Cultural Norms, Social Interactions and the Fertility Transition in India

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Abstract

In this paper, measures of cultural traits are used to test the hypothesis that the variation in fertility levels in India, both over time and across regions, can be explained by cultural factors and social interactions. There are wide differences in both the level and the pace of fertility decline across different parts of India. The paper examines the arguments for why culturally determined rules and obligations might affect preferences and constraints and how they interact with economic incentives to regulate fertility outcomes. The variation in cultural norms across Indian communities is found to play a large part in explaining differences in outcomes across regions as well as determining the path of fertility decline over time. Under the assumption that households have adaptive expecations over community-level fertility, there is robust evidence of social interaction effects but little support for the existence of multiple equilibria.

1 Introduction

It is a fact often remarked upon that the organisation of a society profoundly affects economic performance and economic growth. Economic anthropologists and economic historians (Landes, 1996, Greif, 1996, Aoki, 2000) have

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observed that cultural variations account for differences in the economic, legal, social and political institutions across societies. It seems obvious that culture matters; what is more complex is identifying the ways in which it might affect development (Sen, 2000)[1]. While investigating the role of cultural factors is fraught, ignoring it altogether is no less so. For instance, as Foster and Rosenzweig (1999) point out, a common finding of cross-section studies investigating gender disparity in survival, is that where women work more, sex-ratios are more favourable - but with Sen (1990), they emphasise that this joint association could be due to a third, unmeasured factor, namely cultural differences.

The hunt for the missing factor has generated a great deal of interest in studying the theoretical implications of cultural variation and a number of empirical studies to assess its importance. Ethnic and tribal differences are blamed for conflict in some societies (Collier and Hoeffler, 1998) and for the ability to capture rents, to the exclusion of others (Collier and Garg, 1999). At the same time, membership of these groups also means that members have more trust in each other, can rely on effective enforcement mechanisms to transact business efficiently and share risk, which in turn is critical for economic development. Much of this analysis takes for granted the structure of cultural heterogeneity in a population.

Greif (1994) exploits the cultural factors that differentiated Muslim and Latin worlds in the late medieval period to examine the relationship between culture and the structure of institutions adopted in each society, and in turn their implications for economic development. The burgeoning literature on 'social capital', (variously defined, but comprehending cultural variation), tries to understand the impact of variation in such capital on a range of outcomes: political participation and public policy in India (Besley and Burgess, 2000), the mortality crisis in Russia (Kennedy et al., 1998), household incomes in Tanzania (Narayan and Pritchett, 1999) and economic growth (Knack and Keefer, 1997, Temple, 1998)[2]. Other studies have tried

[1] In this address to the World Bank, Sen discusses the effect of cultural influences on behaviour but cautions against easy acceptance of lofty theories, such as the alleged impact of Asian values to explain economic growth in east Asia. But he does encourage the investigation of the ways in which culture might regulate behaviour and condition institutions, but forswearing the broad brush for the detai:. "Here again it is important to emphasise the possibility of variation over time (and thus the role of learning), the contingent relevance of different behaviorial norms and the need to see these connections in terms of particular relations rather than as subjects of grand generalisation that identify some general cultural features as being quintessentially and generically 'the best"'

[2] More is likely to follow: the World Bank has commissioned a set of studies on 'Culture and Development', designed to examine areas in which culture affects social behaviour and

to capture the impact of neighbourhood effects and peer influences on intergenerational mobility (Borjas,1992) and on unemployment (Topa, 2000). What is generally agreed is that social interactions and cultural norms affect economic outcomes. The main question is how to capture these effects empirically (Brock and Durlauf, 2000).

It is useful to distinguish cultural norms from institutions before proceeding further. Aoki (2001) for example draws the parallel between the economy and a game and suggests that institutions can be conceptualised in three ways: as players of the game (Nelson (1994)), as rules of the game (North et al. (1990)) and as the equilibrium outcome (e.g. Greif (1994), Sugden (1996), etc.) Most recent approaches seem to follow the last approach, where an institution is a collectively shared, self-sustaining and endogenous system of beliefs. Cultural norms as used in this paper, however, will take the second of these three approaches and refers then to the exogenous rules, (as if) linked to a meta game. Cultural norms are usually stable and can be treated as fixed over time. Bisin and Verdier (2000) and Gintis (2000) discuss models of the transmission of culture and cultural stability. These models emphasise transmission of cultural preferences or traits through socialisation, in part by the family and in part by leading members of the community. However, as Gintis points out, there is evidence that cultural rules are persistent not only because they might be instrumental in achieving some ends but more plausibly because values are internalised, so that adopting other cultural traits is psychologically costly. These models do suggest that if socialisation is an important way to transmit and preserve cultural traits, a crucial role is that played by the non-market interaction of families with other social role models. My focus is more limited: I concentrate on how market interactions are mediated through the various cultural norms prevalent in society. There is the larger question of whether such mediation produces cultural change in its wake but this is not the focus of what follows.

What is common to the empirical studies of such issues is the need to capture and separate the role of individual incentives, of cultural norms and social interactions. The empirical analysis of social effects, (Manski, 1993, 2000, Moffitt, 2000, Brock and Durlauf, 2000), is often concerned with investigating the finding that those belonging to the same social group behave in a similar fashion. Manski (1993, 2000) distinguishes three possible effects that might explain such similar outcomes: endogenous (or social) in-

influences how both groups and individuals within them are able to respond to economic change.

teractions, where the choices made by one individual depend on the actions of others; contextual effects, where individual behaviour is affected by the exogenous characteristics of the group to which he belongs; and correlated effects, where agents behave in a similar way because they live in similar environments. The first two effects might properly be supposed to be the influence of the social group while the third is a misleading effect that gives rise to the appearance of being driven by the group (whether social, cultural or otherwise). Social interactions or endogenous social effects generate externalities while contextual effects do not. In Aoki's language and in the rest of the paper, institutions as equilibrium outcomes embody social interactions. The direct effects of cultural norms as used here are a form of contextual effects, although they condition the social interactions over time.

In this paper, I use a unique data set, on the cultural traits of communities across India, collected by The Anthropological Society of India, to examine the impact of cultural variation on fertility behaviour over time.

Why fertility? Perhaps the one area where cultural variation has been thrust into the foreground is in the study of fertility change. Reproductive behaviour is above all a social matter, influenced by both the immediate family and the cultural norms of the community in which they live. 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 have noted the variation in marriage and kinship systems[3] and have remarked on its relationship to decision making within households and 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. Mason (1997), in an address to the Population Society of America, discusses six different explanations for fertility transitions, adding that no single explanation accounts for the diversity of experience across countries. Standard economic theory plays a part in most of these explanations but the variation in experiences across countries (Coale and Watkins for Western Europe (1986), Bongaarts and Watkins (1996) for Latin America and Africa) suggests that standard explanations need to be complemented in some fashion to make sense of the evidence. Cultural variation is a natural candidate and has often been mentioned in this regard. The various discussions of fertility transitions suggest that while there is general agreement that the

[3]Basu (1988,1992) and Das Gupta (1998) 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.

economic costs and benefits of children play a key role, they cannot explain why fertility transitions have been initiated at different levels of development. Furthermore, the relationship between measures of development and fertility seems to be non-linear. Bongaarts and Watkins (1996) draw attention to the fact that historical evidence for Europe suggests that areas with common culture and language experienced fertility declines independently of the level of development[4]. This in turn lead Durlauf and Walker (1999) to speculate that a good candidate for supplementing standard economic explanations are social interactions, defined as endogenous social effects, where choices made by one individual depend on actions taken by others. Dasgupta (1993, 2000) provides the clearest account thus far about how such interdependence might generate multiple equilibria in reproductive outcomes and maintain fertility at different levels in different communities The key notion here is that there is a relationship between the assumption that the decisions of individuals are an increasing function of the choices made by others in their community or social group and the existence of such equilibria . The role of cultural norms is to coordinate behaviour in choosing a particular equilibrium level of fertility. Dasgupta argues that this selection of the equilibrium might occur either through the expectations about other people's actions in the same social group (the sub-game perfect equilibria in a repeated game between those in the same group) or through evolutionary selection. The second notion is that these equilibria can be ranked in terms of welfare and this in turn opens up the issue of how a society might be induced to move from one equilibrium to another. A change in individual expectations about group behaviour or a change in the reference group are both candidates for a shift from one equilibrium to another, inducing a fertility transition. Note that social interactions cannot on their own generate a fertility transition but they do allow small exogenous changes in individual behaviour to have large and rapid effects and in some circumstances, generate the different equilibria. Such models then generate threshold effects. Durlauf and Walker suggest that it must be economic conditions that drive the process, magnifying the effects of social interactions. For instance, with social multiplier effects (Cooper and John, 1988), economic conditions need only change slightly to affect individual expectations about aggregate behaviour. The great appeal of this framework is that fertility transitions

[4] Arokiasamy, Casson and McNay (1999) 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.

can occur within this context and can occur at different times and different levels of development. For instance, where norms of female seclusion are strong, it might require high levels of incomes to induce even a few to change their behaviour and adopt a higher level of female participation in school and work and a lower level of fertility. In this paper, measures of cultural traits(norms) in India are used to test the hypothesis that the variation in fertility levels in India, both over time and across regions can be explained by cultural factors and social interactions.

The next section lays out the arguments for why culturally-defined notions of identity and family life affect behaviour and how culturally-determined rules and social obligations affect constraints - and how these in turn interact with economic incentives to regulate fertility behaviour. The implications of variations in cultural norms are explored further within the context of a formal model of household behaviour, abstracting from social interactions to concentrate on the contextual effects of cultural norms. This is followed in Section 3 by the discussion of the empirical model which focuses on the vexing question of whether and how contextual effects and correlated effects can be distinguished empirically from endogenous social effects or social interactions. Section 4 offers a discussion of the data used here, while Section 5 presents a summary of the results. Section 6 concludes the paper.

2 Why might cultural norms affect fertility?

There is an enormous literature that tries to explain what might determine fertility behaviour. The standard references (Birdsall, 1988, Becker, Schultz, 1997) focus on the roles of household income, schooling and labour market opportunities for men and women, returns to human capital investment in children, missing markets for insurance, risk of high infant mortality and the influence of culture and religion in shaping the expected patterns of behaviour both about fertility practices and about the roles that men and women play at home and at work. Furthermore, cultural (and religious) norms could also affect returns to investment in girls compared to boys or could affect the ability of women to use their education in particular ways (for instance, by proscriptions on particular kinds of work). The other determinants of household fertility might likewise be affected as well. Before turning to an explicit examination of why cultural norms might matter, it is useful to describe how the other variable mentioned affect fertility outcomes.

If children provide utility to their parents (are normal 'goods'), wealthier

households would tend to have more children. However, as Becker and Lewis (1973), Willis (1973) explain, if the quality of children matters as well (where quality is shorthand for higher investment in children), then wealthier parents might substitute away from large numbers of children to fewer but better educated and healthier children, thus reducing fertility.

Increases in education of the parents, particularly the mother might reduce fertility. If increased education is more likely to attract women to paid work, it reduces fertility if the opportunity cost of time relative to the (potentially positive) income effect increases. Increased schooling for women might also raise productivity within the household (say, by allowing parents to use health facilities or schooling facilities more efficiently) and lower the costs of investment in children and thus allowing parents to have fewer but better educated and healthier children. It might increase the power of women within the household and allow women to exert more control over their fertility decisions and if the costs of children fall overwhelmingly on women as they usually do, this would in turn lower fertility. Given the number of channels by which increases in female education might potentially lower fertility, it is not surprising (and quite heartening) that most studies find that female education is the dominant factor driving fertility declines. However, most studies cannot distinguish the reasons why it matters and why it has such different effects in different contexts (Behrman et al, 1999).

In the absence of well-functioning insurance markets, children may be a source of old-age support and fertility might be relatively higher. In predominantly agricultural societies, where child labour might be productive relative to the costs of raising children, this also provides an incentive to have more children. All of these effects are compounded where health conditions are poor and the risk of losing children at an early age is high. High infant mortality rates and low life expectancies also mean that the returns to investing in the quality of children are low.

Studies of fertility change also suggest that religious beliefs and cultural norms might have strong associations with fertility, particularly by shaping the way. the way households respond to economic incentives. However, most studies control for this by using fixed effects (or dummy variables for religion) but it must be clear even from this basic summary that the role of cultural norms is not likely to be simple. There is a substantial literature on how cultural norms affect outcomes and this is the subject of what follows.

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 mecha-

nisms of social control. Cultural norms as 'rules of the game', can be thought of as a subset of such traits that govern civic interaction amongst members of groups, defined in turn by cultural traits. Perhaps it is as well to assert that there is no intention here to suggest a causal link between entire aspects of social organisation and socio-economic outcomes but less controversially, to explore those aspects of cultural organisation 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 (1915) generated a great deal of controversy with the suggestion that Hindu culture and caste organisation have had a dampening effect on economic development [5]. Contemporary accounts such as Landes (1996) 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 (and geographical) 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 set 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.

Fertility is clearly an object of household regulation and is responsive to the costs and incentives faced by households. More important, since the costs of pregnancy and child-rearing are borne by the mother[6], her ability to respond to incentives and regulate her fertility matter. 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

[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 motivation to work hard. 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.

[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.

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 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 . 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 and 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 her participation in society at large, are lower in the south.

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, Madan and Trauttmann 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. As will be elaborated below, it can be argued that variations in marriage systems might mediate the impact of economic variables on the incentives for families to invest in their children.

Apart from differences in female autonomy, fertility is also likely to be affected by the operation of markets. In poor societies where capital markets are non-existent children offer the only source of support in old-age. In societies where returns to men are higher than returns to women or female participation in paid work is discouraged, this failure of capital markets translates to a dependence on sons as a source of old-age security. 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. There are also 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. (Sons can be substituted for, by brothers or close male relatives, but nevertheless, they are seen as an important symbol in the transition to the afterlife.)

The preference for sons arising out of the need for old-age security or for normative reasons can be modelled 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.

One measure of son preference is patrilocal exogamy which is an important feature of the social organisation of India. This refers to the migration of women from their origin villages to that of their husband. The 1981 Census indicates that almost 69% of women over 15 had left their origin village, compared to less than 18% of men. In a series of papers (1999, 2000), Edlund 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 makes it possible to enforce the claim on inheritance. Also men may be less mobile because of farm-specific investments. Women, however, have a much shorter period of fecundity and cannot wait to claim their inheritance and this in turn might have encouraged the payment of dowries so that it largely substitutes for inheritance. Note that in this event dowries remain the property of the bride and this is a very particular use of the term.

The payment of dowries as a form of pre-mortem inheritance might also mean that the bride forfeits her right to return home (the practice of 'Kanyadan', where the bride is given away as a gift to her future husband symbolises precisely this), whereas where communities pay a bride price rather than a dowry, the bride can claim the right to return home. (Note that this custom also could also serve to reduce the bargaining power of women within the household to the extent that their options of leaving the household are much reduced). In summary, patrilocal residence may be driven by inheritance customs that support the old-age security motive. The view of dowry as inheritance is also consistent with an argument for son preference, namely that sons act as old-age insurance. However, son preference and the old-age insurance motive are consistent with patrilocal residence independent of whether dowries are paid while neo-local residence allows both sons and daughters to offer care in sickness and old-age. The payment of dowries and their possible role in affecting fertility is therefore

treated separately and discussed below. 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 investment in them. Apart from the arguments for dowries sketched out above, an alternative interpretation 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 are 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[7] .

Another cultural trait cited as being of some importance is the custom of marriage to near relatives. In the South, a preferred marriage type amongst some communities is that of cross-cousin marriages, uncle-niece marriages and similar alliances. The arguments of Karve 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. 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.

The next section assumes that contextual effects of cultural norms matter and focuses on deriving an empirical formulation to test whether they do and further, whether they can be distinguished from endogenous effects, so that individual behaviour is affected by community behaviour as well.

3 The Empirical Model

The basic structure of models with social interactions have been laid out by Brock and Durlauf (1999, 2000) in series of papers. To illustrate its application to fertility behaviour, Durlauf and Walker(1999) employ a model by

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

Cooper and John (1988) and the exposition below follows that of Durlauf and Walker (1999). The key idea is that there is a relationship between potential multiple equilibria and the dependence of individual behaviour on group behaviour. Suppose, that the payoff functions, V, of every household in the community is identical and increasing in own fertility (number of desired children) but exhibits negative spillovers (is decreasing) in the average number of children desired in the community to which the household belongs. Individual fertility, f_i,is also assumed to lie in the bounded interval $[0, \overline{f}]$:

$$MaxV(f_i, \overline{f_{-i}}) \tag{1}$$

where $\overline{f_{-i}}$ denotes the average choice of everyone excepting household i, in the community. The first order condition for maximisation is that:

$$\frac{\partial V(f_i, \overline{f}_{-i})}{\partial f_i} \; = \; 0 \tag{2}$$

Furthermore, a symmetric Nash equilibrium will exist if there is a level of fertility, $f^* \in \; [0, \overline{f}]$ such that

$$\frac{\partial V(f^*, f^*)}{\partial f_i} \; = \; 0 \tag{3}$$

This equilibrium can be inefficient if individual households decisions about fertility are uncoordinated, so that there is a difference between private and social utilities. Denote the common social level of fertility by f^{**}. This will be achieved if:

$$\frac{\partial V(f^{**}, f^{**})}{\partial f_i} \; + \; \frac{\partial V(f^{**}, f^{**})}{\partial \overline{f}_{-i}} \; = \; 0 \tag{4}$$

If there are negative spillovers from the fertility behaviour of other households, it must be the case that at the social optimum, $\frac{\partial V(f^{**}, f^{**})}{\partial \overline{f}_{-i}}$, must be negative and $\frac{\partial V(f^{**}, f^{**})}{\partial f_i}$, must be positive. Given that V is concave, this must in turn mean that the private optimum, f^*, is higher than f^{**}, which is that level of fertility chosen by all households if households were able to coordinate fertility behaviour. It is also plausible that the utility functions exhibit complementarities so that $\frac{\partial^2 V(.,.)}{\partial f_i \; \partial \overline{f}_{-i}} < 0$, which as Durlauf and

Walker demonstrate is a necessary condition for the existence of multiple non cooperative Nash equilibria. This amounts to the condition that the optimal fertility response function of the household is an increasing function of the average fertility level in the community, which as Dasgupta (1993,2000) points out is the distinctive feature of conformist behaviour. In these circumstances, one way in which an equilibrium might be selected is through adaptive expectations for instance, and an equilibrium thus selected must be self-consistent in that the beliefs of each household are sustained by the actual behaviour of households in the community.

This framework is used to set up an empirical model. Consider a population of households, indexed by i, each belonging to a community, indexed by j. In the most general version, each household wishes to maximise its payoff, defined over a vector of individual -specific characteristics, X_{ij}, its desired fertility level, f_i, its beliefs about the average fertility behaviour of other households in the community, m_j^e. The use of expectations about behaviour is to capture the notion that social interactions in large groups (such as communities defined by ethnicity) are mediated by beliefs about other people's behaviour, rather than actual behaviour, which is unlikely to be directly observable.

$$MaxV(f_i, X_{ij}, m_j^e) \tag{5}$$

The optimisation of this function subject to constraints posed by full income gives rise to an optimal response function (demand) for desired fertility as a function of beliefs and household characteristics, prices (of consumption, human capital etc.) and incomes y_{ij}. The entire vector of prices, incomes and own characteristics that might influence fertility behaviour can be partitioned into a vector of individual-specific variables, X_{ij} and community-level aggregates, Z_j that might regulate household fertility. Furthermore, the effect of household-specific variables is assumed to be mediated by cultural norms, C_j, and therefore, correctly written as a function of these norms. This is suppressed in the notation below, but in what follows, it is assumed that the vector X, includes both household level variables and their interaction with cultural norms.

$$f_i \;=\; F(X_i, Z_j, \; m_j^e) \tag{6}$$

In the empirical analysis, this is approximated by a linear function of the variables to be specified in detail below. However, while a linear approximation seems the most obvious first approach, it is also the least likely

to yield identification of the different social effects as Manski (1993,2000), Moffitt(2001) and Brock and Durlauf (2000) make clear. This problem is made apparent in the specification below.

Suppose the linear approximation takes the form:

$$f_i \;=\; \alpha \;+\; \beta m_j^e \;+\; \gamma' X_i \;+\; \delta' Z_j \;+\; u_{i.} \tag{7}$$

Here, β, captures the endogenous effects of social interactions, while γ and δ, capture exogenous (contextual and correlated) effects[8].

It is assumed that households are drawn randomly from the set of communities and that within each community, all interactions are global and symmetric, so that the single parameter, β, indexes the social interactions effect. The subjective expectation of the i^{th} household of the average choice in the community must be the mathematical expectation of the average choice in the community, denoted by m_j, in order for expectations to be self-consistent. The unique self-consistent solution for this linear model is:

$$m_j \;=\; \frac{\alpha + \gamma' E(X_i|Z_j) + \delta' Z_j}{1-\beta} \tag{8}$$

The reduced form for household fertility is thus:

$$f_i \;= \frac{\alpha}{1-\beta} + \;\gamma' X_i + \frac{\beta}{1-\beta}\delta' Z_j + \frac{\beta}{1-\beta}\gamma' E(X_i|Z_j) + u_{i.} \tag{9}$$

Note that if there is a (sub)set of (aggregate) household-specific variables X, not contained in Z, all the effects can be identified. Manski (1993) considers the case where $E(X_i|Z_j)$ is linearly dependent on Z and points out that in this case even the existence of social effects cannot be identified. The difficulties are magnified in the case considered in this paper, where there is only information at the aggregate level. This in turn implies the impossibility of estimating an equation such as (15) but only allows the estimation of the equivalent of the 'social equilibrium' equation (14), with average fertility level as a regressand and X_j (the community average of the household-specific variables), used to identify $E(X_i|Z_j)$, i.e. assuming that

[8] Manski (1993) refers to contextual effects as the variation in the outcome induced by group averages of exogenous variables. He assumes that all individual-specific variables also affect outcomes through their group aggregates. However, there is nothing in the literature on fertility behaviour that suggests that the demand for children should be affected, not merely by own incentives but by the aggregate or community-level values of these incentives as well. The terminology still applies to the extent that there are group level averages (say health spending in the community) that affect the individual demand for children.

$E(X_i|\ Z_j) = X_j$. In this general case, even with exclusion restrictions on community aggregates Z, all that can be said is that social effects exist, but endogenous effects cannot be identified. Note also that with a linear approximation to fertility behaviour, the existence of multiple equilibria are ruled out - there is an unique equilibrium. However, it is useful to begin with this approximation before exploring more complicated functions. The first specification that is to be tested is given below and will be referred to as *Specification (A)*:

$$f_j \ = \frac{\alpha}{1-\beta} + \ \frac{1}{1-\beta}\gamma' X_j + \frac{1}{1-\beta}\delta' Z_j + + u_{j.} \tag{10}$$

As is apparent from the above, even if the vector Z, contained attributes that are not part of the set of household-level variables, X, given the fact that the data are only available at the aggregate level j, β remains unidentified. However, as long as the coefficients on both Z and X are significantly different from zero, it can be concluded that social effects matter.

The next specification examines the possibility of improving on this dismal outcome by using information over time. It turns out that the disadvantage of working with aggregate information is mitigated here if information is also available over time. This allows expectations formation to be explicitly modelled by using past information available to members of the community. A reasonable assumption in this context might be that households are affected by lagged expected average behaviour. A plausible reason for this assumption is that within households, women's fertility decisions are often influenced by those of older sister-in-laws or older sisters and without whose support such decisions might be difficult.

$$f_{i,t} \ = \ \alpha \ + \ \beta m^e_{j,t-1} \ + \ \gamma' X_{it} \ + \ \delta' Z_{jt} \ + \ u_{i,t.} \tag{11}$$

Once again, imposing consistency of expectations, the social equilibrium equation is:

$$m_{j,t} \ = \ \alpha \ + \ \beta m_{j,t-1} \ + \ \gamma' E(X_{it}\ |Z_{jt}) \ + \ \delta' Z_{jt} \tag{12}$$

$$m_{j,t} \ = \ \frac{\alpha}{1-\beta L} + \ \frac{\gamma' E(X_{it}\ |Z_{jt})}{1-\beta L} \ + \ \frac{\delta' Z_{jt}}{1-\beta L}, \ \ |\beta| \ < \ 1 \tag{13}$$

$$f_{i,t} \ = \ \frac{\alpha}{1-\beta} \ + \ \gamma' X_{it} \ + \ \frac{\gamma' E(X_{it}\ |Z_{jt})}{1-\beta L} \ + \ \frac{\beta}{1-\beta L}\delta' Z_{jt} \ + \ u_{i,t.} \tag{14}$$

The equation for aggregate, community-level fertility can then be written as, (again assuming that $E(X_i|\ Z_j) = X_j$ and exploiting the fact that $\frac{1}{1-\beta L}(X_{jt}) = X_{jt} + \beta^2\gamma X_{j,t-1}$):

$$f_{j,t} \ = \ \frac{\alpha}{1-\beta} \ + \ \gamma' X_{jt} \ + \ \frac{\beta^2\gamma' X_{it-1}}{1-\beta L} \ + \delta' Z_{jt} \ + \ \frac{\beta^2\delta' Z_{jt-1}}{1-\beta L} + \ u_{j,t.} \quad (15)$$

Note that here, even if the set of household-level variables, X is linearly dependent on Z, the social interactions effect β, is identified. The specification above is difficult to estimate given a limited set of observations over time and a large set of potential variables in X. The alternative strategy pursued here, given the limited data, is to use lagged fertility in period $(t-1)$ as a proxy for expected average behaviour, to obtain estimates of β. This suggests the following specification as a testable alternative to (21) and is referred to as *Specification B*:

$$f_{j,t} \ = \ \alpha \ + \ \beta f_{j,t-1} \ + \ \gamma' X_{jt} \ + \ \delta' Z_{jt} \ + \ u_{j,t.} \quad (16)$$

Thus far, it has been assumed that expectations are linear in the variables of interest. This is not essential and in fact a source of potential misspecification. If multiple equilibria do exist, then the assumption of linearity is incorrect. In what follows, non-linearity in fertility is assumed to be driven by beliefs about fertility and this is approximated by a quadratic function of past fertility and is referred to as *Specification C*:

$$f_{j,t} \ = \ \alpha \ + \ \beta_1 f_{j,t-1} \ + \beta_2 f_{j,t-1}^2 + \ \gamma' X_{jt} \ + \ \delta' Z_{jt} \ + \ u_{j,t.} \quad (17)$$

The empirical specification has been silent on the role of culture. The role of culture, in the first instance is visualised as affecting household incentives and hence, cultural norms are interacted with household-level variables, to provide an expanded set of exogenous variables. All of the specifications considered above then include the expanded set of exogenous covariates, with household-level aggregates multiplied by norms. However, it is plausible that cultural norms affect not just economic incentives but also the manner in which households within communities form expectations over beliefs about behaviour. If Specification B (and perhaps C) prove sensible, the following specification D, is to be estimated to test whether social interaction effects differ by community.

$$f_{j,t} \ = \ \alpha \ + \ \beta(C_j)\ f_{j,t-1} \ + \ \gamma' X_{jt} \ + \ \delta' Z_{jt} \ + \ u_{j,t.} \quad (18)$$

To summarise, this section has laid out four possible specifications that will be tested. The first, A, assumes that expectations about behaviour are

contemporaneous and self-consistent. In this specification, the existence of endogenous effects or social interaction effects cannot be identified. The next couple of specifications, (B and C) assume that expectations about behaviour are driven by lagged expected average behaviour which seems a reasonable assumption in the context of fertility. The final specification, D, examines whether the social interactions effect differs across communities. The next section discusses the data available to test these specifications.

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 on 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 percentage of villages with electricity) 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. Data on literacy was obtained from the Census 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 sections 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. Table 2 provides a summary of these variables across state groups.

1.The measures used to capture patrilineal kinship or son-preference are:

i) whether communities practise patrilocal exogamy in marriage.

ii) whether marriage rules are based on gotra exogamy (which in turn reinforces patrilocal exogamy)

iii) whether the marriage customs include that of 'kanyadan'

iv) whether inheritance is to the sons, to the exclusion of daughters.

2. Female bargaining power is obtained as an average over the following traits:

i) whether they have control over family expenditure.

ii) whether they contribute to family income (this is directly related to both female seclusion and to participation in paid work)

iii) whether divorce is socially sanctioned (even if legally allowed, social sanctions often affect the ability of women to divorce).

3. Female seclusion is measured by the percentage of communities in each state that report that women traditionally confine themselves to house-work (can be seen as a combination of gender differences in work and female seclusion).

4. Dowry payment are measured by the percentage of communities that practice the custom of payment of dowries exclusively (and so do not obtain a bride price or practice a combination of the two customs).

5.Affinal marriages include all possible types of marriages between blood relatives that are permitted in the communities surveyed. These include cross-cousin, uncle-neice marriages and so on.

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[9]. 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.

A key issue with the data is whether the traits measured change substantially over time. This study assumes that they can be regarded as fixed: however, this can be checked since the survey also posed questions for some traits to enquire if there had been any change in practice over the previous two decades[10]. A summary is provided for some of the traits used here in Table 3. It is clear that all of the traits used in this study can (without much violence to the assumption) be treated as fixed and unchanging. Apart from the data on age at first marriage', which has been rising over time across all regions, and to some extent, an increase in the custom of paying dowries, the rules of residence, inheritance and marriage have changed little in this period. As for 'age at first marriage', the rise is hardly surprising since it is clearly determined by other variables (both economic and cultural), particularly fertility and education and is therefore not part of the set of

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

[10] 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.

exogenous variables used here.

5 The econometric specification and results

The discussion in section 2 suggested that the main correlates of fertility at the household level are income (wealth), education (particularly of the mother), the absence of functioning insurance markets and poor health conditions, apart from cultural norms. This study of fertility across India uses data aggregated to the level of the state (a regional classification based on historical and linguistic boundaries) and so these variables in turn enter the regressions as state-level aggregates. The key variables are: mean consumption per capita (as a proxy for permanent income), average literacy of women[11], the share of the population living in urban areas (as a proxy for market development) and the infant mortality rate. Also included is the total amount of spending on health and education by the state government, which controls for state-level endowments of education and health[12]. Using the notation employed in Section 4, the household-level variables aggregated to the state-level (consumption, infant mortality, education and share of population in urban areas) are the components of X_j, while education and health spending (which is not aggregated from household level data and represents state-level endowments) is Z_j. In the final specification of the regressions, the household-level variables (X_j), are interacted with cultural norms to capture the impact of cultural norms on household incentives as suggested by the discussion in section 2.

[11] Male literacy is highly collinear with female literacy at the state-level. There are a number of reasons why it might be so at the level of the household as well and a plausible reason why is the practice of assortative mating. However, it is impossible to separate the effects of male from female literacy on outcomes in the aggregate. It must be stressed therefore that the impact of female literacy is much the same of average literacy and is no argument for the primacy of female over male education, as far as these results are concerned. The gender gap in education (measured as a percantage of female education for instance) was also highly collinear with literacy.

[12] It would, of course, be far better to have disaggregated information son, for instance, the number of health centres, doctors and nurses per capita and average distance to health centres and schools and so on. Unfortunately, such data were unavailable from the usual sources. Health and education spending were aggregated because they are highly collinear and move in a similar way within states. It should be noted that social spending in these sectors is primarily the responsibility of state governments rather than the Central government and hence a useful measure of State-level provision. However, it is an imperfect measure of the quality of education and health provision with the bulk of expenditure being on salaries. Imperfect as it might be, it is however the only information available consistently over this period across states.

Apart from the specification of the variables to be included in this regression, the main concern in such regressions is the potential endogeneity of education, consumption and infant mortality. The theory suggests that investment in education is determined together with decisions about the number of children. A second difficulty is that data on education (whether female, male or average literacy) are only available from the Census, carried out in 1961, 1971, 1981 and 1991. Consumption pre capita might also be affected by actual fertility outcomes and data on consumption are also unavailable for a number of years. The dangers of potential endogeneity in infant mortality are less obvious: one of the main reasons advanced in the literature is the impact of high fertility on birth spacing and hence infant mortality.

The route taken here to deal with these problems is as follows. First, using the sample for three census years ('71, '81, '91), I estimate a panel generalised least squares regression allowing for a general pattern of correlation across years and within states, using as regressors, X_j, Z_j and the interaction of X_j with controls for state groups. This regression is then used to test whether education is endogenous (using a standard Durbin-Hausman-Wu Test): it suggests that education might be (at a p-value of 16%) but no evidence to suggest that either consumption or infant mortality[13] cause deviations from consistency[14]. Based on this initial exploration of the data, I construct a prediction model for literacy, using as instruments, past literacy (1951 and 1961), the gini coefficient, the head count index of poverty, the annual average rainfall, percentage of villages electrified and percentage of land under irrigation, in addition to the set X_j. A test of validity of instruments confirmed that the null hypothesis that they were valid

[13] In addition to the set of exogenous variables, additional instruments were past levels of infant mortality and past levels of consumption.

[14] An alternative route is to use a full set of interpolated data for all the variables and test for a more restricted pattern of endogeneity (Bhargava, 1991 and Bhargava et al. 2001). The point here is that the interpolated variables cannot be treated as fully endogenous variables in the system since the time observations are sytematically related; a pattern particularly pronounced for the Census data on education. The alternative assumption is to assume that the endogenous variable can be decomposed into a component composed of a state-level fixed effect interacted with a time effect and an exogenous component, which is uncorrelated with the state-level effects. The state-level effects are randomly distributed with finite variance and this component is of course correleted with the errors. This in turn means that deviations of education (for instance) from its time mean can be used as additional instruments. So a test for exogeneity of education amounts to testing whether its time means are uncorrelated with state-level random effects. To this end, the specifications above were also estimated as random effects models and the tests again confirm that consumption and infant mortality can be treated as exogenous.

could not be rejected [15]. Finally, using the available data and the prediction model, education values were imputed for the missing years. Next, the panel GLS regression was re-run on the entire data set (excluding missing values for consumption and infant mortality), and tests for endogeneity of infant mortality and consumption repeated here. Again, they confirmed that estimates were unaffected by instrumentation, allowing them to be treated as exogenous in the specifications that follow.

Table 4 presents estimates of a panel generalised least squares regression that allows for panel specific correlation structures and heteroscedasticity across them. The regression uses interactions of the household level aggregates X_j with the five different possible regional state groups in India. The notion here is to explore whether there is any evidence at all for variation in effects across regions (and therefore, possibly, for variation within them, by state and community) or whether the coefficients can be pooled. If this exploratory regression suggests no evidence for heterogeneity in the effects of say literacy across states, then it is difficult to make a case for the varying impact of cultural norms across states, mediated by household incentives. Of course, it reveals little about what form such heterogeneity ought to take but it is useful in proceeding to the next stage. The regression coefficients here ought not to be taken as final estimates of such heterogeneity but as suggestive of the broad pattern of correlation between the fertility rate and the independent variables.

Table 4 suggests that there is heterogeneity in the impact of all the household-level variables concerned. None of the coefficients pool across state groups suggesting an underlying pattern of heterogeneity in the impact of these variables.

Table 5 provides random effects estimates of specification A, with the introduction of the main cultural norms used here: patrilineal kinship, female seclusion (whether women are traditionally confined to work at home), female bargaining power, whether dowry payments are the norm and the incidence of affinal marriages (cross-cousin marriages, uncle-neice marriages and so on). All of these traits are measured as the percentage of communities in the state that follow the custom. The cultural norms are interacted with the vector of the household-level aggregates, X_j, and together with so-

[15] It might be argued that some of these variables (for instance, percentage of land under irrigation) ought to affect fertility behaviour directly. The test for validity of instruments tests this jointly with the hypothesis that the original specification is correct. However, it is likely that at the household level, such a variable might not be a valid instrument and it is the aggregated nature of the regression that allows it to be treated as if it were uncorrelated with the error in the uninstrumented regression.

cial spending on education and health, this constitutes the set of regressors to explain fertility behaviour over time and across regions. All that can be gleaned from these estimates is that social effects exist: both household-level aggregates and the community-level aggregates influence outcomes[16].

What do these (contextual) social effects imply about behaviour across regions of India? Table 6 uses the last set of estimates in Table 5, to provide estimates of elasticity of fertility with respect to the household-level aggregates, over this period. The impact of higher consumption translates into reduced fertility most effectively in the southern states, closely followed by the West and North. The impact of reductions in infant mortality (or better health conditions which it must proxy), obtains the highest impact in the West and South - and performs least well in the North, followed by the Bimaru states. The same pattern obtains for the impact of literacy: clearly, the effect of the differences in traits in the North and Bimaru relative to other regions explains a good part of the differences in outcomes across regions, particularly in the way literacy and health regulate fertility outcomes.

Table 7 provides both random effects (uninstrumented) and GMM estimates using the Arrellano Bond estimator of Equation 22 or Specification B. This is the same specification as before, but includes the lagged value of fertility rate as a proxy for expectations about fertility behaviour[17]. The estimates suggest strongly that if the assumption about expectations is admissable, then there is strong evidence for a social interactions effect. This is given by the coefficient on the lagged value of the total fertility rate which ranges from .22 (un-instrumented) to .18 (instrumented). This is perhaps the most striking result here: the strength of the coefficient demonstrates that fertility behaviour is not merely affected by the exogenous characteristics of the community to which the household belongs but directly by the actions of others in the community. The aggregate nature of this exercise does not permit one to go beyond stating that there is evidence for social interaction. How this interaction might arise requires (and deserves) exploration with household-level data - but, one possibility is that a woman's use

[16] Note that the estimated standard errors have to be corrected for the fact that literacy is predicted from a previous regression- hence the standard errors here are higher than would be obtained without the correction.

[17] Equation 22, where the lagged values of all the household level aggregates and lagged Z_j, are used with the assumption that households are affected by lagged expected average behaviour, was also estimated. However, the estimates are unreliable since the number of parameters doubles from 30 to 60, in a data set with 330 observations quite aprt from serious collinearity problems due to the presence of lagged variables.

of contraceptives might depend on the prevalence of its use by her relatives, neighbours or others in her community. The importance of this effect lies in the fact that in the presence of social interactions, a household or woman's decision to reduce her fertility will increase the chance of others doing so as well, thus leading to a change in excess of that predicted directly by increases in education, better health conditions and higher incomes.

Table 8 presents estimates of Specification C (Equation 23), where the square of lagged fertility is introduced in an attempt to capture non-linearities in the optimal response function. As argued earlier there is no reason to suppose that this response function is linear. Again, there is strong support for the argument that the function is increasing and non-linear: if the estimates are taken at face value, they suggest that the system might converge to one of two possible equilibria. The coefficient on lagged fertility remains at .20 (instrumented) while the square of lagged fertility is estimated at -.03, and is significant at 10%. (Introducing any further polynomial terms does not offer any improvement over these estimates- the coefficient on a cubic term is insignificant and weak). With the assumption that fertility behaviour is driven by adaptive expectations about average fertility (see Dasgupta (2000) for a similar assumption about fertility behaviour), the results suggest that evidence for a social interaction effect remains strong, and provides weak support for multiple equilibria[18].

Table 9 provides estimates of Specification D, which allows the social interaction effect to vary by cultural norms. This specification appears to be extremely plausible: the coefficients on the lag and its interactions with female bargaining power and female seclusion are significant, and while some of the contextual effects are affected, the regression retains explanatory power. The random effects counterpart to this regression yields similar estimates. This is clearly evidence that supports the notion that cultural norms do mediate economic incentives but also affect the size of social interactions across regions. Table 10 obtains the average social interaction effect by region, given the regional distribution of cultural traits. It suggests that social interaction effects are large and about the same everywhere except for the North (and West), where the social interaction effect is larger[19]. This in turn implies that private incentives matter relatively less in the North and

[18] The two roots of this equation should be taken as illustrating the possibility of multiple equilibria rather than actual values the system might tend towards, since the exact form of the non-linearity is difficult to specify with aggregate data of the kind used here.

[19] The table reports population -weighted averages by region. A breakdown by state reveals that the social interaction effect is lowest in Kerala and the highest in Haryana and the Punjab.

hence changes in economic conditions are likely to matter less also; imitative practices constrain the fall in fertility. Equally, however, it suggests that the pace of decline, once it does begin, is likely to be higher in the North relative to the South and other regions.

6 Conclusions

Fertility behaviour is a private matter that is strongly responsive to private incentives and to public provision. However, this cannot alone explain the differences in fertility across regions and over time. Models of social interactions can plausibly account for some of the difference for they focus on the aggregate consequences of individual decisions. Society matters.

The focus here has been on examining the question for India over the period 1970-1993. The hypothesis put forward here was that individual incentives are mediated through cultural norms about marriage and the family as well as by social interaction effects of others in the same community. The results strongly support both these claims: with the assumption of adaptive expectations over fertility behaviour, social interaction effects appear to matter and are different between regions. Clearly, cultural norms affect both economic incentives and the manner in which social behaviour affects individual actions.

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 alone. The mechanism of the transmission of human capital and income increases on to lower fertility are clearly specific to regions and communities.

Finally, there is robust evidence of endogenous social effects or social interactions: fertility behaviour is not merely affected by the exogenous characteristics of the community to which the household belongs but is directly affected by the actions of other households in the community. This in turn means that the total change in individual incentives in the population, mediated by social interactions, leads to an aggregate change that is larger than that generated solely by the change at the individual level. Put sim-

ply, there is a cumulative social effect, beyond the direct effect of changes in private behaviour.

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