion (and hence higher dowries) will have *lower fertility* levels, for a given level of human capital investment, since high dowries impose a cost on having children. However, the marginal return to children (Y'_{2n}) will also be affected by θ, via the role of female

(mother's) returns to labour. The total effect of seclusion on fertility will then be mediated by the extent of substitutability between boys and mothers. For example, if higher seclusion means lower marginal returns to boys, this would lower fertility, reinforcing the effect of seclusion via dowries. However, if higher seclusion increases the marginal return to boys, then the overall fertility effect of seclusion becomes ambiguous. Note, though, that the effect of seclusion on fertility via dowries is for a given level of girls' human capital—a choice variable, so below we will need to return to the effect of seclusion on human capital investment.

The model also allows the exploration of the effect of a more educated mother on the number of children and the education of her daughters. The husband chooses both the educational level of his wife and the number of children. A household with a more educated wife will have incentives to have fewer children and will also invest more in their daughters. To see this, first consider the choice between a more educated wife (for whom a lower dowry is received) and alternative investments. A wife with a higher endowment of human capital will be chosen until:

$$\frac{-Y'_{2H_w}}{Y'_{1H_w}+\Delta'_{H_w}} = 1+r \tag{5}$$

To understand this, one needs to make the (reasonable) assumption that the denominator on the left-hand side is negative: the reduction in dowry received from a marginally more educated wife must be larger than the increased marginal return in the first period only from her higher endowment. Otherwise, there would not be a choice problem, since the husband would just pick the wife with the highest level of education. Condition (5) however provides an ambiguous conclusion: it states that the higher the return of alternative investments in the second period, the higher the educational level chosen, if the net marginal return in the first period falls faster than the marginal return in the second period. Otherwise, the wife's human capital is a substitute for alternative investments and increases in returns will be accompanied by marriage to a less-educated wife.

Equating (4) and (5) we get a measure of the trade-off between female education and investing in children. Equation (6) gives the resulting condition:

$$\frac{-Y'_{2H_w}}{Y'_{1H_w}+\Delta'_{H_w}} = \frac{Y'_{2n}\,H_b - \Delta(\theta H_g)}{p\left(H_b + H_g\right)} \tag{6}$$

From the previous analysis it is clear that human capital for females and investing in children are substitutes in investment, in the sense of different ways of incurring costs in the first period to get a better return in the second, relative to alternative assets (old age security motive). The issue is whether the relative importance is changing, for example with higher levels of education. Acquiring either children or an educated wife is costly: for children, the marginal cost of raising them (and paying for optimal human capital for them) in the first period and the marginal dowry for the girls in the second period, and for human capital of wives, the reduced dowry from choosing an educated woman as wife. Children—at least the boys—have return in the second period, while the human capital of the wife pays in the first and second period. In (6), we can think of the

denominators giving measures of the net marginal cost in the first period and the numerators as the net benefit in the second period. It is plausible that net marginal returns to the wife's human capital fall faster than net marginal returns in the first period (as discussed above), but for given levels of human capital for boys and girls, the marginal cost of having children is constant. If so, the consequence is that if it is optimal to have less children, it will be accompanied with relatively higher human capital for wives. In short, the ratio of children relative to female human capital will increase in female human capital. The effect of female seclusion described before can be understood in a similar way. Female seclusion lowers effective human capital, so it will be accompanied by relatively higher fertility for the same levels of female education than for less secluded contexts.

Further, one can examine the conditions determining investment in girls' human capital. In the model, given patrilocal exogamy, investing in education for girls has an effect via the reduction in dowry payments needed. For positive investment, investment in girls' human capital will take place until:

$$\frac{-\theta\Delta'_{H_g}}{p} = 1 + r \qquad (7)$$

For a given return to assets, the relationship between seclusion and human capital investment for girls will depend on the rate at which dowry decreases with human capital. Higher seclusion (lower θ) will imply investment in human capital up to a point with higher marginal reduction in dowry from education—if the reduction falls in human capital (as assumed in (3)), then the effect is to reduce human capital investment.

The model brings out some interesting predictions on the link between cultural traits and fertility. Some follow directly from the way in which the particular traits are introduced in the model. Patrilocal exogamy, relative to its main alternative in India, neo-local exogamy, raises fertility. Dowry payments ought to reduce fertility *ceteris paribus*, but where they are affected by human capital investment, may well raise fertility. Female seclusion works in more complicated ways, since it affects a number of choice variables that indirectly affect fertility. It is predicted to lower fertility, through its effects on dowry, but also to lead to lower investment in girls, presumably leading to further effects on fertility, which were not explored in this simple two-period model. Seclusion also has an impact on fertility by affecting the impact of mother's education on fertility: higher female education has a lower effect on fertility in a secluded society. Finally, the effect of economic change has not been analysed in this simple two-period model. However, one could reinterpret the return to assets as returns to alternative investments (alternative to traditional income generating activities). They presumably increase during periods of growth of the economy, so that one obtains the standard conclusion that growth in the returns to assets makes labour and children less necessary for old age security.

The model is rather restrictive in its attempt to describe the regulation of fertility within the household. No attempt is made to incorporate women's time or bargaining power in the picture: arguably, variables seriously affected by the enabling environment defined by culture and society. However, the model is intended to illuminate the likely interaction between cultural traits and standard economic variables of interest like increases in income or increases in female literacy. The model has shown that

outcomes, such as following changes in female education and changes in the returns to alternative sources of investment, have different effects depending on the values of the traits modelled in this section. It points to the fact that even the simplest attempt to incorporate cross-sectional variation in traits and its interaction with economic variables which are determined by the household can produce effects that might seem counter-intuitive and the importance of taking these effects into account. They also point to the importance of accounting for the endogeneity of female human capital investment in any econometric test of fertility behaviour. In section 5, an econometric model, taking into account some of the key effects described above, is estimated. The next section provides details of the data used here.

4 The data

To test the role of cultural traits, the paper relies on annual data for rural areas of 15 major states in India, covering the period, 1970-93. The primary data on total fertility rates and infant mortality rates is culled from various issues of the Sample Registration Bulletin published by the Registrar General of India. This is combined with data on consumption, its distribution and poverty put together by Özler, Datt and Ravallion (World Bank, Policy Research Department) and further supplemented by data from National Accounts also put together by Datt and Ravallion. Further data on infrastructure (percentage of irrigated area, road density) and literacy were obtained from Fan, Hazell and Thorat (1998), while data on health and education spending were provided by R. Jha and obtained from various issues of the Bulletin of the Reserve Bank of India.

Cultural traits across Indian states are obtained from *The People of India Series*, Volume VII, published by OUP for the Anthropological Survey of India. The data used were collected by the Anthropological Survey of India as part of a project on the People of India, designed to generate a descriptive anthropological profile of all the communities of India, and the impact on them of change and development. The project was launched in October 1985 but there have been previous listings undertaken by the colonial authorities since 1806. 4635 communities were studied across India. Sources used were previous ethnographic surveys but the primary source consisted of field surveys conducted with approximately five informants per community, interviewed over an average of five days. Interviews were conducted in 3581 villages (mostly multi-community) and in 1011 towns spread over the districts of India. The survey covered 421 districts and 91 cultural regions.

The data obtained on communities thus was aggregated to the state level. The information is available as the percentage of communities that follow or have a particular trait, categorized by urban/rural residence, by religion, occupation, and by scheduled caste and tribe. The traits cover identity, ecology, social organization, economy and occupation, perception and development process and linkages. Data are available on 392 such traits out of a possible 792.

In this study, the focus is on four groups of data on traits. The four groups are variables related to female seclusion and autonomy, patrilineal relationships (usually implying son preference), marriage payments (dowry, bridewealth) and marriage systems (affinal marriages). In line with the discussion in section 2 and 3, they were chosen since they

reflected traits that are most likely to have a bearing on fertility, either directly or through interactions with key variables such as female education or income.

A critical issue related to a test of the role of cultural traits is that they may well change over time. Given that the questions on cultural practices were posed in the period mid-eighties, it might well be argued that customs might have changed since the 1970, which represents the beginning of this study. However, the survey of cultural traits was intended to be retrospective in nature and furthermore, questions were posed on whether these practices had been or were changing in the respective communities. The data on traits used here pertain to traits that have not changed over the period. It is also striking how slow cultural practices are to change: for example, age at marriage has changed in many communities but even here, the pace of change has been very slow. It is possible, of course, that the impact of these norms and traits has been changing over time and indeed, this is of vital interest in this study. By explicitly considering the interaction between cultural traits and consumption levels and literacy levels over time, this is allowed for, at least via changing socioeconomic circumstances.[16]

The variation in cultural traits across India is shown in Table 2. As is clear, northern States clearly are associated with both patrilocal exogamy (low levels of neo-local exogamy), high norms of male inheritance, *Kanyadan* marriages and dowry payments as well as lower levels of female autonomy. This is closely paralleled by the Bimaru states, with the exception of the variables capturing female autonomy, which appears higher in the Bimaru states.

Divorce with social approval is least likely in the north and south, relative to the west and Bimaru. However, the key variable that captures whether women have any control over spending suggests that the traditional divide between north and Bimaru compared to the south holds here. This is also quite different from whether women contribute to income: women are allowed to do so in the Bimaru states (relative to the north) but traditionally retain little control over the purse-strings. There are also strong variations in the practice of seclusion (captured here by whether women traditionally confine themselves to housework). Again, this is highest in the north, followed by the east. The payments of dowries (in exclusion to other exchanges) is the dominant trait in the north and is clearly correlated with the customs of male inheritance, patrilocal exogamy and *Kanyadan* marriages. Bride-price payments are more the norm in the south, east and west but here customs of dowry payments often co-exist with bride-price.[17] Affinal marriages are more the norm in the south and west and are relatively rare elsewhere. The role of such marriages in regulating fertility is debatable but it has been argued that to the extent that they are also consistent with marriages between families of equal status, they offer more autonomy to the bride than the hypergamous marriages of the north.

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16 Another way of viewing this is to consider the underlying cultural traits to be constant, but that the social norms and their impact may well have been changing, through the effects of changes in socio-economic circumstances.

17 There is a large literature suggesting that these customs are also changing rapidly (called a process of 'Sanscritisation' by Srinivas and others. However, the data used here pertain to the percentage of communities that maintain that the custom has seen little change.

Table 2
Cultural traits: Percentage of communities (unweighted) in region with trait

	South	Bimaru	North	West	East
Female autonomy/seclusion					
Status of women is low	73	71	88	82	66
Women do only household work (seclusion)	10	17	43	18	29
Women contribute to family income	97	79	70	86	89
Divorce with social approval	57	71	51	66	70
Women have control over family expenditure	47	35	34	33	53
Patrilineal kinship (son-preference)					
'Kanyadan' marriages	21	44	64	31	43
Residence: patrilocal	85	98	92	91	87
Male inheritance	78	91	98	89	88
'Gotra' exogamy	3	17	28	8	34
Marriage payments					
Only dowry paid	39	48	81	26	38
Marriage systems					
Affinal marriages (cross-cousin etc)	39	9	4	25	12

Data: The Anthropological Survey of India.

5 Econometric model and results

There are two main points to carry away from the discussion of how cultural traits might regulate fertility behaviour in that their effect is mediated through variables of economic interest such as human capital investment and increased incomes, beyond any direct effect on fertility. Furthermore, in this and other models of human capital investment and fertility, human capital investment is endogenous to fertility behaviour and must be treated as so.

In this section, I present an econometric test of the role of cultural traits. However, there are a large number of traits and only limited number of observations available. In particular, the data are available for 15 states (indexed by i) and 23 years (indexed by t), covering the period 1970-93. As a first step, it is useful to impose relatively little structure on the role of the cultural traits, to discover whether they have any explanatory role at all. To do this, let TFR_{it} denote the (logarithm) of the total fertility period in state i and year t. The empirical model corresponding to the simplest test of the theory discussed earlier suggests the following formulation, where total fertility over time and across states is assumed to depend on literacy,[18] incomes (consumption per capita) and the returns to labour (captured by the amount of irrigated land). The regression controls

18 The discussion henceforth is confined to female literacy. Introducing average levels of male literacy confuses the issue since at this aggregate level, the variables are highly correlated, particularly since the values have to be interpolated between censuses.

for health endowments (infant mortality) and the endowments of public goods (public health expenditure per capita), as well as fixed effects and a time trend. Monetary variables are expressed in real terms, at 1974-75 prices (see Datt *et al.* for details).

$$TFR_{it} = \beta_{i1}(\text{female literacy})_i + \beta_{i2}(\text{mean consumption})_i + \beta_{i3}(\text{infant mortality}) + \beta_{i4}(\text{health expenditure p.c.}) + \beta_{i5}(\text{land}) + \delta_i(\text{time trend}) + \mu_i(\text{state-level effects}) + \varepsilon_{it} \quad (8)$$

All variables are expressed in logarithms. Note that the coefficients are indexed by *i*, so that they capture the variation across states (denoted by *i*) in response to changes in the variables. This is the most general specification employed to test the hypothesis that the elasticity of fertility with respect to the other variables varies across states and subsumes any differences in cultural differentiators that might affect differences in fertility. The first step is to examine whether this is plausible, and it amounts to running separate regressions by state. In these regressions literacy and infant mortality were both instrumented for, using the headcount index of poverty, data on rainfall, expenditures on education and measures of infrastructure such as roads and irrigation. It was clear from doing so that there is a certain amount of pooling possible and in particular, it is possible to restrict it to changing elasticities with respect to consumption and literacy—two of the key variables of interest in understanding the role of socioeconomic variables on fertility. The table below provides elasticities aggregated by region that demonstrate how the response of fertility varies across regions.

The elasticity of fertility to literacy is significantly different across regions and is high in the south relative to the other regions. It is not significantly different from zero in the Bimaru states and in the east. The elasticity of fertility to consumption is high in both north and east, followed by the Bimaru: however, in the south and the west regions, there is little response to changes in consumption. The results provide grounds for exploring this variation further, and unpacking these effects using the variation in cultural traits across states.

To do so, and given that only a relatively limited number of degrees of freedom are available given the small data set, the regressions could not use all variables described in Table 2 separately. Instead, some combinations of traits (simple averages), in particular five, were used. The choice of groups was based on the discussion in section 3, taking into account that some variables within each sub-group had quite different patterns across regions. In particular, seclusion, affinal marriages and dowry were used separately, while otherwise the groups of variables describing patrilineal relationships and female autonomy were averaged.

Table 3
Elasticities of fertility with respect to consumption and literacy across regions

Regions	Elasticity of fertility with respect to consumption	Elasticity of fertility with respect to female literacy
East	-0.49*	-0.04
South	-0.11	-0.84*
Bimaru	-0.21*	0.13
North	-0.64*	-0.43*
West	-0.09	-0.33*

Note: * denotes significance of at least 5 per cent.

Equation (8) was re-estimated, but this time allowing the coefficients to be constant across states and capturing the interstate variation by introducing interaction terms between the vector of traits on the one hand and female literacy and mean consumption on the other. Denoting γ_1 and γ_2 as the vector of coefficients on literacy and consumption, the regression estimated becomes:

$$TFR_{it} = \beta_1(\text{female literacy})_i + \beta_2(\text{mean consumption})_i + \gamma_1(\text{traits*female literacy}) + \gamma_2(\text{traits*mean consumption}) + \beta_3(\text{infant mortality}) + \beta_4(\text{health expenditure p.c.}) + \beta_5(\text{land}) + \delta(\text{share of population in urban areas}) + \mu_i + \varepsilon_{it} \quad (9)$$

The model was estimated both using fixed (state-level) and random effects. In the random-effects model, the fixed effects were replaced by the cultural traits. Finally, controls for the proportion of tribal and scheduled caste population per state were introduced, so that any effect of traits due to composition of the population alone is accounted for.

Tests of the specification were carried out. It was clear that the Breusch and Pagan test for random effects firmly rejected the null hypothesis that the effects were zero, while the Hausman test for equality of random and fixed effects coefficients, assuming that the model is correctly specified, suggested that the null hypothesis of equal coefficients was also rejected.[19] This in turn prompted the estimation of a full-blown random-effects model with interactions between consumption and traits as well as literacy and traits. The results for the first-stage estimation of infant mortality rates and literacy rates (as instrumented in final regressions) and the random-effects estimates of the model above are presented in Tables 4 and 5. The random-effects regression was estimated by generalized method of moments (GMM) and allows for female literacy and infant mortality to be instrumented for.

19 The Hausman test values are small in comparison with the Breusch–Pagan and hence a random effects specification was chosen. However, the fixed effects specification was also estimated and the fixed effects regressed on the key cultural traits. The estimated values were similar to those in the random effects regressions.

Table 4
First stage regression for infant mortality and female literacy

	Infant mortality		Female literacy	
	coefficient	p-value	coefficient	p-value
% of population in urban areas	-1.62	0.00	1.01	0.00
Mean consumption	0.15	0.36	-0.31	0.59
Headcount poverty index	0.32	0.00	-0.23	0.14
Roads density	-0.06	0.00	0.22	0.05
Annual rainfall (mm)	-0.02	0.01	0.08	0.24
Development spending p.c.	-20.2	0.00	4.51	0.49
Agricultural real wage	-0.11	0.00	0.19	0.17
Constant	2.84	0.00	-0.42	0.85
groups=15	n=331	R^2=0.61	n=60	R^2 = 0.49

The first-stage regressions demonstrate that the instruments used work rather well in predicting both literacy and infant mortality rates, with the latter obtaining the better fit. The regressions are of some interest in themselves, for they also provide some insight into the variables that matter in determining these outcomes. Development spending (which includes both health and education spending) has a significant effect on infant mortality but little impact on female literacy. However, the share of the urban population, the spending on roads and the real wage to agricultural labour has a significant impact on both variables. Mean consumption has no impact on either but higher poverty levels are positively related to levels of infant mortality. Clearly, state-level interventions have an impact on infant mortality but less so on female literacy. However, it should be noted that the regression on female literacy uses far fewer observations (unlike the data on infant mortality, this is only available for census years) and hence, standard errors are considerably higher as a consequence.

The final regression is presented in Table 5. It obtains the estimates of a random-effects regression employing the traits and the interactions between the traits and the variables, literacy and consumption. The socioeconomic variables have significant direct effects, except for female literacy which is weak. Mean consumption has a strong and significantly negative impact on the total fertility rate.

The cultural traits appear to have effects in line with our simple theoretical framework and this is demonstrated more clearly in Table 6, which presents the marginal effects calculated at different values of consumption and literacy. Note that they are largely consistent with the model presented earlier. Patrilineal kinship, by promoting son-preference, increases fertility—and while this effect is mitigated as literacy rises, growth in consumption actually reinforces its positive effects. Female autonomy and affinal marriages reduce fertility. Dowry raises fertility—but its effects fall as consumption and literacy increase. Finally, female seclusion on its own, by reducing the net return to girls, has a negative effect on fertility. However, this effect is weaker where consumption is high, which is consistent with the explanations offered earlier.

Table 5
GMM random-effects regression total fertility rate, 1970-93

Variables	coefficient	p-value
Socioeconomic variables		
Share in urban areas	-0.01	0.00
Time trend	0.12	0.21
Road density per capita	-0.05	0.30
Female literacy (instrumented)	-1.28	0.47
Real health and education spending per capita	-0.06	0.00
Mean consumption per capita	-10.67	0.00
Infant mortality rate (instrumented)	0.22	0.14
Land per capita	0.03	0.38
Patrilineal kinship (patrilocal exogamy, male inheritance only, Kanyadan)		
Patrilineal kinship	-8.35	0.02
Patrilineal kinship * female literacy	-0.85	0.02
Patrilineal kinship * mean consumption	2.83	0.00
Female autonomy (approval of divorce; female control over spending)		
Female autonomy	-1.78	0.15
Female autonomy * female literacy	-0.45	0.18
Female autonomy * mean consumption	0.05	0.93
Female seclusion (women only work at home)		
Female seclusion	-0.95	0.16
Female seclusion * female literacy	0.08	0.15
Female seclusion * mean consumption	0.14	0.13
Affinal marriages (cross-cousin and other consanguineal marriages)		
Affinal marriages	-1.33	0.00
Affinal marriages * female literacy	-0.30	0.00
Affinal marriages * consumption	0.51	0.00
Dowry (only dowry is paid)		
Dowry	2.29	0.00
Dowry * female literacy	0.08	0.52
Dowry * mean consumption	-0.30	0.01
Controls for scheduled caste and tribe by state		
Breusch-Pagan LM test for random effects	71.2 (0.00)	
Hausman test of specification of fixed effects	24.0 (0.03)	
n=331, 15 groups	overall R^2=0.75	

Source: Cultural traits from the Anthropological Survey of India.

It is clear that much of the impact of both literacy[20] and consumption work their effects through the cultural traits. Most of these effects are significant at least 10 per cent. Female literacy reduces fertility more in areas with patrilineal kinship or son-preference, suggesting an emancipating effect. Female autonomy and affinal marriages result in a larger reduction in fertility via female literacy—in line with more opportunities for women in such contexts. Higher income levels result in a lower fertility decline in areas with high female seclusion and son-preference, i.e. in these areas the demographic transition via growth would be more limited. Clearly, all these effects are very suggestive. If anything, they show how cultural traits have a strong impact on the way socioeconomic variables affect fertility.

But how important are these effects? Indeed, from Table 5, it is hard to see whether these cultural traits are more important than the traditional explanations of fertility differences in general and specifically in India: income and female literacy. I will now try to quantify this. The final table presents the results of a simulation exercise which examines what the counterfactual increase in the total fertility rate would be if the different regions were endowed with the mean level of literacy or consumption or cultural traits, holding other variables constant at the state-level means. It allows the decomposition of the changes in fertility over time and across states to be attributed to the strength of particular socioeconomic conditions or traits of regions.

Table 6
Marginal effects of cultural traits evaluated at minimum and mean values of (ln) consumption and female literacy

Traits	Marginal effect at minimum	Marginal effect at mean
Patrilineal kinship	0.28	1.52
Female seclusion	-0.25	-0.12
Affinal marriages	-0.93	-1.30
Female autonomy	-1.60	-1.98
Dowry	1.92	1.69

The first four rows present the impact on the levels of the total fertility rate, while the last three obtain the percentage effect. (The fourth row obtains the effect of deviations of the regional mean across variables from the national and so provides a summary effect). For instance, if the north (which has seen significantly higher consumption relative to the rest of India) had experienced the mean consumption level over this period, fertility rates would be 14 per cent or 0.50 higher than they have been. Equally, if the north had the mean level of cultural traits, total fertility rates would be 6 per cent lower than they are today, while if the south had been held to the dominant norms of the country at large, fertility rates would be 25 per cent higher than they are. It is striking that literacy has a relatively low impact on outcomes relative to the importance of both cultural traits and levels of consumption.[21] The better educational levels in the south

[20] It is difficult to argue that the impact of literacy is largely female literacy since male literacy levels are not included in these regressions. To the extent that the gender gap in literacy is relatively stable within states, it may capture the general effect of literacy rather than female literacy in particular.

[21] These calculations ignore the indirect effect on fertility via infant mortality, which are also affected by literacy. Still, the overall effect is relatively small, compared to the effects via cultural traits.

only account for a 3 per cent decline in fertility, or the worse levels in Bimaru for 2 per cent. Relatively high incomes and consumption contributed substantially in the east and north. But in west and especially in the south, the contribution of the cultural traits is most important for the relatively lower observed levels of fertility, while a substantial part of the relatively high fertility level in Bimaru is accounted for by cultural traits encouraging high fertility.

Table 7
Consumption, literacy and cultural traits:
Simulation results (using intertemporal means per region)

	East	South	Bimaru	North	West
Actual mean total fertility rate	3.20	3.27	4.58	3.64	3.16
Counterfactual increase in TFR (level)					
Using mean consumption	0.26	-0.03	-0.01	0.50	0.00
Using mean literacy	-0.07	0.09	-0.08	0.07	0.03
Using mean cultural traits	-0.07	0.60	-0.54	-0.24	0.54
National minus regional mean	0.06	0.89	-1.32	-0.37	0.11
Counterfactual increase in TFR (in %)					
Using mean consumption	7	-1	0	14	0
Using mean literacy	2	3	-2	2	1
Using mean cultural traits	-2	25	-12	-6	18

6 Conclusions

The results in this paper have confirmed some of the conventional wisdom regarding fertility in India—but have also undermined some of the larger claims made for the effect of investment in human capital alone. The results show that standard explanations for fertility and observed transitions matter in India as well as elsewhere. Economic growth (as proxied by increases in mean consumption) does matter for declines in fertility over time. Investment in human capital also contributes to lower fertility. However, it was noted that much of the interregional fertility differences and change cannot be accounted for by these variables: fixed differences between regions and regional trends are important as well. Also, the mechanism of the transmission of human capital and income increases onto lower fertility are clearly specific to regions and communities.

In this paper, I have argued that information on cultural traits can account for a substantial part of these unexplained differences. The key issue raised by this paper is whether socioeconomic variables of interest are mediated by cultural traits in their effect on fertility and the answer is a definite yes. To show this, I used a unique dataset on cultural traits collected by the Anthropological Survey of India which offers a richer explanation of differences in total fertility over time and across states.

It was found that both literacy and mean consumption lower fertility on their own, but when measures of cultural traits are introduced, their effect is dependent on these traits.

Traits such as female autonomy and patrilineal kinship (typically resulting in son-preference) affect fertility directly, but also through their interaction with consumption and literacy. For example, female literacy has a larger effect on fertility in areas with higher female autonomy. However, from this it is clear that higher rates of literacy or income alone are unlikely to have substantial effects on lowering fertility but are mediated by norms that do throw up barriers to swift change.

Much of this analysis is preliminary. Much more work is needed to disentangle the way the different socioeconomic effects interact with cultural contexts. For example, how does literacy affect fertility differently in different societies? Do cultural traits create externalities on society as a whole, affecting the extent to which literacy gains and income growth are shared?

Nevertheless, a simple simulation exercise showed that by unpacking part of the fixed and trend effects via the cultural traits, much more of the variation in fertility can be explained. In fact, for several regions, such as the south, west and Bimaru, cultural traits seem to account for much of the difference in fertility relative to the rest of the country. Also, it can be seen that in the north, the relative 'poor' cultural traits (assessing them thus solely with reference to their role in determining fertility declines) would have resulted in much higher fertility if it had not been for their relatively high levels of consumption.

Bibliography

Arokiasamy, P., R. H. Cassen, and K. McNay (2000). 'Demographers and Economists: The Fertility of Uneducated Women in India. A Preliminary Analysis'. London: London School of Economics. Mimeo.

Basu, A. (1992). *Culture, the Status of Women, and Demographic Behavior.* Oxford: Clarendon.

Basu, A. (1999). 'Fertility Decline and Increasing Gender Imbalance in India, Including a Possible Southern Turnaround'. *Development and Change*, 30 (2).

Becker, G., K. Murphy, and R. Tamura (1990). 'Human Capital, Fertility and Economic Growth'. *Journal of Political Economy*, 98.

Besley, T., and R. Burgess (2000). 'Land Reform, Poverty Reduction and Growth: Evidence from India'. *Quarterly Journal of Economics*, May.

Dasgupta, P. (2000). 'Population, Resources and the Environment'. Draft chapter for the *Handbook of Environmental and Resource Economics.* Cambridge. Mimeo.

Datt, G., and M. Ravallion (1999). 'When Is Growth Pro-Poor? Evidence rom the Diverse Experiences of India's States'. WB Working Paper No. 2263. Washington, DC: World Bank.

Diamond, J. (1997). *Guns, Germs and Steel: The Fates of Human Societies*. New York: Norton.

Drèze, J., and M. Murthi (1999). 'Fertility, Education and Development: Further Evidence from India'. STICERD Working Paper Series, No. 20. London: London School of Economics.

Dumont, Louis (1993). 'North India in Relation to South India', in P. Uberoi (ed.), *Family, Kinship and Marriage in India*. Delhi: Oxford University Press.

Dyson, T., and M. Moore (1983). 'On Kinship Structure, Female Autonomy, and Demographic Behavior in India'. *Population and Development Revie*w, 9: 35-60.

Edlund, L. (2000). 'Dowry to Daughters: Theory and Evidence'. Mimeo.

Edlund, L. (2000). 'Marriage Squeeze Interpretation of Dowry Inflation: A Comment'. *Journal of Political Economy,* forthcoming.

Fan, S., P. Hazell, and S. Thorat (1998). 'Government Spending, Growth and Poverty: An Analysis of Interlinkages in Rural India'. IFPRI Environment and Production Technology Division Discussion Paper No. 33.

Galor, O., and D. Weil (1996). 'The Gender Gap, Fertility, and Growth'. *American Economic Review*, 86 (3): 374-87.

Jha, R., B. Biswal, and U. D. Biswal (2001). 'An Empirical Analysis of the Impact of Public Expenditures on Education and Health on Poverty Status in India'. Working Paper No. 998. Kingston: Queen's Institute for Economic Research. Queen's University at Kingston, Canada.

Karve, I. (1965). *Kinship Organization in India.* Bombay: Asia Publishing House.

Landes, D. (1998). *The Wealth and Poverty of Nations*. London: Little Brown.

Madan, T. N. (1993). 'The Structural Implications of Marriage Alliance in North India: Wife-Givers and Wife-Takers among the Pandits of Kashmir', in P. Uberoi (ed.), *Family, Kinship and Marriage in India*. Delhi: Oxford University Press.

Mandelbaum, D. C. (1972). *Society in India*, volumes 1 and 2. Berkeley: University of California Press.

Miller, B. (1984). *The Endangered Sex: Neglect of Female Children in Rural India*. Delhi: Oxford University Press.

Myrdal, G. (1968). *Asian Drama.* New York: Pantheon.

Özler, B., G. Datt and M. Ravallion (1996). 'A Data Base on Poverty and Growth in India'. Washington, DC: World Bank, Policy Research Department. Mimeo.

Rao, V. (1993). 'The Rising Prices of Husbands: A Hedonic Analysis of Dowry Increases in Rural India'. *Journal of Political Economy*, 101: 666-777.

Rosenzweig, M. R., and O. Stark (1989). 'Consumption Smoothing, Migration and Marriage: Evidence from Rural India'. *Journal of Political Economy*.

Trautmann, T. (1993). 'Marriage Rules and Patterns of Marriage in the Dravidian Kinship Region, in P. Uberoi (ed.), *Family, Kinship and Marriage in India*. Delhi: Oxford University Press.

Uberoi, P. (ed.) (1993). *Family, Kinship and Marriage in India*. Delhi: Oxford University Press.

Weber, M. (1993). *The Protestant Ethic and the Spirit of Capitalism.* Translated by Talcott Parsons. London: Routledge.

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Camera-ready typescript prepared by Liisa Roponen at UNU/WIDER
Printed at UNU/WIDER, Helsinki

The views expressed in this publication are those of the author(s). Publication does not imply endorsement by the Institute or the United Nations University, nor by the programme/project sponsors, of any of the views expressed.

ISSN 1609-5774
ISBN 952-455-138-1 (printed publication)
ISBN 952-455-139-X (internet publication)