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WOMEN, WIDOWHOOD AND FERTILITY:
A THEORETICAL AND EMPIRICAL STUDY OF RURAL INDIA*

by

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Although some descriptive studies have revealed certain surprising differences between husbands and wives with respect to the desired number of children,[1] and others have noted that the incentives for having children might vary according to the structure of the household,[2] most theoretical and empirical studies of fertility behavior have failed to distinguish between the husband, the wife and the household.

Based on evidence from rural areas of developing countries suggesting that wives are the primary decision-makers as far as fertility behavior is concerned, this paper develops a simple model of fertility behavior which gives the wife-mother a semi-autonomous role in determining the number of surviving children, though conditional on age-at-marriage, education, household structure and location. The model is then tested with cross-section data from rural India. The results provide at least tentative support for several important implications of the model.

The presentation is organized as follows. Some highlights of the descriptive literature and their implications for the modeling of fertility behavior are given in Section I. The model is presented in Section II. Section III discusses the data and empirical specification of the model. Finally, in Section IV we present the results and draw some implications for research and policy.

I. Descriptive Literature and Its Implications

Most less developed countries (LDCs), and especially the rural areas thereof, are male-dominated societies in which male heads of households are the primary decision-makers with respect to resource accumulation and allocation decisions of all kinds, including those primarily affecting their wives and daughters, such as those of educational attainment, labor force participation, marriage age and other terms of their marriage contracts, divorce and separation, and in some cases polygamy. Most knowledgeable specialists, however, grant that the control of male heads-of-household over fertility and infant mortality outcomes or "decisions" of their wives, daughters-in-law, daughters and nieces who may be living in the household is much weaker and more indirect. This seems especially true in extended or joint households As a result, most studies [e.g., Dixon (1976), Salaff (1972)] concede to the wife an important, if not dominant, role in fertility behavior, especially in relation to how constrained she is in virtually all other respects. Also in infant mortality, the wife-mother plays a dominant role, although, of course, circumstances can be much affected by the household structure and the static and dynamic allocation of resources. Within the household not only are fertility and mortality variables over which married women are likely to have more control, but, in view of the likelihood of long widowhood, women also are likely to have the incentive to exercise that control.

The importance of widowhood and hence of dependence on one's sons can be seen in several ways. For example, Vatuk (1980b) noted that only 25% of all Indian males over 60 years of age are without wives whereas

over 70% of all Indian women over 60 are widows. This large discrepancy is due in part to higher remarriage rates for husbands than wives after divorce or widowhood and also to the rather sizeable age differentials that generally prevail between husbands and wives at first marriage [Vatuk 1975, 1980a,b]. Given that widowhood is such an important fact of life for most women and that sons are a relatively reliable form of old-age security (the various surveys [e.g., Vatuk (1981)] showing that more than two-thirds of elderly women in rural India live with their sons), it should hardly be surprising that Indian women"... generally begin to be concerned at a fairly early stage of life with the need to provide themselves with a male heir." [Vatuk, 1980b, p. 5]. As Ridker put it, "children, especially sons, may appear to be all that will save them from destitution after their husbands are dead ..." (Ridker, 1976, pp. 9-10). Another example may be drawn from Malaysia where 978 ever-married women and their husbands who were interviewed as part of the Malaysian Family Life Survey[1] provided responses to the questions concerning the expected sources of old-age support. In more than three-quarters of the cases the women turned out to expect greater dependence on their children than did their husbands. Indeed, when the responses to expected dependence on their children were scaled from a low of 0 to a high of 5, the scores of the women were on average 1.9 greater than those of their husbands, a difference that was significant at the .01 level. One obvious explanation for this difference was the age differential between the husbands and their wives which was on the average 5.88 years, implying that the women could expect a significant period of widowhood.

The importance of children as a source of old-age support for both women and men tends to be considerably greater in rural areas than in urban areas. This is in part attributable to the absence in rural areas of LDCs of (a) reliable assets that can be accumulated and subsequently decumulated during old age, (b) old age and disability insurance, and (c) markets for at least some of the goods and services that elderly people require for survival.[2]

Another source of evidence in the anthropological literature for the widowhood, old-age security motivation for fertility being especially strong in females is the tendency for the wife-mother to be the center and most effective promoter of the affectual links, the peacemaker between generations, and the fulcrum of stability of the household. [Velez 1978, p. 159, Simic 1978, p. 102]

Many anthropologists, especially those working in Africa and in the more primitive regions of other geographic areas, e.g., Fortes (1978), explain the special interest in, and hence independence of the wife-mother over fertility in terms of the substantial rights that she attains from motherhood as opposed to the rather few rights that accrue to her on marriage. Likewise, the prestige associated with the demonstration of fertility (but also the shame or blame for failure to conceive) is focused almost exclusively on the wife rather than on the husband.

Still another explanation for the wife-mother exerting an independent (though perhaps rather constrained) influence on fertility and child-survival in rural areas of LDCs comes from the literature of social psychology. In this literature it is argued that the degree of agreement over action, i.e., lack of independence of the wife-mother in

family matters, is positively related to the degree of communication between spouses, or conversely that the degree to which she is self-assertive in family matters is negatively related to the extent of communication between spouses. The literature also provides strong evidence that communication between spouses is much less frequent, complete and satisfying in rural areas of LDCs, and perhaps paradoxically especially so in societies in which male domination of women is strongest, than it is in developed countries. [See, for example Stycos (1955), Bott (1957), Blood and Wolfe (1960), Hill et al (1959), Yaukey et al (1965), Navran (1967), Poffenberger (1969), Carlaw et al (1971), Mitchell (1972), Knodel and Prachuabmoh (1976), Coombs and Fernandez (1978)]. Where lack of communication and hence lack of agreement between spouses about fertility are prevalent, it is implied that wife-mothers will exercise independent influences over fertility and child-survival.

Finally, some psychologists have argued that there is experimental evidence that women in different cultures are generally more risk-averse than men. [Slovic (1966)]. If so, this could provide an additional explanation as to why women are more concerned with old-age security and hence more interested in children, especially male children, than are men.

Whatever the cause or source of the independent role of the wife-mother, the point is that there are very considerable grounds for believing that she may be able to play such a role when it comes to fertility behavior even in societies in which males dominate females in virtually all aspects. Because of the necessarily intimate relationship between the wife-mother and her children during infancy where breast

feeding prevails as it does almost universally in rural areas of developing countries, the wife-mother's role in getting children to survive infancy is also extremely important.

What really matters as far as the old-age pension motive, and indeed also most other motives for having children, are concerned is the number of surviving children. For these reasons, but also because of the close relationship between fertility, on the one hand, and infant mortality/survival, on the other, [Birdsall et al (1979), Carter and Merrill (1979), Ram and Schultz (1979), Khan, Hammer and Lynch (1977), Laslett and Wall (1972), Goubert (1970), Aries (1965), Stone (1977) and Thadani (1978)], the number of surviving children may be a more appropriate measure of fertility behavior than the number of live births and it would seem appropriate to attribute to the wife-mother considerable influence in explaining variations in this variable.

Since age-at-marriage is determined at the household level and certainly not by the wife-mother [Nugent and Walther (1981)], and since the effect of age-at-marriage on the number of surviving children is rather different from those affecting desired fertility given age-at-marriage, a still more appropriate measure of marital fertility behavior is the <u>actual</u> number of surviving children relative to the <u>potential</u> number of surviving children.[3]

Nugent and Walther (1981) cite anthropological evidence indicating that the practice of joint living arrangements with one's parents may also be useful for its demonstration effect on one's own children of what they should do for their parents in their old-age. Ample evidence in a variety of institutional conditions is also provided for the fact that property rights and inheritance rules are generally rigged in such

a way that household heads, especially wealthy ones, have at their disposal rather powerful instruments of control for holding onto their children, i.e., inducing them to remain in the parental household until their demise. Household affiliation and structure, therefore, are important links in the causal chain between old-age security and fertility, especially considering that the degree of extension of the household can exert a variety of influences, both positive and negative, on age-at-marriage, on infant mortality, on resource allocation and accumulation and on fertility. Indeed, controversy over the direction, as well as the magnitude of the effects of household structure on fertility is especially keen with respect to rural India.[4]

II. A Simple Model of Fertility and Old-Age Security

This section presents the theoretical model relating fertility to old-age support from the perspective of the wife-mother. As suggested above, fertility decisions of the wife are viewed as being conditional on age-at-marriage, personal characteristics of both herself and her spouse, on the size, structure, wealth and other characterisitcs of the husband's family. Again, for reasons given above, the model, as developed below, focuses on the demand for surviving children relative to potential fertility (given age-at-marriage and the effective duration of the marriage) and, assumes that the wife-mother, the person who bears and rears the children, is the primary decision-maker. Other members of the household, including her husband, influence her decisions through their control over the flow of resources to her. Thus, the time she is

required to contribute to productive activities for the household is assumed to decrease as the number of children she bears and cares for increases, the amount of the decrease depending on the value placed on children by the household. In a similar fashion, the household also controls the share of the household's food and other goods that the wife-mother receives. The wife-mother, however, is assumed to be in a position to determine how to allocate the resources and time available to her among child-bearing and rearing activities and other activities that are "hers", i.e., are above and beyond the time and resources she is required to devote to fulfillment of her responsibilities to the household.

The model shares a number of features with the one-period household production models of fertility behavior which have been developed over the last two decades [Becker (1960), Willis (1974), Becker and Michael (1976), Rosenzweig and Evenson (1977)]. Specifically, the model employs a static one-period framework, envisions the decision-maker as having preferences both for child services and for other commodities, and considers the production of these commodities to be the result of combining time and goods. However, in contrast to the models mentioned above, the model presented here treats the mother (as opposed to the household or other individuals in the household) as the decision-maker and restricts her resources to "her" time, i.e., that which is net of the time she is required to allocate to productive activities for the household, and to the resources she receives both for herself and for her child-bearing and rearing activities. These features allow the mother's preferences for children to differ from those of the household and give her some independence in fertility behavior but at the same

time recognize that the mother's decisions to bear children are very much constrained by the household's decisions.

At this point, we turn to a formal specification of the model. In order to facilitate the presentation, the equations specifying the structure of the model, as well as the first-order conditions for optimization, are presented in Table 1.

The structure of the model consists of three parts: (1) the utility function for the decision-maker, in this case the wife-mother, (2) the production functions for the commodities providing utility, namely, the number of children, the quality of children (per child) and other commodities which provide satisfaction, and (3) the constraints on the inputs, time and goods, in the production functions.

As specified in equation (1), the utility of the mother is a function of child services, C, and other commodities, Z, where child services are defined as the product of number of children, N, and quality per child, Q. The preferences for C and Z are determined by the social and cultural environment and depend specifically on the value placed on child services relative to that on other activities which provide satisfaction.

The benefits of children to the wife-mother associated both with their direct contributions to her when she is old, widowed and dependent on others for support and with the contributions that the household provides her that are dependent on her fertility behavior are not included in the preference function directly. Instead, these reasons for valuing children are incorporated in the resource constraints.

The production functions for the three commodities in the mother's utility function are specified in equations (2)-(4). The production

functions for numbers of children and for quality of children are specified as functions of the time inputs by the mother, T_{1N} and T_{1Q}, of the time inputs of other family members, T_{2N} and T_{2Q}, of the marketable goods inputs, X_N and X_Q and to be contingent on the degree of extension of the household E a proxy for the efficiency of the household in producing these commodities. The production function for Z is similar, but the time of other household members is excluded. The concept underlying these production functions is that there are a number of alternative means for producing child services and other commodities. The mother's time is distinguished from the time of others in that the two inputs are not considered to be perfect substitutes. A usual assumption regarding the production function for number of children is that they are linear homogenous which implies that doubling the inputs - T_{1N}, T_{2N}, and X_N - would lead to a doubling in the number of children. Since this assumption is excessively restrictive, it is not invoked in the present model

Finally, the goods and time constraints, are presented in equations (5)-(8). Both the goods and time constraints are specified assuming no joint production. The time of the wife-mother required by the household for household activities, T_{1L}, is specified to be negatively related to the children services she produces. i.e., $T_{1L} = T_{1L}(C)$, $\partial T_{1L}/\partial C < 0$, $\partial^2 T_{1L}/\partial C^2 > 0$. The available time of the mother, i.e., her total time, T_1, less T_{1L}, is specified in equation (5) to be the sum of the inputs of her time into the three production functions, i.e., T_{1N}, T_{1Q} and T_{1Z}. We assume also in equations (6) and (7) that the time provided by other members for producing numbers of children, T_{2N}, and child quality, T_{2Q}, are related to the child services produced, such that $\partial T_{2N}/\partial C$, $\partial T_{2N}/\partial C$

> 0 and $\partial^2 T_{2N}/\partial C^2$, $\partial^2 T_{2Q}/\partial C^2 < 0$, and hence that T_{2N} and T_{2Q} can at least indirectly be influenced by the fertility behavior of the wife-mother.

The goods constraint, equation (8), is possibly the most crucial one in the model as far as the motives for fertility behavior are concerned. It allows us to distinguish the contributions of the household to the wife-mother in the form of the wife-wage, V_1, from those she expects to receive directly from her children, V_2, and from other sources, such as social insurance, V_3. Both V_1 and V_2 may be assumed to be positively related to C, such that $\partial V_1/\partial C$, $\partial V_2/\partial C > 0$ and $\partial^2 V_1/\partial C^2$, $\partial^2 V_2/\partial C^2 < 0$. Equation (8) should be interpreted in present value terms, indicating that the present value of the resources she receives $V_1 + V_2 + V_3$ must be equal to the present value of the value of the marketable goods (whose price is q_x) she uses in production of N, Q and Z, X_N, X_Q and X_Z, respectively.

The extent to which the household rewards the mother for bearing children depends on the value it places on chidren which, in turn, is likely to depend on the structure of the household, E, and particularly on the sex and age distribution of dependents, and on the agricultural practices and land ownership of the household. The relative importance of V_1 and V_2 in her budget constraint would depend on such things as her expectations of outside support, V_3, on the length of time she expects to be widowed and on the relative levels of benefits she expects to receive on an annual basis from the household in the form of wife-wage and from her sons.

The mother is assumed to choose how to allocate her time (net of the time she is required to contribute to the household) and her

resources in the production of the three commodities (numbers and quality of children and other commodities) so as to maximize her satisfaction. The Lagrangian for the optimization problem, equation (9), along with the first-order conditions, the necessary conditions for optimization, equations (10a)-(10r), are presented in Part II of Table 1. There are a total of 18 first-order conditions and 18 unknowns so that conceptually one may solve for the demand for children and for the demand for child quality simultaneously with all the other unknowns (endogenous variables). Among the other endogenous variables are the shadow prices for the inputs to the production and utility function (λ_1-λ_7), the time inputs of the mother and other family members (T_{1N}, T_{1Q}, T_{1Z}, T_{2N}, T_{2Z}), the marketable goods inputs (X_N, X_Q, X_Z), and the commodities (N, Q, Z) which enter the utility function. We proceed now to interpret these conditions.

The first-order condition, (10a), indicates that the shadow price of children, λ_1, depends on the direct utility, $\partial U/\partial C$, and the old-age benefits she derives from her children, $\partial V_1/\partial C$, as well as on the response of the household to additional children, $\partial T_{1L}/\partial C$, $\partial T_{2N}/\partial N$, and $\partial V_2/\partial C$. These relationships may be expressed as:

$$\lambda_1 = \frac{\partial U}{\partial C} \cdot Q + \lambda_4 \frac{\partial T1L}{\partial C} \cdot Q - \lambda_5 \frac{\partial T2N}{\partial N} - \lambda_7 \frac{\partial V}{\partial C} \cdot Q$$

$$= Q \left(\frac{\partial U}{\partial C} + \lambda_4 \frac{\partial T1L}{\partial C} - \frac{\lambda_5}{Q} \frac{\partial T2N}{\partial N} - \lambda_7 \frac{\partial V}{\partial C}\right)$$

According to the assumption made above. $\frac{\partial T1L}{\partial C} < 0$, $\frac{\partial T2N}{\partial N} > 0$, $\frac{\partial V}{\partial C} > 0$ and thus from the standpoint of the woman, the shadow price of number of children would be lower than the direct utility of children given by

$\partial U/\partial C$. A similar relationship for the quality of child services is obtainable from (10b) and may be written as:

$$\lambda_2 = N \left(\frac{\partial U}{\partial C} + \lambda_4 \frac{\partial T_{1L}}{\partial C} - \frac{\lambda_6}{N} \cdot \frac{\partial T_{2Q}}{\partial Q} - \lambda_7 \frac{\partial V}{\partial C}\right)$$

Thus, the shadow prices of quality and quantity of children, as viewed by the mother, are dependent on her expectations regarding the response of the household to her child-bearing and rearing activities and on her expectations regarding the direct benefits she expects from her children when she is old and widowed.

Condition (10c) implies that the marginal cost of producing Z must be equal to the marginal utility of Z to the wife-mother. Conditions (10d)-(10f) equate the opportunity cost of the time allocation of the wife-mother T_1 to N, Q and Z, respectively, to the marginal benefits of these respective time allocations arising from the effects of these time allocations on current and future expected transfers and production of Z. Equations (10g)-(10k) provide somewhat similar efficiency conditions for the allocation of T_2. Equations (10l)-(10s), not repeated in the table, are simply the seven technical and resource constraints given by equations (2)-(8).

A more complete and realistic formulation of the model would require distinctions between male and female children, sex-ordering of children, and also the provision for changing household structure and budget constraints, realistic constraints on borrowing and lending between periods, which could only be adequately dealt with a fully dynamic model. All these extensions would have the effect of further complicating the model. Even as it is, it is sufficiently complex that

the derivation of a full set of implications (hypotheses) from the model would require (a) the specification of the functional forms of all functional relationships in the model, (b) the assignment of suitable values to all parameters in these functions, and then (c) simulation experiments (with an appropriate amount of sensitivity analysis) involving changes in the values of the exogenous variables. The derivation of unambiguous implications is rendered even more difficult by the fact that, in practice, a certain empirically defined variable may serve as a proxy for more than one exogenous variable in the model.

In view of these considerations, therefore, we deem it appropriate to keep the model relatively simple and then to appeal to it for providing the intuition for several of the hypotheses put forward in Section III which follows.

III. Data and Empirical Specification

The purposes of this section are to describe the data utilized and to provide the empirical specification of the fertility model which was formally presented in simplified form in Section II above.

A. The Data

The data utilized are from the survey of rural households in India conducted by the National Council of Applied Economic Research pertaining to the agricultural years 1968-69 through 1970-71 and known as the Additional Rural Income Survey (ARIS). Some of the data, especially that on income and expenditures, were collected for each of the three

years covered by the survey. The other data were collected for only one or two of the years. As such surveys go, the sample is quite large (4,118 households and more than 27,000 individuals) and the structure of the questionnaire affords a number of consistency checks. Although far from ideal in some respects (as will be explained momentarily) for testing the relationships postulated in the model, it is indeed fortunate that retrospective data on marriage and fertility, and data on several of the other most important and most relevant variables in the model were collected, making it one of the most appropriate data sets for present purposes.

Specifically, the survey contains data on the size and structure of households, on income and expenditures, on wealth and the composition thereof in some detail, on age, education, marital status, relationship to the household head of all individuals in the household, on the timing of children, surviving and otherwise, for all married women in the sample households, and hence on the age and sex composition of the household, and the age at and duration of marriage and hence on potential or natural fertility, and a fair amount of information on cropping patterns, technology, community-supplied services and locational characteristics, that may be deemed to measure or serve as proxies for the price of market goods, q_x, and other relevant considerations.

With respect to analyzing the effect of the introduction of a formal system of old-age pensions on marriage behavior, notably the data contains information that identifies whether or not there are household members participating in the "Provident Fund", the major formal old-age pension system in India. Although there are welfare programs at the state and local government levels and several old-age homes run by

religious and other groups that may also substitute for such a system, the amounts of support available from such programs are so small, and the indigence requirements so difficult to satisfy that lack of information about them is not an important qualification, especially considering that most such programs and facilities are restricted to urban areas. [See, for example, Vatuk (1980b)]. Unfortunately, however, the number of rural householders participating in the formal Provident Fund program is relatively small, making it difficult in practice to distinguish the effects of participation in that scheme from those of other and closely associated characteristics of such participants such as income and educational status, and also to a certain extent location.[5]

Other limitations of the data are (1) that it contains little information about tenure status or of the nature and duration of land or labor contracts, (2) that there is relatively little reliable information about prices and wage rates, and (3) that the retrospective information is limited to fertility, thereby making it impossible to identify and measure especially for older women their household structure, wealth, labor force participation, Provident Fund participation, income and wealth at the time of marriage or even in the early part of the woman's fertility history

B. Empirical Specification and Descriptive Statistics

We turn now to the detailed empirical specification of the model. Although the model was presented in terms of a simultaneous equation framework in which some eighteen variables are determined simultaneously, unfortuantely not all of these variables are observable. In particular, there are no observations concerning the allocations of

wife-time and other persons-time to the production of Z goods and child services, N, and Q, and the present value of the V_1, V_2 and V_3 variables entering the budget constraint of the wife-mother. Finally, since not all children born to the ever-married women whose fertility histories are recorded were living in the household at the time of the survey, Q could not be and hence was not measured. In our empirical work, therefore, we necessarily have to restrict our focus to the relatively few variables which are either observable directly or measurable by proxies.

As explained above, for our measure of fertility we employ the ratio of the actual number of surviving children to the potential number of children, given their age-at-marriage and the duration of their marriage, as suggested by Boulier and Rosenzweig (1978). The actual number of surviving children was reported directly and the potential or natural fertility of the woman has been computed on the basis of information on age-at-marriage of the wife, age at effective end of the marriage (defined as the age at death or departure or the husband or woman's age reaching 45), and estimates of potential fertility for different age intervals of rural Indian women in the 1960s from Potter, Jr., Wyon, Parker and Gordon (1965).[6] This measure is referred to as FERT. It is applied to the sample of ever-married women with spouse present of age 35 or older for whom fertility histories would be relatively complete, and for whom all information on the relevant variables designated below and listed in Table 2 is complete and internally consistent.

As to the variables used as determinants of FERT we divide the considerations into three basic groups, individual characteristics of

the wife-mother and her husband, characteristics of the household, and finally community variables

Following recent suggestions in the literature, as proxies for individual differences in fertility potential or supply, we include the time interval (in years) between marriage and birth of the first child (CHINT 1) and that between the first and second child (CHINT 2). We also include indexes of educational attainment of the wife-mother (EDCIF) and of the husband (EDCIM),[8] the age-at-marriage variables, AMF for the female, and AMM for the male, and finally, the sex ratio of the children (SEXRAT), defined in terms of the number of female live births divided by the total number of live births reported by the wife-mother.

For household variables we include several measures of wealth: the value of the house in thousands of rupees (HOUSE), dummy variables for various sizes of landholdings (LAND2 - LAND6),[9] the values of agricultural and livestock capital again in thousands of rupees (AGRILCAP) and (LIVESTOCK), respectively, the proportion of land irrigated (IRRIGP), the share of rented land in total land (TENANTP) and finally, the average annual value in thousands of rupees of non-labor income per capita over the three sample years (YNONLPER). Other household variables included in the empirical specifications of the model are: participation in the Provident Fund scheme by someone in the household (PROVIDF), dummy variables for non-Hindu religion of the household head, RELIGM for Moslem, and RELIGO for Christian and other non-Hindu, a dummy variable for nuclear as opposed to extended or complex type of household structure (HOUST)[10] and the following dummy variables for the dominant cropping pattern: for rice with high-yielding varieties or HYV (CV3A) for rice without HYV (CV3B), wheat and other grains with HYV (CV3C), wheat, etc. without HYV (CV3D) and other crops with HYV (CV3E).

The community-level variables included are the size of population of the village (VILPOP), the minimum distance from the village to mass transport facilities such as bus or railroad (in kilometers) (MINDIST), the absence of credit facilities other than moneylender from the village (CREDD21) or absence of credit facilities other than coop or moneylender (CREDD22), and the following dummy variables for regions of India, SOUTH (if Kerala or Tamil Nadu), SOUTHCENTRAL (if Andhra Pradesh or Mysore), WEST (if Maharashtra), CENTRAL (if Madya Pradesh or Uttar Pradesh), EAST (if Assam, Bihar, Orissa or West Bengal), and NORTHWEST (if Gujarat, Himachel Pradesh, Kashmir or Rajasthan).

Since several of the aforementioned household variables are relevant only to women living in cultivating households, and since much of the information on these and some other variables, such as that on HOUSE, RELIGM and RELIGO, is available for cultivating households only, a considerably more limited set of variables is used to determine FERT of non-cultivating households.

The complete lists of variables included in the specifications of FERT for the two types of households, cultivating and non-cultivating, are given in Table 2.

For simplicity, we specify a linear relationship between all variables in the model. Since there could well be interactions between household structure (HOUST) and the other exogenous variables in the model [Carter and Merrill (1979), Walther and Nugent (1982)], however, it would seem important to test the null hypotheses that there are no differences in behavior between nuclear and non-nuclear households within both cultivating and non-cultivating households. In both cases the null hypothesis of identical relationships across household types

was rejected at the .01 level. Since there are significant differences in numerous slope coefficients, in all our subsequent empirical work, we treat our four groups, nuclear cultivating households, extended cultivating households, nuclear non-cultivating households and extended non-cultivating households, as four separate samples to which the empirical model is applied.

Table 2 also provides descriptive statistics -- means and standard deviations -- for all available variables in each of the four samples. Perhaps the single most striking statistic is that in all four samples the mean of FERT is well below 0.5, indicating that, despite the relatively large number of children (approximately six) that the average rural Indian woman with completed fertility had at the time of the survey, actual fertility is well below the maximum or potential indicating both that various forms of fertility and survival control are indeed practiced and that there is plenty of room for factors other than sexual opportunity for explaining variations in the number of surviving children across the sampled households.

Some interesting differences in these statistics between household types can also be detected. First it can be seen that FERT is higher in nuclear households than in extended households. The significantly higher FERT in nuclear households is in part attributable to the facts (also demonstrated in the Table) that the interval between the first and second children tends to be shorter (i.e., CHINT 2 is lower) and that SEXRAT, a fertility-enhancing variable, is higher, for nuclear than for extended households. These results may also be indicative of the fact that sons whose wives have many children and/or a relatively high proportion of female children are encouraged to leave the extended house-

holds whereas those with few children are likely to be encouraged to remain in the extended household [Carter and Merrill (1979)].
On the other hand, note that AMF and AMM are both lower for extended households than for nuclear households, tending to raise potential or accumulated natural fertility.

As shown by the respective means of the EDCIF and EDCIM variables, the educational attainment levels of husbands though not of wives are generally somewhat higher among those in cultivating households than among those in non-cultivating households. The educational attainment levels of wives in nuclear households are rather consistently higher than those in extended households; in the case of their husbands there is no particular pattern to the differences between nuclear and extended households. Extended households are generally wealthier than nuclear households (even on a per capita basis) as reflected in the larger mean for YNONLPER for non-cultivators and for cultivators in the higher averages for LANDD4 - LANDD6, HOUSE, AGRILCAP, LIVESTOCK, and the lower rental share TENANTP. Note, however, that nuclear cultivating households have slightly higher shares of irrigated land (IRRIGP) than extended households. Not surprisingly, as shown by the means for VILPOP and MINDIST, cultivating households, and especially extended ones, tend to live in smaller villages and be somewhat more distant from transport facilities than do those in non-cultivating households. An absence of credit facilities, as measured by higher means of CREDD21 and CREDD22, tends to be more characteristic of extended households than nuclear households.[11]

Also shown in Table 2 are the expected signs of the coefficients of the right hand side variables on FERT. Of particular relevance to the

model are the signs of AMF, AMM, the wealth variables, PROVIDF, CREDD21 and CREDD22 and the educational attainment variables. AMF would be expected to have a positive effect on FERT because the later the wife gets married the more concern she is likely to have for old-age security and the higher must be her intra-marital fertility rate to achieve any desired number of surviving children.[12] Because living in more inter-generationally complex household structures tends to raise the women's expectations of support from her children [Nugent and Walther (1981), Walther and Nugent (1982)] the influence of AMF might be expected to be larger in extended households than in nuclear ones. On the other hand, since AMM is inversely related to the household's demand for children, AMM being the variable over which the household head has the greatest control as far as fertility is concerned, one would expect AMM to be inversely related to the level and slope of the household's allocations of resources to the wife and its willingness to increase that allocation with greater fertility. The strength of this relationship, moreover might be expected to be greater in nuclear households where the (negative) correlation between AMM and the household's demand for fertility would be higher. The signs of the wealth variables, especially those complementary to the use of children services like LAND and LIVESTOCK, would be expected to be positive, and especially so in nuclear households, for the same reasons. An exception might be the value of mechanical equipment and tractors, measured by AGRILCAP, since this form of capital might in general be expected to be labor-displacing, thereby lowering the household's demand for children.

An especially important implication of the model presented in Section II is that participation by the household of the wife-mother in

the Provident Fund program which contains both an old-age and a life insurance component would be expected to reduce both the expectation of and the need for transfers from children. Since, as mentioned above, the information available does not identify which member of the household is the participant in the Provident Fund and because participation is a relatively new phenomenon in rural India making it likely in complex or extended households that the sons themselves would be the participants, the effect of PROVIDF on FERT might well be expected to differ between household types, perhaps being negative only in nuclear households. Indeed, since participation in the Fund is available primarily only to unionized workers on plantations and in factories, etc., with relatively high income and wealth, the estimate of PROVIDF may also be biased upward to the extent that it serves as a proxy measure for income and wealth. Because the importance of children as a source of future transfers would be expected to be greater in the absence of credit facilities and hence also in the absence of opportunities for savings for subsequent disinvestment, the effects of CREDD21 and CREDD22 on FERT should be unambiguously positive. Since the intergenerational complexity of household structure serves as a partial substitute for a capital market, again, as indicated in the last column of Table 2, the positive effect of CREDD21 and CREDD22 on FERT would be especially likely in nuclear households.

The direction of the effects of educational attainment of the wife-mother EDCIF and also of the husband EDCIM on FERT would depend on whether or not the positive effect of these variables coming by way of the positive influence of their greater knowledge on survival prospects of children (fertility being measured in terms of surviving children)

would outweigh the negative influence of such education on the time allocations of parents, especially those of the wife-mother to the production of child services because of their greater earning power in market activities, and on the substitution of quality for quantity of children. Since in extended households, there are likely to be close substitutes for the wife's time in the generation of child services, the negative influence of EDCIF would be more likely to appear in nuclear households than in extended households. The net directions of the effects of most of the other household and community-level variables would be ambiguous because of offsetting influences: For example, the use of high-yielding varieties as in CV3A, CV3C and CV3C might be expected to raise the household's demand for children services but could very conceivably raise the demand for quality relative to quantity and also, by raising income and wage rates could shift the $V_1(C)$ and $V_2(C)$ functions upward, thereby decreasing FERT. Also locational variables like VILPOP (MINDIST) might tend to raise (lower) the opportunity cost of the wife-mother's allocation of time to children but, on the other hand, might increase (reduce) the amount of other sources of support V_3 available to her, again leaving the sign of the estimated coefficient ambiguous.

IV. Results and Conclusions

Because for reasons given above all right hand side varaibles are considered exogenous, the estimating equations are estimated by ordinary least squares. The results for all samples are presented in Table 3.

As can be seen by the estimated coefficients of determination given at the bottom of the table, only about one-third of the variation in the ratio of the accumulated number of surviving children to that of the potential number (FERT) across rural Indian women with relatively complete fertility histories is explained by the variables included in the model. This relatively low R^2 indicates that there is plenty of room for improvement. Nevertheless, this degree of explanatory power compares favorably with comparable attempts to explain similar measures elsewhere or other fertility measures in the context of rural India.[13]

Since different levels of unobserved variables between the samples would tend to be reflected in the estimates of the intercepts, not too much should be made of the differences in the estimates of the intercept in the different samples that are revealed in Table 3. Also, as noted above the rather large difference between the values of the constant terms for nuclear and extended households may be more reflective of the tendency of sons with many children to be pushed out of extended households rather than of nuclear households to induce higher fertility rates on the part of women living in them than would extended households.

Consistent with the expectations expressed above and in the last column of Table 2, as revealed in all samples of Table 3 the signs of CHINT 1, CHINT 2 are consistently negative and significant, of SEXRAT are positive and in half the cases also significant. Not surprisingly, in several of the cases where the expected signs of the coefficients were ambiguous, as with EDCIM, the cropping pattern and regional dummy variables, and the community-level VILPOP and MINDIST variables, the estimated coefficients are frequently insignificant and vary considerably from one sample to another. Somewhat more surprising and unex-

pected, but not of great consequence to the proposed model are the observed inconsistencies from one sample to another in the estimated coefficients of TENANTP, RELIGM and RELIGO.

Of greater relevance and importance to the purpose of this study are the following results:

(1) that the influence of AMF on FERT is positive and significant in all samples;

(2) that the coefficient of AMF on FERT is more positive in extended households than in nuclear households where the slope of the $V_2(C)$ function would be expected to be more steeply upward-sloping;

(3) that the influence of EDCIF on FERT is more negative in nuclear households than in extended households;

(4) that the effect of AMM is negative only in nuclear households;

(5) that the effects of larger landholdings such as LANDD5 and LANDD6 are more positive (or less negative) than those of no land or small landholdings such as LANDD1 (the excluded variable) and LANDD2.

(6) that the influences on FERT of all wealth-related variables which may be thought of as being complimentary to child services, such a LAND, HOUSE, LIVESTOCK and IRRIGP, are generally positive while that for AGRILCAP (which may be a net substitute for child-services) is negative in both nuclear and extended cultivating households;

(7) that the coefficients of child-service-complementary wealth variables like LAND and LIVESTOCK are more positive in nuclear households than in extended households;

(8) that the effect of PROVIDF would be more negative in nuclear households than in extended households;

(9) that the coefficients of CREDD21 and CREDD22 are more positive in nuclear cultivating households than in extended cultivating households.

While these results are all very encouraging, in view of the relatively small sample sizes, low significance levels, and the existence in some cases of alternative explanations for these results, they can hardly be taken as definitive. Moreover, the fact that the differences in the size and direction of the coefficients of YNONLPER, CREDD21 and CREDD22 are all opposite to those expected in the case of non-cultivating rural households suggests that the results are considerably less supportive in the case of non-cultivating households. Quite possibly, however, the weaker and less unambiguous results for non-cultivating households can be attributed to the greater heterogeneity with respect to unobserved characteristics and omitted variables among such households.

Taken as a whole, however, the econometric results provided in this section, together with the more descriptive literature reviewed in Section I, are supportive of the following propositions put forward in this paper:

(1) that women tend to play a rather large role in, and exert a somewhat independent influence on, fertility behavior in rural areas of LDCs than have generally been supposed in existing models,

(2) that household structure influences the strength as well as the direction of various other determinants of fertility behavior, such as educational attainment, wealth, the presence of credit facilities, cropping patterns, and age-at-marriage of both marriage partners, and

(3) that the existence of formal old-age pension programs and well-developed financial and capital markets can reduce intramarital fertility, especially in nuclear households.

In view of the above findings the following implications for future research may be drawn. First, additional effort should be directed to empirical research with data sets wherein more variables in the model, especially those with respect to quality of children, time allocations of wives, expectational variables such as those of old-age support, and additional retrospective information, could be observed as in the more general equilibrium setting in which the model was developed in Section II.

Second, attempts to estimate the overall effects of influences like the introduction of old-age-security programs, credit and savings institutions in rural areas should take into consideration the important interdependencies between household structure, marriage, wealth accumulation and fertility that have been pointed out in this paper.

With regard to policy implications, the most obvious conclusion is that one should be cautious not only because of the aforementioned need for more definitive results and therefore more research, but also because of the likely differences in such behavior between different types of households, and considerable doubt about the welfare consequences of reduced fertility. Moreover, caution is especially warranted because of the fact that many of the policy effects may come rather indirectly by way of other effects that could exert offsetting influences. For example, the introduction of savings institutions, credit facilities and old-age pension systems, may well reduce the household's demand for children and hence raise age-at-marriage[14] and thereby reduce

both potential fertility and possibly also as shown above actual fertility relative to potential fertility directly, but on the other hand, the higher age-at-marriage of the wife-mother may have the effect of increasing her desire for children relative to the potential number she can have given age-at-marriage and the effective duration of marriage.

Because of the dramatic increases in the proportions of elderly people in the rural populations of LDCs that may be expected in the foreseeable future it is highly likely that such changes will exert considerable stress on the stability of the traditional system of caring for the elderly within intergenerationally extended or complex households. Given also (1) the expressed intent of LDC governments to spread old-age pension systems and capital and financial market institutions into rural areas, and (2) the evidence presented here that such policies are more likely to be fertility-reducing in the nuclear households that would seem to be encouraged by such policies[15] than in complex or extended ones, there may indeed be reasons for believing that the net effect of such policies on fertility would be negative.

Considering the greater importance of the old-age security motive for wives than for their husbands, and the important role that wives play in the determination of the accumulated number of surviving children relative the potential number (given age-at-marriage and marriage duration), to be effective, however, information about the existence of, eligibiltiy rules for, and the terms and conditions of such programs should be directed to women to a far greater extent than has been the case in the past

Footnotes

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1 For an introduction to and description of this survey see Butz and Da Vanzo (1978).

2 For a more complete rationale for the importance of the old-age pension motive in rural areas of LDCs see Nugent and Walther (1981).

3 This measure, which is explained more carefully in Section III below, is also referred to as the accumulated actual relative to natural fertility rate. Such a measure was developed by Boulier and Rosenzweig (1978) who gave it the name duration ratio (DRAT).

4 For an analytical sketch of the interrelationships between marriage age, fertility, household structure and old-age security, see Nugent and Walther, 1981.

5 Participation in the Provident Fund may be presumed to become relevant and important only for those participants whose actual or expected participation covers a relatively long period of time. In view of the fact that few rural workers could be expected to have long and stable employment histories in jobs that qualify them for Provident Fund participation, and in the absence of retrospective information on employment histories, the possibility that current participation in the Provident Fund scheme would have significant effects on fertility (especially past) and other forms of behavior would seem rather limited. Another shortcoming of our measure of Provident Fund participation in this respect is that participants are given the right and apparently frequently do withdraw their funds before retirement, hence, in reality not really constituting an old-age pension system even for those who are long term participants [Far East Economic Review (1978)].

6 For each year prior to birth of the first child but after marriage and living with the husband present, this is computed by (1) summing (a) the expected number of months of pregnancy wastage over a five year period (ranging from a low of 1.73 for young women to a high of 3.11 for older women) and (b) the number of months in gestation (9 months), (2) dividing this sum into the total number of months in the period, and (3) dividing this number by the number of years in that interval to get the potential fertility per year. For each year after the birth of the first child a third item (c) the average number of months of post partum amenorrhea (ranging from a low of 7.4 for younger women to a high of 13.5 for older women) is added to the total in step (1). These calculations are then applied separately for each year of marriage over the

effective lifetime of the marriage, i.e., until death or departure of the husband or until age 45 of the women. whichever ever occurs first.

[7] See, e.g., Easterlin, Pollak and Wachter (1980), Butz and Habicht (1976) and Easterlin and Crimmins (1981).

[8] Specifically these variables are coded as zero if the individual is either illiterate or had no schooling, as 1.0 if the individual is literate and/or had some primary schooling, as 2.0 if the individual completed primary education, as 3.0 if educational attainment includes some but less than complete, secondary education, and as 4.0 if the individual attained a complete secondary education or above.

Since these variables are not continuous, we also experimented with defining them as separate dummy variables for each of the levels. Since we found the rest of the results unaffected by the way in which the variables were treated, for simplicity we treat them as continuous variables.

[9] These variables are defined as follows:

LANDD2 = 1 if the size of landholding (LAND) is $0 < LAND \leq 1$ hectare; = 0 otherwise
LANDD3 = 1 if the size of landholding (LAND) is $1 < LAND \leq 2.5$ has.; = 0 otherwise
LANDD4 = 1 if the size of landholding (LAND) is $2.5 < LAND \leq 4.5$ has.; = 0 otherwise
LANDD5 = 1 if the size of landholding (LAND) is $4.5 < LAND \leq 6.5$ has.; = 0 otherwise
LANDD6 = 1 if the size of landholding (LAND) is $6.5 < LAND$; = 0 otherwise

[10] A two-step procedure is used to define the HOUST dummy variable. First, households are coded according to the three-digit classification procedure proposed and applied by Laslett and Wall (1972) and others. Then, this detailed classification code is dichotemized as explained by Walther and Nugent (1982) such that HOUST takes the value 1 for nuclear households and 0 for complex or multiple households.

[11] For more complete details and explanation of these differences between cultivating and non-cultivating households, see Walther and Nugent (1982).

[12] It must also be admitted that measurement error in AMF would also tend to have a positive influence on FERT because AMF has a negative influence on accumulated natural fertility which is in the denominator of FERT.

[13] See, for example, Boulier and Rosenzweig (1978).

[14] We have demonstrated that this is the case, for the same sample at least, in Nugent and Walther (1982).

[15] For rather mixed evidence on such an effect see Walther and Nugent (1982).

Table 1

The Fertility Model

I. Structure of the Model

Utility function: $U(C,Z) = U(NQ,Z)$ (1)

Production functions:

$$N = N(T_{1N}, T_{2N}, X_N; E) \quad (2)$$
$$Q = Q(T_{1Q}, T_{2Q}, X_Q; E) \quad (3)$$
$$Z = Z(T_{1Z}, X_Z; E) \quad (4)$$

Time and Goods Constraints:

$$T_1 - T_{1L}(C) = T_{1N} + T_{1Q} + T_{1Z} \quad (5)$$
$$T_{2N} = T_{2N}(N) \quad (6)$$
$$T_{2Q} = T_{2Q}(Q) \quad (7)$$
$$V_1(C) + V_2(C) + V_3 = q_x(X_N + X_Q + X_Z) \quad (8)$$

II. Optimization of the wife-mother's utility utilizing the Lagrangian formulation of constrained optimization.

$$\begin{aligned} L = U(NQ, Z) &- \lambda_1(N - N(T_{1N}, T_{2N}, X_N)) - \lambda_2(Q - Q(T_{1Q}, T_{2Q}, X_Q)) \\ &- \lambda_3(Z - Z(T_{1Z}, X_Z)) - \lambda_4(T_1 - T_{1L}(C) - T_{1N} - T_{1Q} - T_{1Z}) \\ &- \lambda_5(T_{2N} - T_{2N}(N)) - \lambda_6(T_{2Q} - T_{2Q}(Q)) \\ &- \lambda_7(V_1(C) + V_2(C) - V_3 - q_x(X_N + X_Q + X_Z)) \end{aligned} \quad (9)$$

First order conditions (18)

$$\frac{\partial L}{\partial N} = \frac{\partial U}{\partial C} \cdot Q - \lambda_1 + \lambda_4 \frac{\partial T_{1L}}{\partial C} \cdot Q - \lambda_5 \frac{\partial T_{2N}}{\partial N} - \lambda_7 \frac{\partial V}{\partial C} \cdot Q = 0 \quad (10a)$$

$$\frac{\partial L}{\partial Q} = \frac{\partial U}{\partial C} \cdot N - \lambda_2 + \lambda_4 \frac{\partial T_{1L}}{\partial C} \cdot N - \lambda_6 \frac{\partial T_{2Q}}{\partial Q} - \lambda_7 \frac{\partial V}{\partial C} \cdot N = 0 \tag{10b}$$

$$\frac{\partial L}{\partial Z} = \frac{\partial U}{\partial Z} - \lambda_3 = 0 \tag{10c}$$

$$\frac{\partial L}{\partial T_{1N}} = -\lambda_1 \frac{\partial N}{\partial T_{1N}} + \lambda_4 \left(\frac{\partial T_{1L}}{\partial C} \cdot Q \frac{\partial N}{\partial T_{1N}} + 1\right) + \lambda_5 \frac{\partial T_{2N}}{\partial N} \cdot \frac{\partial N}{\partial T_{1N}}$$

$$-\lambda_7 \frac{\partial V}{\partial C} \cdot Q \cdot \frac{\partial N}{\partial T_{1N}} = 0 \tag{10d}$$

$$\frac{\partial L}{\partial T_{1Q}} = \lambda_2 \frac{\partial Q}{\partial T_{1Q}} + \lambda_4 \left(\frac{\partial T_{1L}}{\partial C} \cdot N \frac{\partial Q}{\partial T_{1Q}} + 1\right) - \lambda_6 \frac{\partial T_{2Q}}{\partial Q} \cdot \frac{\partial Q}{\partial T_{1Q}}$$

$$- \lambda_7 \frac{\partial V}{\partial C} \cdot N \frac{\partial Q}{\partial T_{1Q}} = 0 \tag{10e}$$

$$\frac{\partial L}{\partial T_{1Z}} = \lambda_3 \frac{\partial Q}{\partial T_{1Z}} - \lambda_4 = 0 \tag{10f}$$

$$\frac{\partial L}{\partial T_{2N}} = \lambda_1 \frac{\partial N}{\partial T_{2N}} + \lambda_4 \left(\frac{\partial T_{1L}}{\partial C} \cdot Q \cdot \frac{\partial N}{\partial T_{2N}}\right) + \lambda_5 - \lambda_7 \frac{\partial V}{\partial C} \cdot Q \frac{\partial N}{\partial T_{1N}} = 0 \tag{10g}$$

$$\frac{\partial L}{\partial T_{2Q}} = \lambda_2 \frac{\partial Q}{\partial T_{2Q}} + \lambda_4 \left(\frac{\partial T_{1L}}{\partial C} \cdot N \cdot \frac{\partial Q}{\partial T_{2Q}}\right) - \lambda_6 - \lambda_7 \left(\frac{\partial V}{\partial C} \cdot N \frac{\partial Q}{\partial T_{2Q}}\right) = 0 \tag{10h}$$

$$\frac{\partial L}{\partial X_N} = \lambda_1 \frac{\partial N}{\partial X_N} + \lambda_4 \left(\frac{\partial T_{1L}}{\partial C} \cdot Q \frac{\partial N}{\partial X_N}\right) + \lambda_5 \left(\frac{\partial T_{2N}}{\partial N} \frac{\partial N}{\partial X_N}\right)$$

$$- \lambda_7 \left(\frac{\partial V}{\partial C} \cdot Q \cdot \frac{\partial N}{\partial XN} - q_x\right) = 0 \tag{10i}$$

$$\frac{\partial L}{\partial X_q} = \lambda_2 \frac{\partial Q}{\partial X_Q} + \lambda_4 \left(\frac{\partial T_{1L}}{\partial C} \cdot N \frac{\partial Q}{\partial X_Q}\right) + \lambda_6 \left(\frac{\partial T_{2Q}}{\partial N} \cdot \frac{\partial N}{\partial X_Q}\right)$$

$$- \lambda_7 \left(\frac{\partial V}{\partial C} \cdot N \frac{\partial Q}{\partial X_Q} - q_x\right) = 0 \tag{10j}$$

$$\frac{\partial L}{\partial X_Z} = \lambda_3 \frac{\partial Z}{\partial X_Z} + \lambda_7 q_x = 0 \tag{10k}$$

$\frac{\partial L}{\partial \lambda_i}$ = the ith constraint from equations (2)-(7) above,

$i = 1 \ldots 7$ (10l)-(10s)

Table 3 (Cont'd.)

III. Definition of Terms

C	Child Services
N	Numbers of children
Q	Quality of services per child
Z	Other commodities
E	The degree of household extension and other variables determining efficiency in household production
T_{ij}	Time inputs for i^{th} person (1 = mother, 2 = others) in j^{th} activity (j = N, Q, Z, X, L)
X_j	Marketable goods inputs into j^{th} activity
L	Productive work either in wage market or required by household.
V_1	Resources dependent on transfers from household
V_2	Resources dependent on direct transfers from children to mother
V_3	Resources such as social insurance benefits not contingent on child services
V	Sum of V_1 and V_2, both of which are functions of C.
λ_k	Shadow prices for commodities and inputs to production of commodities (k = 1, 2, ...7)

Table 2

Descriptive Statistics on All Variables in Samples

of Ever Married Women (with Spouse Present) of Age 35 and Above

Variable	Cultivating Households		Non-Cultivating Households		
	Nuclear	Extended	Nuclear	Extended	Expected Direction of Effect on Fertility
	Sample Size: 404	703	304	236	
FERT	.438	.391	.427	.409	-
	(.147)	(.156)	(.143)	(2.853)	
CHINT1	3.866	4.041	4.112	3.775	-
	(3.094)	(3.474)	(3.429)	(2.853)	
CHINT2	3.465	3.791	3.306	3.733	-
	(2.192)	(2.946)	(1.913)	(3.572)	
EDCIF	1.250	1.131	1.253	1.191	- in nuclear
	(.637)	(.474)	(.601)	(.540)	households
EDCIM	2.540	2.464	2.283	2.436	?
	(1.062)	(1.128)	(1.090)	(1.096)	
AMF	17.309	16.477	17.418	16.898	+ especially in
	(3.422)	(3.522)	(3.905)	(4.029)	extended households
AMM	24.099	22.821	24.059	22.809	- especially in
	(5.790)	(5.875)	(5.552)	(5.452)	nuclear households
SEXRAT	.478	.411	.468	.438	+
	(.216)	(.215)	(.225)	(.215)	
LANDD2	.215	.107			?
	(.412)	(.310)			
LANDD3	.282	.228			?
	(.451)	(.420)			
LANDD4	.205	.210			+
	(.405)	(.407)			
LANDD5	.116	.159			+ especially in
	(.321)	(.366)			nuclear households
LANDD6	.168	.277			+ especially in
	(.375)	(.448)			nuclear households
HOUSE	5.010	6.819			+
	(6.945)	(8.422)			
AGRILCAP	2.098	2.592			?
	(4.209)	(5.349)			
LIVESTOCK	1.601	2.390			+ especially in
	(1.641)	(2.178)			nuclear households
IRRIGP	.480	.461			+
	(.442)	(.435)			
TENANTP	.059	.039			?
	(.191)	(.144)			

Table 2 (cont.)

Variable	Cultivating Households		Non-Cultivating Households		Expected Direction of Effect on Fertility
	Nuclear	Extended	Nuclear	Extended	
Sample Size:	404	703	304	236	
YNONLPER			.402	.433	+
			(.656)	(.474)	
PROVIDF	.022	.018	.043	.012	- in nuclear
	(.148)	(.133)	(.203)	(.112)	households
RELIGM	.037	.049			+
	(.189)	(.216)			
RELIGO	.032	.012			?
	(.177)	(.107)			
CV3A	.124	.098			?
	(.330)	(.298)			
CV3B	.282	.256			?
	(.451)	(.437)			
CV3C	.149	.228			?
	(.356)	(.420)			
CV3D	.210	.225			?
	(.408)	(.418)			
CV3E	.072	.044			?
	(.258)	(.205)			
VILPOP	2.191	1.839	3.189	2.939	?
	(3.109)	(1.948)	(4.002)	(3.583)	
MINDIST	5.752	6.314	4.470	4.729	?
	(6.487)	(6.355)	(5.853)	(6.277)	
CREDD21	.094	.105	.089	.102	+ especially in
	(.292)	(.306)	(.285)	(.303)	nuclear household
CREDD22	.379	.417	.391	.415	+
	(.486)	(.493)	(.489)	(.494)	
SOUTH	.158	.053	.270	.093	?
	(.366)	(.224)	(.445)	(.291)	
SOUTHCENTRAL	.074	.080	.053	.051	?
	(.262)	(.272)	(.223)	(.220)	
WEST	.092	.060	.030	.025	?
	(.289)	(.237)	(.170)	(.158)	
CENTRAL	.161	.308	.135	.199	?
	(.368)	(.462)	(.342)	(.400)	
EAST	.158	.147	.128	.148	?
	(.366)	(.355)	(.335)	(.356)	
NORTHWEST	.220	.199	.214	.271	?
	(.415)	(.400)	(.411)	(.446)	

Table 3

	Cultivating Households		Non-Cultivating Households	
	Nuclear	Extended	Nuclear	Extended
Intercept	.247	.292	.419	-.146
	(2.79)	(4.10)	(7.15)	(1.33)
CHINT1	-.013	-.006	-.013	-.011
	(5.65)	(3.98)	(5.71)	(2.04)
CHINT2	-.016	-.014	-.020	-.008
	(5.37)	(7.35)	(5.21)	(1.79)
EDCIF	-.025	-.003	-.008	-.008
	(1.89)	(.28)	(.55)	(.23)
EDCIM	-.012	.012	.010	.006
	(1.68)	(2.43)	(1.29)	(.38)
AMF	.013	.019	.009	.031
	(5.56)	(7.97)	(4.15)	(6.13)
AMM	-.002	.001	-.003	.001
	(1.35)	(1.23)	(1.96)	(.27)
SEXRAT	.016	.090	.071	.008
	(.53)	(3.83)	(2.20)	(.12)
LANDD2	.102	-.141		
	(1.53)	(2.32)		
LANDD3	.133	-.113		
	(1.95)	(1.88)		
LANDD4	.117	-.135		
	(1.72)	(2.22)		
LANDD5	.154	-.126		
	(2.18)	(2.04)		
LANDD6	.160	-.101		
	(2.26)	(1.64)		
HOUSE	.002	.003		
	(1.32)	(2.03)		
AGRILCAP	-.000	-.001		
	(.07)	(1.27)		
LIVESTOCK	.007	.005		
	(1.46)	(1.73)		
IRRIGP	.032	.016		
	(1.77)	(1.06)		
TENANTP	.107	-.012		
	(2.61)	(.24)		
YNONLPER			-.020	.055
			(1.65)	(1.63)
PROVIDF	-.058	.018	-.029	.003
	(1.99)	(.46)	(.72)	(.02)
RELIGM	-.068	.051		
	(1.88)	(2.14)		
RELIGO	.053	-.069		
	(1.23)	(1.44)		

Table 3 (cont.)

	Cultivating Households		Non-Cultivating Households	
	Nuclear	Extended	Nuclear	Extended
CV3A	.021	.027		
	(.75)	(1.14)		
CV3B	-.008	.016		
	(.33)	(.82)		
CV3C	-.050	-.018		
	(1.95)	(.92)		
CV3D	.004	.020		
	(.21)	(1.15)		
CV3E	-.064	-.037		
	(2.04)	(1.36)		
VILPOP	.003	.002	-.005	.003
	(1.23)	(.75)	(2.48)	(.48)
MINDIST	.001	-.001	.001	.001
	(.79)	(.92)	(.80)	(.42)
CREDD21	.019	-.001	-.034	-.019
	(1.36)	(.03)	(1.19)	(.32)
CREDD22	.029	-.010	-.013	.030
	(1.72)	(.80)	(.77)	(.79)
SOUTH	-.055	-.071	.008	-.049
	(1.16)	(2.21)	(.30)	(.68)
SOUTHCEI	-.039	-.099	-.072	.052
	(.81)	(3.95)	(1.87)	(.63)
WEST	.009	-.071	-.070	.075
	(.07)	(2.78)	(1.49)	(.71)
CENTRAL	-.017	-.059	-.012	.036
	(.58)	(3.41)	(.43)	(.69)
EAST	-.006	-.081	-.009	-.019
	(.07)	(3.48)	(.29)	(.33)
NORTHWEST	.013	-.015	.045	.086
	(.47)	(.72)	(1.78)	(1.89)
R^2	.358	.333	.320	.336

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