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there's <u>always</u> hope.

EDUCATION, FERTILITY AND REMITTANCES IN A DEVELOPING ECONOMY

EDUCATION, FERTILITY, AND REMITTANCES IN THE TRADITIONAL SECTOR OF A DEVELOPING ECONOMY

By

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ABSTRACT

The determinants of fertility behavior vary considerably from country to country. An oft-cited motivation for childbearing in developing countries is the economic returns parents expect to receive from their children. The demand for children as security assets is important in areas where insecurity is rife, alternative assets are risky or absent, and the support provided by children lacks market substitutes. An overlapping generations model in which fertility, children's education and migration are jointly determined by rural agricultural households is formulated. The effects on family size of changes in education costs, urban wages, child altruism towards parents, and rural living conditions are derived from the model. Some policy implications of the theoretical results are examined. The findings appear to support the notion that as long as a traditional family-based system of obligations is retained and urban-rural wage differentials remain large, the security motive will continue to be significant as an explanation for the high level of fertility in traditional rural societies.

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The above testifies to the fact that a thesis project is a team work. However, on a personal level, the completion of this thesis certifies perseverance, and I am profoundly grateful to God for the opportunity of undertaking this program of studies. As part of the growth process, I readily assume responsibility for any errors that may remain.

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CHAPTER 1

INTRODUCTION

1.1: INTRODUCTION

There continues to be a strong interest in the high levels and trends of fertility in developing countries. The resulting demographic pattern has been the subject of research and policy formulation over the past three decades. The economic-demographic study of India done by Coale and Hoover in 1958 essentially stated that rapid population growth leads to a high child dependency which diverts household income away from saving and toward current consumption. Several researchers, for example Enke (1971), following the Coale-Hoover tradition formulated models producing results that show high fertility as an obstacle to socio-economic development.[1] Such findings suggest the need for fertility reduction strategies, a variety of which have been recommended in the literature.

A prerequisite for effective fertility regulation is the understanding of the determinants of fertility. It is

generally recognized that the socio-cultural, biological, and economic factors which influence family-size decisions vary considerably from country to country and across regions within countries. This implies that analytical approaches to the explanation of fertility behavior must take account of local conditions if the results and policy recommendations are to be relevant.

The microeconomic framework provides a wide variety of models of fertility behavior. Most of the initial approaches utilized the household demand and production analyses and viewed children as household commodities demanded mainly for the psychic benefits they confer on their parents. The quantity (number) of children demanded vary with their quality (cost). The underlying assumptions of these models, however, restricted their relevance to urban, industrialized economies. Rural economies did not receive much attention.

More significantly, it became clear that the socio-economic conditions prevailing in developing countries meant that the early economic models had to be modified to make them applicable in these settings. For example, the evidence of a strong economic motivation for childbearing in LDCs had to be incorporated. An oft-cited motive for the

high fertility, especially in the rural areas, is the economic returns parents expect to receive from their children (Leibenstein, 1974). This is the basis for the "old age security" hypothesis of the demand for children and it requires the inclusion of the economic contributions of children to household production and income over the life cycle. The demand for children as security assets is important in areas where social insecurity is prevalent, alternative assets are risky or absent, and where the support children provide for their parents lacks market substitutes (Nugent, 1985).

Several more recent microeconomic models incorporate this modification which provides the basis for interesting theoretical and empirical analyses in an LDC setting. In this thesis we formulate a model in which choices about family size and investment per child are jointly determined by parents living in a rural traditional society. Since societies differ, it is important to highlight some of the features of the society whose demography we wish to study.

The main occupation in the traditional society is farming, but with the low level of technology applied to a fixed amount of family-owned land, the only way to increase production is to increase the number of workers. There is,

therefore, a close link between agricultural production and family size decision-making processes. Mortality among infants and children is relatively high. Social security is enhanced by having large families and through a network of marriage alliances. In an extended family household the individual's rights, obligations and economic roles are determined along kinship lines and his/her well-being depends on the average well-being of the household.

Although the focal unit of interest is the rural household, rural dwellers are not altogether secluded from the urban sector of the economy. There is a considerable volume of rural-to-urban migration and a significant proportion is initiated by the family as a strategy for spreading its labor resources over a wider market than the home village. The purpose of such migration may be further education and/or search for urban jobs. There exist within the traditional family system, mechanisms for ensuring the sharing of wealth among family members, migrants and non-migrants, young and old. For modelling purposes we adopt a particular form of this intergenerational sharing arrangement in the rural household and assume also that migrant children fulfil their familial obligations through remittances.

The fact that fertility, mortality and out-migration rates are high in the rural areas of developing countries provides a strong case for studying the interrelationships between these demographic variables and the socio-economic characteristics of such areas. Consequently, this thesis deals with education, fertility and remittances in the traditional sector of a developing economy.

1.2: THESIS OVERVIEW

The thesis is composed of seven chapters. The organization of the chapters starts with a general overview of the less developed countries and narrows down to a traditional society. Chapter 1 introduces the contents of the thesis.

Chapter 2 describes the broad demographic and socio-economic characteristics of LDCs drawing on examples from Africa, Asia, and Latin America. Because of its history of fast population growth, the demographic pattern of sub-Saharan Africa is discussed in more detail with the aid of survey data from World Fertility Survey (WFS) sources. In Chapter 3 we present the demographic features of rural

Nigeria and use the traditional Yoruba society to illustrate the institutional and cultural structure that supports the observed demographics. Chapters 2 and 3 form the "resource base" upon which we draw in order to identify the characteristics of a typical traditional sector in a developing economy.

Chapter 4 discusses various aspects of the microeconomic theory of fertility behavior. It includes a critical survey of a selection of studies that illustrate the basic theoretical models, extensions to the initial framework, and later modifications that have made the theory relevant to the explanation of fertility in rural agricultural societies. Of particular interest is Nerlove's 1971 study. As stated earlier, the economic motivation for childbearing is strong in developing countries. In chapter 5 we present a theoretical model of the asset demand for children. The model builds on Nerlove (1971) by introducing two additional components, education and migration, and examines how these variables affect the attractiveness of children as assets in rural agricultural households.

The implications of the model are examined in Chapter 6 by means of a series of computer simulation experiments. There is recent evidence that more governments in LDCs,

including those in sub-Saharan Africa, wish to formulate effective population policies. Our model, depicting the relationships among socio-economic and demographic variables, provides a framework for examining a number of policy options in a high fertility rural society. Chapter 7 contains some concluding remarks on the main themes of the thesis and suggestions for future research on the issues raised in this study.

1.3: NOTE TO CHAPTER 1

This result, and particularly the underlying assumptions of these models, was the central subject of the "population debate" of the 1970s and early 1980s. For a recent synopsis of the main points of contention, see Wattenberg and Zinsmeister (1985).

CHAPTER 2

THE TRADITIONAL SECTOR OF A DEVELOPING ECONOMY

2.1: INTRODUCTION

In this chapter, we present an overview of the demographic and socio-economic characteristics of the less developed regions of the world. Since these characteristics differ across LDCs, we draw on examples from Africa, Asia, and Latin America in order to highlight those features that best typify the traditional sector of a developing economy. The remaining part of the chapter is divided into two sections. In the first section, we discuss the demographic features of the LDCs, while in the second section a description of the social organization that supports the observed demographics is presented.

2.2: DEMOGRAPHIC CHARACTERISTICS

According to Table 2.1, about 78 percent of the world's people live in Afica, Asia and Latin America. The estimates

of fertility and mortality indices vary from one macro-region to another but the data show that the rates are highest for Africa, and well above both the world average and the rates for Asia and Latin America. The crude birth rate for Africa in 1984 was 46 births per thousand population compared to a world average of 27, an Asian average of 27, and a Latin American average of 32. The crude death rate in the same year was 17 deaths per thousand population in Africa compared to a world average of 11, an Asian average of 10 and a Latin American average of 8.

These estimates imply that the natural rate of population growth in Africa is high -- again, higher than the rate in other macro-regions. Over the 35-year period covered in the table, the average annual rate of population increase was 3 percent in Africa, or almost double the Asian average. At that rate, the population of the continent will double approximately every 23 years. While the sub-regions of Africa are more or less similar, it is noteworthy that the crude rates are highest for West and East Africa.

In the absence of unusual migration patterns, the age distribution of a population is determined by its birth and

death rates. For most developing countries, high birth rates and gradually declining death rates have combined to produce youthful populations, and this is particularly true for Africa. According to the data in Table 2.2, young people (0-15 year-olds) constituted about 45 percent of the African population in 1985, with the Western and Eastern sub-regions recording the highest proportion of youths. At the other end of the age distribution, all the regions in the developing world have similar proportions of old people, all below the world average. The above age pattern confirms a fact of demography that a rapidly growing population has a lower proportion of old people than one that is increasing slowly.

As indicated above, the demographic indices for West Africa although similar to those of the other sub-regions of Africa, are generally higher. For this reason, as well as to provide a background for the next chapter, we examine the composition of this sub-region in a little more detail. Cochrane and Farid have recently compiled and analyzed sub-Saharan African (SSA)[1] data from various national studies conducted by the World Fertility Survey (WFS) and their paper is the main source of the data used here.

Table 2.3 presents a summary of vital demographic rates

for the ten African countries. Over the five-year period 1980-85, the crude birth rate ranged from 43 in Cameroon to 55 in Kenya. Over the same period, the crude death rate was lowest in Kenya, with the result that Kenya recorded the highest rate of natural increase — 41 per thousand people. The absence of data on expectation of life at birth for the same period for all ten countries prevents an overall comparison of the figures in the last two columns of the table. Among those countries for which there are estimates for 1980-85, life expectation ranges between 40.9 and 50.3 years for males and between 44.1 and 53.7 years for females, with Ghana recording the highest average life span for both sexes. On the whole the figures show that an average newborn infant will not live to see his or her fifty-fourth birthday if recent mortality rates remain unchanged.

Estimates of total fertility rates (TFRs)[2] over a twenty-year period are reported in Table 2.4. The region shows a wide range in current TFRs, with an overall average of 6.7 children per woman. In five of the ten countries, women would bear between six and seven children, on average, while in Kenya an average woman would bear over eight children during her reproductive years if the rates persist. A closer examination reveals that any decline in

fertility rates over the last twenty years has been slight, with the possible exception of Mauritania and Sudan; Cameroon actually records a more or less steady rise in fertility.

A further insight into fertility trends can be gained by looking at the estimates of age-specific fertility rates for women during their childbearing years. According to Table 2.5, fertility peaks at ages 20-24 or 25-29. More significant, however, is the fact that across sub-Saharan Africa, fertility rates are remarkably high for women under 20, for whom there are between 150 and 200 births per thousand, in most of the surveyed countries. Two facts combine to produce that result:

(i) Studies show that marriage is practically universal in tropical Africa. Due to the emphasis on kin solidarity the pressure for women to marry is often quite strong; hence the proportion of women remaining single by age 49 years rarely exceeds 3 percent (Ukaegbu,1981).

(ii) In addition to the near-universality of marriage, the singulate age at first marriage (SAFM)[3] is generally low ranging from 17.5 years in Cameroon to 21.3 in Sudan. Overall, age at marriage is at the low end in West Africa, at the high end in parts of East Africa,

and intermediate in Central Africa, the coastal areas around the Bight of Benin and the Gulf of Guinea in the west, and the Indian ocean in the east (Bongaarts, et al., 1984). The WFS survey reports that the youngest female nuptiality pattern occurs in Cameroon, Ivory Coast, and Senegal, where the proportions of ever-married women in the 15-19 age-group are 53%,56%, and 59% respectively (Cochrane and Farid, 1986). The young bride who is a stranger in her new (extended) family often enhances her status by giving birth to a child, and is therefore motivated to have children early and in considerable number.[4]

It is generally hypothesized that the more modern and affluent populations (the educated, urban, white-collar workers) have lower fertility than the traditional populations (the uneducated, rural, agricultural workers).[5] For sub-Saharan Africa as a whole, the expectations are fulfilled as the highest fertility rates are found in the rural areas. However, it appears that urban residence has not been a strong depressant for fertility. This is reflected in the fact that the urban-rural fertility differentials reported in Table 2.6 are relatively small; the average difference in the TFR between rural areas and major urban centres is only 1.16.

A large segment of WFS national fertility surveys consists of questions relating to the knowledge and practice of contraception among women. In these surveys, contraceptive methods are grouped into two major groups: efficient and inefficient methods.[6] A further distinction found in the literature is one based on the intent of birth control. According to this classification, birth control that is intended to limit family size (as opposed to child spacing) includes both the use of contraception and the practice of induced abortion (Bongaarts, et al., 1984). Table 2.7 summarizes the data on the use of contraception among currently married women ranked in order of level of use. In all ten countries, the use of modern methods of birth control at the time of the survey was very limited, and in four of them modern contraception was practised by only one percent of the women and not at all in the Ivory Coast and Mauritania. Current use of other methods is not prevalent either and is, on average, substantially below the level of use among married women in Asia and Latin America. Also, the difference between the proportion of current-users and ever-users is greater in sub-Saharan Africa than elsewhere, indicating an absence of sustained fertility control in the region. Data on induced abortion are very rare in SSA. In general abortion is probably used

in a number of urban areas among the very young women before marriage, but otherwise, the practice appears to be infrequent and has a negligible effect on fertility levels (Bongaarts, et al., 1984).

Important to the concept of controlled fertility is the mother's confidence in the survival of each child from birth through childhood. It is usually expected that, other things being constant, a sustained reduction in infant and child mortalilty rates will raise confidence in the chances of survival and will eventually contribute to lowering birth rates.[7] Tables 2.8 and 2.9 present WFS estimates of infant and child mortality derived from birth histories data covering a twenty-year period. The figures indicate that, with a few exceptions, there have been moderate to substantial declines in the levels of mortality among infants and children over that period. However, the data also show that mortality varies widely across sub-Saharan African countries. In the four years prior to the last survey, infant mortality range from 74 per thousand live births in Ghana to 126 per thousand in Lesotho. Over the same period, child mortality rates are higher; ranging from 127 deaths per thousand children under age five in Ghana, to the high rate of 262 per thousand in Senegal. It is suggested that high death rates among 2-3 year-olds, often

arising from nutritional problems following weaning, contribute significantly to the observed level of child mortality (Cochrane and Farid, 1986).

It should be noted that in WFS surveys, birth history estimates of infant and child mortality rely on the mother's reports of dates of live births and the age at death of children who die. In countries where the official registration of births and deaths is not routinely done, it is likely that omissions and misreporting can lead to distortions of the trends and the age pattern of infant and child mortality (Cochrane and Farid, 1986; Warwick, 1982).

In comparison with other developing regions, the data show that the rates are generally higher in sub-Saharan Africa. The most recent figures (0-4 years prior to last survey) indicate that infant mortality is 20 percent higher than in Asia and 49 percent higher than the rate in Latin America. The differences in child mortality rates are even higher -- 42 percent higher than the Asian rate and almost double the rate for Latin America.

In tropical Africa, as in other developing areas, mortality is often thought to be higher in rural than in urban areas. This is due to differences in living standards and health conditions in general, but particularly to the

differential availability of and access to public health facilities.[8] The data in Table 2.10 reflect the expected urban-rural differentials in infant and child mortality. In most countries, the rates are relatively low in major urban centres, higher in other urban areas, and higher still in the rural areas. There are, however, exceptions. In Kenya, Lesotho and Mauritania, infants born in rural areas have about the same chances of survival as those born in non-major urban areas, while in Nigeria, infants born in the metropolitan centres have no special survival advantage over those born in smaller cities.

We turn now to examine the institutional and cultural framework that supports the demographic characteristics of LDCs. In the next section we highlight the fertility-relevant components of social organization that mediate between individuals and families as decision-makers in the traditional sector. Researchers who have studied developing societies agree that an understanding of the family unit provides the basis for a proper understanding of the household economy and traditional fertility.[9] Drawing on examples from Africa and Asia, we illustrate the role of the family in traditional societies and its influence on their demographic features.

2.3: THE RURAL SOCIETY

Although rapid urban growth has become a conspicuous feature of LDCs in the recent past, the proportion rural in these countries remains high and recent United Nations estimates indicate that two-thirds of their populations are likely to remain in the rural areas until the first decade of the twenty-first century. Between 1960 and 1980, while the proportion of the population in the rural areas of LDCs decreased from 78 percent to 69 percent, the rural population itself increased from 1,632 million to 2,285 million, or by 40 percent (UN,1982).

The occupation of the rural people is primarily agriculture. A comparison of nations classified by the World Bank as low-, middle-, or high-income countries shows that the proportion of the labor force in agriculture declines from 72 percent in the low-income group, to 45 percent and 6 percent, respectively, in the middle- and high-income nations (World Bank,1980). Consistent with these results, the rural sectors of LDCs fall mainly in the low-income category.

In most rural societies, decisions about both agricultural production and fertility are made by

individual families, thus providing a vital connection between the two processes. While the structure and specific functions of the family may vary widely across societies, it invariably provides the link between the individual and the larger society. In an extended family household rights, obligations, and appropriate economic roles and authority are determined along kinship lines, and hence, the individual's well-being depends on the average well-being of the household and his/her relative position in the internal power structure of the family.

Agricultural production may be classified as either subsistence agriculture or the cultivation of cash crops; a farm family at any one time may be involved in one or both activities, depending on its size and resource endowments. The allocation of household labor and the choice of food for home consumption versus cash crops are usually determined by traditional rules and rights, as is the distribution of cash income from cash cropping (Galdwin, et al., 1987). The system of long-fallow cultivation practiced in most of Africa provides a great motivation for large family size (Boserup, 1984). Under that system, men and adolescent boys fell trees and burn bushes to clear land for cultivation; all other work in the fields is usually performed by women and children. Because women are

responsible for the production of food for the family, they make extensive use of child labor (Boserup, 1985). Where export (or cash) crops are produced, they are usually cultivated by men, but their wives often help in production, and sometimes also in processing and selling the crops (Boserup, 1985; Galdwin, et al., 1987). Therefore, women in such regions have need for substantial supplementary labor provided by their children, and men have economic motivation for polygamy and for having many children.

The economic contributions children make to their families in rural areas are varied, though not always easily quantified. They contribute their own labor, in the home and on the farm, often starting at young ages. For example, Nag and others (1978) report that boys aged six to eight years in a Nepalese village spend an average of 2.6 hours a day caring for farm animals, and girls of that age, besides similar duties, spend almost 1.7 more hours a day caring for other children. In a village in Java, it is reported that boys aged 15-19 years put in 8 hours of work a day, and girls of the same age contribute 10 hours per day.

In our context, the process of migration provides an

excellent example for examining the role of the family unit. The decision to migrate from the rural area may be individually motivated in that an individual leaves largely for his own good. Several village-level studies[10] in developing countries confirm that structural factors (such as the limited range of job opportunities) are of considerable importance in causing individuals to migrate. Riddell (1980) notes that in rural Africa economic necessity often pushes men out of the traditional society in order to work for wages. Boserup (1985) cites the emerging land shortages in certain areas as being a factor in the emigration of young people from the villages. Sometimes it is the perception of relative deprivation which prompts the move -- the realization that to remain in the rural society means poverty while a move to the city provides a chance of economic advancement.

On the other hand, some migration may be "linked" in that the "family" may be the motivation (Connell et al., 1976; Harbison, 1981; Stark and Bloom, 1985). For example, some migration may be the result of a decision made by the family to spread its labor resources beyond the home village. Connell and others (1976) point out that birth-order and the number of sons in the family may be very important in determining who migrates. The fact that

migration may occur for the sake of the family, rather than the individual, presents an interesting perspective on family size determination in developing societies.

When people move away from the rural area, they maintain ties with their families who remain in the villages, especially if the move was family-initiated. The nature of these ties may take various forms. One result of the linkage is a two-way flow of money and resources. In migration literature, the term "remittance" is often used to denote the money sent home by migrants. However, the definition need not be so narrow; remittance may include all money, goods, services and guarantees provided by one party (migrant) to another (family)(Caldwell, 1982). For example, among the Yoruba of Nigeria, social obligations require that the migrant make periodic returns to his home village to participate in family and community ceremonies.

The sharing of wealth between migrants and those who remain in the village of origin is the result of a complex pattern of socialization and the inculcated sense of duty is not necessarily discarded or weakened because family members have dispersed. However, a critical factor is the extent to which the village-based family, or its head, can establish and maintain control over its migrant members so

as to ensure a regular in-flow of remittances. Also, to the extent that a mover leaves his/her family of procreation (spouse and children) behind in the village, has investments in the village (e.g. farmland or farm animals), or intends ultimately to return to the village, he/she would feel obligated to remit money to the village-based family. Within the village community, there are usually various traditional mechanisms at the disposal of the family for exercising this control. For example, Hugo (1983) reports that in West Java, the adat or customary law regulates the patterns of reciprocal obligations and ties between and within families and generations, and thus the channels through which wealth is transferred.

Stark, in collaboration with a number of other researchers,[11] suggests a somewhat different explanation for the rural-urban links. According to this explanation, remittances are determined as part of a self-enforcing contractual arrangement between the migrant and the family to which the migrant adheres for reasons other than purely altruistic considerations. The underlying idea is that for the household as a whole, it may be a Pareto-superior strategy to have members migrate elsewhere, either as a means of risk-sharing or as an investment in access to higher earnings streams. Remittances are, therefore, a

device for redistributing gains, with the relative shares determined in an implicit contract struck between the migrant and the remaining family (Stark and Bloom, 1985). Whatever the differences in the explanations, a common theme is that family-motivated migration is a calculated strategy designed to achieve family-defined goals.

Many of the case studies from Africa and southeast Asia report that remittances are quite substantial. Rempel and Lobdell (1978) conclude from their review of the literature that the proportion of urban income remitted varies directly with the strength of social and economic ties to the rural area, and inversely with how well migrants have established themselves in urban areas. Other factors reported to influence the amount of remittance are the level of urban income, the migrant's education, and sex. Among "circular" migrants from fourteen West Javanese villages surveyed, Hugo (1983) reports that the proportion of Jakarta-earned income remitted ranged from 21 to 44 percent, the highest rates being among those who earned higher average incomes. Oberai and Singh (1980) observed that in the Indian Punjab, upward intergenerational wealth flows were large among 57 percent of the out-migrants they studied. Similar findings were obtained for Kenya (Knowles and Anker, 1981) and Nigeria (Odimuko and Riddell, 1979).

If remittances are large, it is meaningful to ask who controls or benefits from them. The evidence from Kenya suggests that transfers are made mostly to close relatives, that is, to husbands/wives, parents and children. The same is true for West Java where temporary migrants reportedly sent four-fifths of their remittances to their nuclear family of procreation, and the remaining one-fifth to their parents. Expenditures of remittances on the extended education of the children and siblings of migrants is a widespread practice in southern Nigeria. For example, in the southeastern part of the country, cash remittances were found to have little effect upon expenditures on primary school education but to have a significant impact on secondary schooling (Odimuko and Riddell, op. cit.).

An overriding conclusion from many of these studies is that remittances are seldom used for investments aimed at rural development. In the poorer villages and households, most of the remittance is used to purchase basic necessities and very little is spent on developing agricultural land. In the more "affluent" rural households the incoming money is used to improve the dwellings and generally to enhance the prestige of the parents and elders. Such practices led Rempel (1981), in commenting about Kenya, to observe that to the extent that remittances

flow to parents and village elders they keep the traditional systems functioning in the rural areas, and thereby prevent the changes required for development.

2.4: SUMMARY

We have examined the social context of the traditional economy. The central role of the family unit in the decision-making process has been highlighted using the incidence of rural out-migration as an example. That the maintenance of rural ties and resulting remittances are prevalent among LDC migrants is clear. These remittances are directed mainly toward the family of procreation and the family of orientation. Remittances of the latter kind are particularly significant because they involve an upward intergenerational flow of wealth from children to parents. Several researchers who have studied traditional societies maintain that this upward direction of wealth flows, and the social structure that reinforces it, constitute a major factor in the persistence of stable high fertility levels in the rural areas of LDCs (Mamdani, 1972; Caldwell, 1976, 1978). In the next chapter we examine, in greater detail, a particular traditional society, namely the traditional society of Nigeria.

2.5: NOTES TO CHAPTER 2

1. Of the ten sub-Saharan countries, all but Kenya, Lesotho and Sudan belong to the West African sub-region.

2. The TFR can be interpreted as the total number of children a woman would bear in the course of her lifetime were she to experience at each age of her reproductive life, the current prevalent rate of childbearing among women at each age.

3. SAFM is the number of years spent single by women who ultimately marry.

4. In those developing societies which are rigidly patriarchal and patrilineal, a secure basis for women's power and status is derived from their ability to have children, especially sons. Hence, they have no motivation to limit the number of children they bear until they have at least two or three sons to consolidate their position in the household (Safilios-Rothschild, 1982). Cain includes an additional element of patriarchal control of significance to the fertility level-- namely, the economic dependence of women on men that is created through the sexual division of labor, restrictions of women's physical mobility, and labor market segmentation. Where their earning opportunities are few, sons represent an important source of insurance against the risk of losing the economic support of a husband. Hence women who are excluded from mainstream sources of income have a strong incentive to reproduce. A case in point is rural Bangladeshi society (Cain, 1982).

5. See for example, a review of the literature by McGreevey et al.(1974) cited by Goldberg (1976).

6. In all the WFS surveys, seven methods are coded as efficient, namely, the pill, the IUD, condom, injection, female and male sterilization, and "other scientific methods" (e.g. spermicidal foams, diaphragm, etc.). Seven categories are coded as inefficient, including the douche, rhythm, abstinence, and all other country-specific folk or local methods reported (Cochrane and Farid, 1986:24).

7. T. Paul Schultz has done a considerable amount of work on the interrelationships between mortality and fertility in developing countries. Using a simple household model, his work goes along the following lines. If we assume that parents want children in order to obtain economic and other benefits, infant and child mortality exert two offsetting effects on fertility. First, a reduction in child mortality increases the number of survivors demanded by decreasing the expected "cost" (including monetary, opportunity, and psychic costs) to parents of bearing and rearing enough offspring to obtain a survivor. Second, it decreases the derived demand for births for a fixed surviving family-size goal of parents by decreasing the number of births required to obtain, on average, a survivor. The former price effect of decreased child mortality should induce parents to want more surviving offspring, but fewer births will be required for any desired number of surviving children, because of the latter supply effect (Schultz, 1976). See an application in Ketkar's 1979 study of Sierra Leone.

8. Studies have shown that the existence of public health services in small traditional villages reduces mortality; see for example, Orubuloye and Caldwell (1975).

9. See for example, Caldwell's work on Africa (1968,1976,1982) and Hugo's studies of S.E.Asia (1983).

10. The collection of studies in De Jong and Gardener

(1981) and Connell et al. (1976) provide excellent sources of information on rural out-migration at the village level.

11. A number of working papers on migration in developing countries have been released by the Migration and Development Program at Harvard University. See for example, Stark and Lucas (1985); Stark and Bloom (1985); Stark and Katz (1985).

TABLE 2.1. POPULATION SIZE AND MEASURES OF CHANGE, THE WORLD AND SELECTED REGIONS, 1950-84

MACRO REGIONS	ESTIMATES OF MID-YEAR POPULATION (MILLIONS)								ANNUAL RATE OF INCREASE (%)	CRUDE BIRTH RATE	CRUD DEAT RAT
	1950	1960	1965	1970	1975	1980	1983	1984			
WORLD TOTAL	2,504	3,014	3,324	3,683	4,076	4,453	4,685	4,763	1.7	27	1
AFRICA	222	278	314	357	410	476	521	537	3.0	46	1
Western Africa	64	81	92	107	123	144	158	163	3.1	49	1
Eastern Africa	60	76	87	101	117	108	150	155	3.2	49	1
Northern Africa	52	65	73	83	94	108	118	121	2.9	42	1
Middle Africa	29	35	38	42	48	55	59	61	2.7	45	1
Southern Africa	17	21	23	26	29	33	35	36	2.5	40	1
AMERICA	331	415	463	510	560	614	647	658	1.7	25	9
Northern America	166	199	214	227	239	252	259	261	0.9	16	9
Latin America	165	217	249	284	322	362	388	397	2.3	32	8
ASIA	1,366	1,666	1,853	2,095	2,357	2,591	2,731	2,777	1.7	27	10
East Asia	671	801	873	984	1,102	1,183	1,225	1,239	1.1	18	7
South Asia	695	864	980	1,111	1,255	1,408	1,506	1,539	2.2	35	13

NOTE: Rates are expressed per 1000 population, values reported in the last three columns are average annual rates over the period 1950-84.

SOURCE: UN, Demographic Yearbook 1984. New York: 1986, p.143.

TABLE 2.2. ESTIMATES OF POPULATION SIZE AND AGE DISTRIBUTION: THE WORLD AND SELECTED REGIONS, 1985

	POPULATION (MILLIONS)				PERCENTAGE DISTRIBUTION			
MACRO REGIONS	ALL AGES	<15	15-64	65+	<15	15-64	65+	ALL AGES
WORLD TOTAL	4,842	1,632	2,933	277	34.0	61.0	6.0	100.0
AFRICA	553	251	285	17	45.0	52.0	3.0	100.0
Western Africa	168	79	85	4	47.0	50.0	3.0	100.0
Eastern Africa	161	76	80	4	47.0	50.0	3.0	100.0
Northern Africa	125	54	67	5	43.0	53.0	4.0	100.0
Middle Africa	63	28	33	2	44.0	53.0	3.0	100.0
Southern Africa	37	15	20	1	42.0	54.0	4.0	100.0
LATIN AMERICA	406	154	233	18	38.0	58.0	4.0	100.0
ASIA	2,824	989	1,711	124	35.0	61.0	4.0	100.0

SOURCE: UN, ibid., pp. 144-145.

TABLE 2.3. SSA COUNTRIES: VITAL RATES, RATES OF NATURAL INCREASE, AND EXPECTATION OF LIFE AT BIRTH

COUNTRY	YEAR	CRUDE BIRTH	GENERAL FERTILITY	CRUDE DEATH	INFANT MORTALITY	NATURAL INCREASE	EXPECTATION OF LIFE AT BIRTH	
							MALE	FEMALE
BENIN	1980-85	51.0	226.9	22.5	109.6	28.5	40.9	44.1
CAMEROON	1980-85	43.2	188.0	17.8	117.0	25.4	46.4	49.7
GHANA	1980-85	47.0	223.0	14.6	156.0	32.4	50.3	53.7
IVORY COAST	1980-85	46.0	220.0	18.0	138.0	28.0	45.4	48.7
KENYA	1980-85	55.1	267.0	14.0	82.0	41.1	46.9	51.2
LESOTHO	1971	36.7	173.0	14.5	114.4	22.2	47.7	51.0
MAURITANIA	1980-85	50.1	173.0	20.9	187.0	29.2	42.4	45.6
NIGERIA	1980-85	50.4	231.0	17.1	114.0	33.3	48.0	52.0
SENEGAL	1980-85	47.7	174.0	21.2	92.9	26.5	41.7	44.9
SUDAN	1980-85	45.9	234.3	17.4	93.6	28.5	46.6	49.0

NOTES: Rates are per 1000.
Expectation of life figures for Kenya relate to 1969, those for Lesotho to 1980-85, and those for Nigeria to 1984.

SOURCES: (i) UN, ibid., pp.156-157.
(ii) World Bank, World Development Report. Washington: 1984, pp. 256,262.

TABLE 2.4. SSA COUNTRIES: ESTIMATES OF TOTAL FERTILITY RATES FOR FIVE-YEAR PERIODS PRIOR TO SURVEY

COUNTRY	YEAR OF SURVEY	YEARS BEFORE SURVEY			
		0-4	5-9	10-14	15-19
BENIN	1981-82	7.08	6.97	6.99	7.08
CAMEROON	1978	6.49	6.47	5.70	5.32
GHANA	1979-80	6.47	6.97	7.21	7.27
IVORY COAST	1980-81	7.36	7.86	7.67	7.32
KENYA	1977-78	8.25	8.84	9.15	8.50
LESOTHO	1977	5.76	5.53	5.75	5.63
MAURITANIA	1981	6.25	7.18	6.86	6.49
NIGERIA	1981-82	6.34	6.97	6.52	6.57
SENEGAL	1978	7.15	7.50	7.72	7.90
SUDAN	1979	6.02	7.09	7.02	6.87
SSA AVERAGE		6.71	7.14	7.06	6.87

SOURCE: S.H.Cochrane and S.M. Farid, Fertility in Sub-Saharan Africa: levels and their explanation. (mimeo). February, 1986, p.78.

TABLE 2.5. SSA COUNTRIES: TOTAL AND AGE-SPECIFIC FERTILITY RATES

COUNTRY	YEAR OF SURVEY	AGE GROUPS							TFR
		<20	20-24	25-29	30-34	35-39	40-44	45-49	
BENIN	1981-82	151	314	329	278	193	99	51	7.08
CAMEROON	1978	185	295	276	220	155	106	41	6.40
GHANA	1979-80	132	257	266	242	169	135	50	6.47
IVORY COAST	1980-81	216	313	300	248	203	132	60	7.36
KENYA	1977-78	178	342	357	293	239	145	96	8.25
LESOTHO	1977	104	269	254	242	169	86	32	5.76
MAURITANIA	1981	155	264	290	242	168	86	44	6.25
NIGERIA	1981-82	173	284	274	231	147	100	60	6.34
SENEGAL	1978	189	304	332	265	197	108	34	7.15
SUDAN	1979	114	264	283	251	149	108	35	6.02
SSA AVERAGE		160	291	296	251	179	111	41	6.71

NOTE: Rates are calculated per 1000 women and averaged over 5 years prior to each survey.

SOURCE: Cochrane and Farid, ibid., p.79.

TABLE 2.6. SSA COUNTRIES: RECENT LEVELS OF FERTILITY BY RESIDENCE

COUNTRY	YEAR OF SURVEY	TOTAL FERTILITY RATE, Ages 15-49			
		ALL	MAJOR URBAN	OTHER URBAN	RURAL
BENIN	1981-82	7.08	5.75	6.70	7.40
CAMEROON	1978	6.40	5.30	6.70	6.51
GHANA	1979-80	6.47	5.41	6.26	6.79
IVORY COAST	1980-81	7.36	6.42	6.86	7.72
KENYA	1977-78	8.25	5.90	6.08	8.48
LESOTHO	1977	5.76	4.79	—	6.23
MAURITANIA	1981	6.25	6.25	6.13	6.28
NIGERIA	1981-82	6.34	6.73	5.88	6.39
SENEGAL	1978	7.15	6.76	6.32	7.47
SUDAN	1979	6.02	4.80	5.68	6.43
SSA AVERAGE		6.71	5.81	6.29	6.97

NOTES: (i) — indicates not available.

(ii) A city may be classified as "major" because of its socio-economic and political importance (e.g., a country's capital city or key commercial centre), or its large population size. It is not unusual for one city to satisfy both criteria in the African context. Other cities are ranked in relation to the major ones.

SOURCE: Cochrane and Farid, ibid., p.102.

TABLE 2.7. SSA COUNTRIES: LEVELS OF EVER AND CURRENT USE OF CONTRACEPTION AMONG CURRENTLY MARRIED WOMEN (standardized for age)

EVER USE				CURRENT USE			
ALL METHODS		EFFICIENT METHODS		ALL METHODS		EFFICIENT METHODS	
COUNTRY	PERCENT	COUNTRY	PERCENT	COUNTRY	PERCENT	COUNTRY	PERCENT
IVORY COAST	74	GHANA	18	BENIN	20	GHANA	6
GHANA	41	KENYA	13	GHANA	10	KENYA	5
BENIN	37	SUDAN	10	KENYA	8	LESOTHO	3
KENYA	32	LESOTHO	7	LESOTHO	6	SUDAN	3
LESOTHO	25	BENIN	3	NIGERIA	5	BENIN	1
NIGERIA	14	CAMEROON	2	SENEGAL	4	CAMEROON	1
SUDAN	13	IVORY COAST	2	SUDAN	4	NIGERIA	1
SENEGAL	12	NIGERIA	2	CAMEROON	3	SENEGAL	1
CAMEROON	10	SENEGAL	2	IVORY COAST	2	IVORY COAST	0
MAURITANIA	2	MAURITANIA	1	MAURITANIA	1	MAURITANIA	0
SSA AVERAGE	26		6		6		2
ASIA (10 countries)	40		32		25		19
L.AMERICA (8 countries)	62		50		42		33

NOTE: Contraceptive use is standardized for age to avoid confusing educational differentials with differences in usage over the life cycle, since younger women tend to be the better educated (see p.37).

SOURCE: Cochrane and Farid, ibid, p.90.

TABLE 2.8. SSA COUNTRIES: TRENDS IN INFANT MORTALITY

COUNTRY	YEAR OF SURVEY	YEARS PRIOR TO SURVEY			
		0-4	5-9	10-14	15-19
BENIN	1981-82	107.6	136.3	138.5	171.1
CAMEROON	1978	104.6	104.7	134.2	139.3
GHANA	1979-80	73.5	74.6	88.7	85.9
IVORY COAST	1980-81	113.1	147.5	164.5	174.9
KENYA	1977-78	86.6	98.7	101.5	127.3
LESOTHO	1977	125.8	133.3	147.5	121.1
MAURITANIA	1981	90.2	83.7	79.9	105.4
NIGERIA	1981-82	90.0	90.8	109.6	108.7
SENEGAL	1978	111.8	122.5	118.5	122.0
SUDAN	1979	79.4	78.3	78.5	65.2
SSA AVERAGE		98.3	107.0	116.1	122.1
ASIA (10 countries)		81.9	87.0	97.3	105.5
L.AMERICA (12 countries)		66.1	71.3	74.5	80.3

NOTE: Rates are calculated per 1000 live births for infants aged 0-1.

SOURCE: Cochrane and Farid, ibid., p.96.

TABLE 2.9. SSA COUNTRIES: TRENDS IN CHILD MORTALITY

COUNTRY	YEAR OF SURVEY	YEARS PRIOR TO SURVEY			
		0-4	5-9	10-14	15-19
BENIN	1981-82	204.2	250.8	254.3	289.3
CAMEROON	1978	191.2	198.0	240.0	244.8
GHANA	1979	127.4	132.0	160.0	153.0
IVORY COAST	1980-81	172.0	231.3	253.4	290.7
KENYA	1977-78	141.6	163.6	167.4	201.4
LESOTHO	1977	173.7	185.0	199.2	170.5
MAURITANIA	1981	195.9	181.1	166.3	217.0
NIGERIA	1981-82	166.1	160.7	204.9	209.6
SENEGAL	1978	262.4	283.2	292.6	275.2
SUDAN	1979	147.3	135.9	142.8	146.7
SSA AVERAGE		178.2	192.2	208.1	219.8
ASIA (10 countries)		125.6	130.4	150.9	169.0
L.AMERICA (12 countries)		92.5	101.0	110.9	122.1

NOTE: Rates are calculated per 1000 children aged under five years.

SOURCE: Cochrane and Farid, ibid., p.96.

TABLE 2.10. SSA COUNTRIES: INFANT AND CHILD MORTALITY BY PLACE OF CURRENT RESIDENCE (Rates per 1000)

COUNTRY	YEAR OF SURVEY	INFANT MORTALITY			CHILD MORTALITY		
		MAJOR URBAN	OTHER URBAN	RURAL	MAJOR URBAN	OTHER URBAN	RURAL
BENIN	1981-82	52.0	98.3	166.2	(45.3)	68.3	112.0
CAMEROON	1978	83.0	90.7	108.3	40.0	55.9	64.9
GHANA	1979	46.2	71.2	80.5	33.0	24.4	39.8
IVORY COAST	1980-81	83.8	128.1	140.1	33.1	42.5	51.8
KENYA	1977-78	71.2	93.5	93.2	(15.4)	22.1	37.7
LESOTHO	1977	—	(127.8)	129.4	--	(40.6)	26.9
MAURITANIA	1981	69.5	92.4	90.7	46.0	54.3	88.2
NIGERIA	1981-82	73.0	65.1	96.0	42.4	36.1	49.0
SENEGAL	1978	68.1	78.4	136.9	43.9	69.3	133.5
SUDAN	1979	90.8	70.4	81.7	19.0	28.2	48.2
SSA AVERAGE		69.7	91.6	112.3	35.3	44.2	65.2

NOTE: ( ) denotes probable inaccuracy or the combination of figures. For example, there is no distinction between "major" and "other" urban areas in the Lesotho data.

SOURCE: Cochrane and Farid, ibid, p.116.

CHAPTER 3

A TRADITIONAL ECONOMY: THE NIGERIAN EXAMPLE.

3.1: INTRODUCTION

Nigeria is the most populous country in Africa with an estimated population of 93.7 million people in 1984. The official annual rate of growth of the population is 2.5 percent although some United Nations sources put it at between 2.9 and 3.1 percent.[1] At the official rate, doubling of the population size occurs roughly every 28 years; at the UN rates it occurs every 22 to 24 years.

Apart from the large size of the country's population, the choice of Nigeria for present purposes is motivated by the fact that the country is overwhelmingly rural. The World Bank estimated that rural dwellers constituted 79 percent of the population in 1982. The country therefore has a large rural society which provides an excellent example of an African variant of a traditional economy.

The economy of Nigeria has always been largely

agricultural but starting in the late 1960s its economic base shifted in significant measure to petroleum following the discovery and exploitation of oil in commercial quantities. However, the country is still essentially agricultural in character, with about two-thirds of the labor force engaged in subsistence farming. Nonetheless the contribution of the agricultural sector to the gross national product and to the nation's foreign exchange earnings has declined substantially. In the mid-1980s, over 90 percent of Nigeria's foreign exchange comes from crude oil exports.

In what follows, we present the demographic picture of rural Nigeria and, where data permit, compare it with that of urban areas. As was the case in Chapter 2, we follow the demographics with a description of the rural social setting. For reasons that are stated later, we have chosen the traditional Yoruba society of Western Nigeria for illustrative purposes.

3.2: DEMOGRAPHIC CHARACTERISTICS OF RURAL NIGERIA

As part of the World Fertility Survey (WFS) program, periodic national fertility surveys are undertaken across

developing countries. Much of the data used in this section result from the latest Nigeria Fertility Survey (NFS) conducted between October 1981 and August 1982. A total of 8,264 households were covered, and a few of their characteristics are summarized in Table 3.1. The average household size is 5.83 with the rural dwellers recording a higher average. A smaller proportion of households are occupied by single individuals in the villages than in the cities and, as expected, there is a higher percentage of extended households in the villages. The predominant marriage type in both sectors is monogamy, and a typical household consists of two generations (parents and children).

Selected measures of fertility are presented in Table 3.2. In the five years prior to the survey, the total fertility rate averaged over six children per woman, and the rate was significantly higher for married women. As was the case for all of sub-Saharan Africa, the age-specific fertility rates indicate remarkably high levels for young women between the ages of 15 and 24 years. The median age at which women in this age-group gave birth to their first child was 18.6 years. Again, the pattern of marriage has a close bearing on the observed fertility in general, and marital fertility in particular. As shown in Table 3.3,

over 95 percent of the surveyed women were in a marital union by age 30, implying near-universality of marriage. The proportion of unmarried women decreases with age, from 59.7 percent for women aged 15-19, to only 0.6 percent for the 45-49 age-group. In terms of place of residence, the median age at first marriage was 16.5 years for rural women and 18.4 for urban women. These facts, together with the timing of the birth of a first child, would suggest that childbearing occurs very early in a marital union.

Contraceptive use is not prevalent among Nigerian women and, as Caldwell puts it, there is very little evidence that family planning is securing a rural toehold. According to Table 3.4, of the 15 percent of women who have ever used any method of birth control, most used inefficient methods. The major constraints upon fertility are very substantial periods of sexual abstinence by women after childbirth and a high frequency of female terminal abstinence. Postpartum abstinence has traditionally been practiced for periods of around three years; the lengthy span is often explained by the desire to space births and to increase the chance of child's survival. The length of the period of postpartum abstinence is becoming shorter, especially in the cities and most markedly among the educated. But in the society as a whole, it still averages over two years and provides the

most important control of the length of inter-pregnancy intervals, and of fertility. The most common cause of terminal abstinence is the birth of a woman's first grandchild, which raises the possibility of a conflict between maternal and grandmaternal duties (Okediji, et al., 1976). Another point of interest is the finding that only 2 percent of the women who used contraception (other than abstinence) in the past intend to use any in the future.

An important correlate of the fertility level is the prevailing mortality conditions, especially infant and childhood mortality. In a high mortality society like Nigeria there is an apprehension about having too few children only to have all or most die and there is a profound fear of being childless.[2] The data in Table 3.5 show that both infant and child mortality are high although the rates have declined considerably over the 1965-1980 period. Throughout the period, female children had a better chance of survival than male children, a fact that may have significant positive impact on fertility in areas where there is a strong cultural preference for sons.

3.3: THE TRADITIONAL YORUBA SOCIETY

The Yorubas are the indigenous inhabitants of Western Nigeria (composed of Lagos, Ogun, Ondo and Oyo states) and considerable parts of Kwara state (middle-belt), making them one of the largest ethnic groups in the country. The Yoruba society is well suited to be used for illustrative purposes because it is relatively better documented than other sections of the Nigerian society. For example, it was the focus of the largest segment of the Changing African Family Project and the Nigerian Family Study[3] which provide a substantial portion of the currently available data on the Nigerian family. In addition to the availability of information, there is the fact that a large segment of the Yoruba society is rural and traditional even though a number of large cities, for example, Lagos, Ibadan,[4] Ilorin, and Abeokuta, are located in these areas.

Life in the rural areas is centred for the most part around agrarian activities. Control over agricultural land is vested in communities and families. Individual occupants are identified by the rights they hold rather than by actual ownership of the land. Under this system, individuals do not have complete control of the land in use and sale of parts or all of it is hardly possible. In some

parts of the society, the practice of farm tenancy is common. Terms of these tenancy agreements often forbid the sub-leasing of farmland and tenants may not cultivate permanent crops on the land leased to them (Olaloku,1979). Under these and other such limitations, joint family decisions on social and economic matters are inevitable.

The fertility rate among Yoruba women is high; the mean ideal family size of women who were prepared to give a precise numerical answer[5] to the question of the "best number of children to have" was 5.7. Only 18 percent of all women regarded family size of less than five children as ideal. The most marked differential in acceptance of the five-child family is by education: 19 percent of the illiterate would accept such a "small" family in contrast to 78 percent of the group who have had some university education. Nevertheless, any family size less than four was so small as to be unthinkable in a Yoruba context in the mid-1970s. Fewer than 2 percent of respondents would choose to have fewer than four children. As stated earlier in the chapter, there is very little attempt made to control fertility and the abhorrence of childlessness is universal in the community. In rural Yoruba society, it is still one of the undisputed facts of life that family numbers, political strength, and affluence are very closely

interrelated. As with other Nigerian rural societies, villages consist of closely located sets of extended family compounds, often comprising the head of the compound, his wife or wives, one or more of the patriarch's younger sons and their wives, unmarried sons and daughters, and aged parents. Networks of relatives[6] are important because they determine one's economic and consequently political power, and provide the basis for an intricate system of mutual obligations.

There are two related ways of increasing the size of one's social network: by reproduction, and by the marriage of one's children. In such a setting, situational gain is of particular importance to patriarchal males. As the number of children beyond infancy grows, and as the number of wives[7] and ultimately the number of children-in-law increases, it is inevitable that the person at the top of the pyramid controls more resources and acquires access to more services and power.[8] This is particularly true in the traditional Yoruba society where there are inequalities, based on sex and age, in the distribution of wealth and consumption.

Children in rural Yoruba households begin to help in the home and on the farm at a very early age (5-7 years)

and they perform a whole range of time-consuming and market-oriented tasks[9] that contribute to the welfare of the family. From the point of view of the farming household, one of the advantages of large number of children is the ability to carry on their farming without having to hire outside labor during periods of peak labor demand. In fact, a large family may, in addition to meeting its own labor demand, be able to hire out its excess labor to other farms.

However, young people are increasingly becoming disillusioned with rural life, the drudgery of farm work, and the limited opportunities for self-advancement. Interestingly, the adults share the same sentiment, as reflected by the fact that only one-sixth of all rural respondents were prepared to see their children become peasant farmers like themselves (Caldwell, 1982). It is generally perceived that the way out of the village to jobs in the modern sector of the economy is almost solely through extended education and there is a remarkable willingness among parents to spend on the education of their children. Getting children to the right schools and keeping them there long enough often requires the coordination of a number of strategies. It may be necessary to persuade relatives outside the nuclear family to help

with the payment of school fees and/or with accommodation in the cities where the higher educational institutions are located. Relatives living and working in urban areas often have both the means and understanding of the social system there to render the necessary and expected assistance. Consequently, the family may initiate the out-migration of some of its young members for the purpose of further education. It is not unusual for priority to be given to those children with the most chance of success.

On casual observation, it would seem that large families would cost parents more to educate and hence make high fertility very expensive and uneconomical. But, apart from help from the extended family, there is an "institution" within the nuclear family that greatly weakens the direct relationship between high fertility and education cost. This institution is what Caldwell calls the "sibling educational-occupational chain", in that, if one child has been educated far enough to get an urban high-income job, it is almost inevitable that he or she will meet the expectation of helping with the education of the remaining siblings. Where the chain moves smoothly, parents make the maximum financial outlays only for the education of the older children; thereafter, they get considerable, if not total, relief from the burden of educational costs.

Schooling, especially prolonged stay in the school system, definitely affects the rural labor market. The most direct impact, of course, is that fewer children are available for farm activities because some are away at school. However, educating children brings with it substantial measurable and immeasurable gains. There is the prestige of being the parent of educated, "well-placed" children in the city. Apart from the sibling-education chain, most rural parents (70 percent according to the 1975 survey) receive continuing assistance from their adult children. What is significant is that such assistance is not dependent on the state of health of the parent. Money, goods and services are given by children, regardless of their marital status, to healthy fully employed parents. Children on average are reported to remit money to parents equal to 10-15 percent of rural household incomes (Caldwell, 1982). Odimuko and Riddell (1979) observed a pattern to the remittances sent by migrants in southeastern Nigeria which is also applicable to Yoruba migrants; that is, that the amount remitted peaked in September, December and March-April. The September peak corresponds to the beginning of the school term when school fees are required, while the December peak reflects the increased household needs during the Christmas period. The peak in March-April

corresponds with Easter festivities and the time of heavy agricultural activities. It would therefore appear that the most secure old man in the village would be the one who has some non-migrant children helping him locally as well as migrant ones who bring in other forms of wealth from the cities. It is also obvious that this strategy is dependent on high fertility and the continuance of the system of obligations.

A number of researchers of West African demography[10] have proposed a thesis that fertility in the region will decline in the future, and that the root cause of the fall will be family nucleation, not in residence patterns but in the concentration of expenditures and obligations. This would mean an end of the old system of mutual obligations formed in a society of large family compounds. In its place would be a strengthening of conjugal bonds and the placement of the individual's needs above those of the larger family. Historical evidence from other parts of the world seem to support this thesis.

Ransom and Sutch (1986) did a study of the relationship between out-migration and the decline of fertility in antebellum New England. Eighteenth-century American farms were family owned, family operated, and self-sufficient. At

the same time the fertility of the farming population was high, with an estimated TFR in 1800 of between seven and eight children. As in contemporary rural African communities, high rural fertility and agricultural self-sufficiency were mutually reinforcing. In the absence of well developed financial markets, self-sufficiency required a reliance upon family-based mechanisms of reciprocity.

But by about the beginning of the 19th century a long, sustained and sharp decline in fertility began. Ransom and Sutch argue that this development coincided with a revolution in the structure of the American family; there was a shift from family to individual values. The old system of grown children providing for old-age began to break down with the opening of the trans-Appalachian West. The resultant high youth out-migration and increased incidence of "child default" in support put such a strain on the traditional system that it became necessary to devise a more reliable strategy of securing old age. In the new regime, parents provided for their retirement years by accumulating assets during their working life. The ultimate result of the reduced reliance on children was that the post-transition household had fewer children.

Williamson (1985) reports similar findings for 19th

century rural England where increased out-migration of young adult males led to a considerable rise in child default rates. The departing young people rarely returned and, because remittances of money to the rural family members were uncommon in England, these departures were tantamount to a default on the parents' investment in their children's rearing costs. Williamson concludes that such defaults were an important factor in the subsequent decline of fertility in rural England.

At the present time, the old system of meeting social and economic ends is still very much in operation in the rural Yoruba society and will continue to be so until a sufficient number of people opt out of it. As with most traditional practices, there are sanctions designed to preserve the system. For example, if a person who is in the position to meet certain obligations or provide financial assistance refuses to do so, he may become persona non grata in his village and forfeit rights to own property in the community.

3.4: SUMMARY

In Chapters 2 and 3, we have looked at the demographic

characteristics of developing countries in general, and of a traditional economy in particular. We have focused on some components of the institutional and cultural context of fertility behavior, and especially on the role of the (extended) family unit. However, the analysis would be incomplete if these factors are accorded exclusive priority over economic factors. Several economists have made valuable contributions to the formulation of concise and testable economic models of fertility decision-making. The economic view point forms the subject-matter of the following chapters.

3.5: NOTES TO CHAPTER 3

1. Reliable official national census data are sadly lacking in Nigeria. The last national enumeration was done in 1973 but due to the fact that the exercise was plagued with irregularities, the results were discarded. Consequently, the official figures in use are updates of the 1963 census data.

2. For example, as Caldwell (1982) reports, there is an intense fear among the Yoruba of being left without descendants. 92 percent of respondents agreed that "the real dead are those who die without descendants". Among the Igbo of Eastern Nigeria, it is also generally accepted that the true test of marital success is in procreation, and a married couple's social status is often closely associated with the number of surviving (male) children (Ukaegbu, 1981).

3. The changing African Family Project was begun in 1973 as a cooperative venture of the Sociology Department of the University of Ibadan and the Demography Department of the Australian National University, with research institutes and individuals in eleven representative countries of Africa, to investigate the preconditions of fertility decline.

4. The population of Lagos is estimated at over two million and Ibadan has over a million people.

5. It is frequently reported by field researchers that respondents give responses such as "up to God" rather than a specific number. Such answers reflect an element of fatalism, suggesting that family-size decisions may be beyond the control of respondents (for example, because of cultural practices).

6. Cain (1982) distinguishes between immediate lateral kin (brothers, cousins, uncles) and immediate lineal kin (father, son, and perhaps, grandson). The weaker the lateral bonds of obligation and economic co-operation, the more an individual must depend on lineal kin. In rural Bangladesh, where lateral bonds are very weak, a man can build a kin-based insurance network only through reproduction. The value of children as a source of insurance and the value of having many children is thus increased.

7. The fact that a man benefits economically in such a society by polygamy is affirmed in the literature. See for example, Boserup (1970) and results from the Nigerian Family Study (1974-75).

8. McNicoll (1980) describes a similar situation for rural Bangladesh. For affluent landowners, children represent opportunities for the family's occupational diversification and hence for expansion or consolidation of its local power. Lower down, among middle and poor peasants, the evidence suggests that children become net producers early (by about age 12 for the average male child), while the consumption costs of early childhood tend to be sheltered within a patrilineal family. In addition, sons who have reached majority by the time their father dies are an important source of security for the widow and for the family's assets.

9. Housework includes house-cleaning, running errands, and minding of younger siblings; farm activities include weeding, making mounds in preparation for planting, harvesting, and marketing of family produce. For a list of the individual tasks performed by children, see Caldwell (1982:47-58).

10. Prominent among them is Caldwell, whose views have been expressed in a series of papers since 1968. Support for the thesis also comes from studies done in Ghana by

Oppong (1974,1977) and in Sierra Leone by Ketkar (1979).There is, however, a voice of dissent. While accepting that the reliability of extended kin networks as insurance varies in degree across developing societies, Cain suggests an alternative hypothesis that, ceteris paribus, the greater the reliability of extended and lateral kin networks, the less important children will be as a source of insurance, and the less resistant will the society be to fertility decline.

TABLE 3.1. NIGERIA: SELECTED CHARACTERISTICS OF SURVEYED HOUSEHOLDS

CHARACTERISTIC	RURAL	URBAN	ALL
AVERAGE HOUSEHOLD SIZE	5.98	5.09	5.83
HOUSEHOLD STRUCTURE (%)			
No Couples	19.20	25.60	20.30
Nuclear	56.80	52.60	56.10
Extended	24.00	21.80	23.60
MARRIAGE TYPE (%)			
Monogamous	76.30	85.20	77.70
Polygynous	23.70	14.80	22.30
GENERATIONS IN HOUSEHOLD (%)			
One	18.90	24.30	19.80
Two	72.80	70.30	72.40
Three	8.10	5.20	7.60
Four	0.20	0.20	0.20

SOURCE: Extracted from World Fertility Survey (WFS), The Nigeria Fertility Survey, 1981-82: A Summary of Findings. Voorburg: International Statistical Institute, September 1984, p. 3.

TABLE 3.2. NIGERIA: SELECTED MEASURES OF FERTILITY BY CURRENT AGE

MEASURE	CURRENT AGE							
	15-19	20-24	25-29	30-34	35-39	40-44	45-49	ALL AGES
Age-specific fertility rate (ASFR)	173.3	283.5	274.0	230.5	146.9	99.5	59.6	6.3
Age-specific marital fertility rate (ASMFR)	309.0	324.3	283.1	239.4	156.4	108.6	74.9	7.3
Median age at birth of first child	—	18.6	19.0	19.0	19.8	20.9	20.9	19.5

NOTES: (i) ASFR and ASMFR are for the five-year period before the survey and the corresponding "All Ages" figures represent the total fertility rates. Rates are calculated per 1000 women.

(ii) The figures in the last row of the table are data for ever-married women only.

SOURCE: NFS, ibid., p. 11.

TABLE 3.3. NIGERIA: DISTRIBUTION OF WOMEN ACCORDING TO AGE AT FIRST MARRIAGE BY CURRENT AGE

CURRENT AGE	AGE BY FIRST MARRIAGE (%)							NEVER MARRIED (%)	NUMBER OF WOMEN
	<15	15-17	18-19	20-21	22-24	25-29	30+		
15-19	22.1	--	--	--	--	--	--	59.7	2,101
20-24	33.9	31.3	10.5	--	--	--	--	15.2	1,710
25-29	37.9	30.0	11.8	8.2	6.4	--	--	3.2	1,766
30-34	35.6	33.9	13.7	8.3	4.7	2.5	--	1.0	1,347
35-39	32.7	33.4	13.2	10.5	5.0	3.2	1.1	0.9	1,110
40-44	23.8	28.4	17.7	14.1	5.8	7.3	2.0	1.0	904
45-49	27.6	27.2	15.6	11.2	8.4	5.4	3.9	0.6	591

NOTES: (1) In the Nigeria Fertility Survey, marriage was defined to include all legally, traditionally, and religiously contracted unions as well as other stable cohabitations not officially recognized by law, tradition or religion.

SOURCE: NFS, ibid., p. 6.

TABLE 3.4. NIGERIA: PERCENTAGE OF WOMEN WHO HAVE EVER USED CONTRACEPTION BY CURRENT AGE

CURRENT AGE	ONE OR MORE EFFICIENT METHODS	INEFFICIENT METHODS ONLY	ANY METHOD
15-19	4.7	9.1	13.8
20-24	3.5	15.4	18.9
25-29	2.2	11.8	14.0
30-34	1.9	13.0	14.9
35-39	2.1	11.2	13.3
40-44	2.1	12.5	14.6
45-49	2.1	13.3	15.4
ALL AGES	2.6	12.5	15.1

SOURCE: NFS, ibid., p. 15.

TABLE 3.5. NIGERIA: INFANT AND CHILDHOOD MORTALITY RATES FOR SELECTED PERIODS

PERIOD	INFANT MORTALITY RATE			CHILDHOOD MORTALITY RATE		
	BOTH SEXES	MALE	FEMALE	BOTH SEXES	MALE	FEMALE
1975-79	84.8	93.9	74.8	144.5	155.0	132.6
1970-74	96.6	103.7	88.0	178.7	183.5	173.0
1965-69	109.7	122.4	96.0	202.2	216.1	187.7

NOTE: Rates are calculated per 1000.

SOURCE: NFS, ibid., p. 14.

CHAPTER 4

THE THEORETICAL BACKGROUND: A REVIEW OF SELECTED LITERATURE

4.1: INTRODUCTION

In this chapter, we examine some aspects of the microeconomic theory of fertility behavior.[1] The primary justification for the application of the analytical tools of microeconomics to fertility is that childbearing decisions involve the use of resources, and hence have implications for other areas of household behavior, as do the more usual economic choices of labor/leisure or consumption/saving. However, Willis (1973) points out a number of characteristics of fertility behavior that make the analysis of fertility within a choice-theoretic framework difficult. For example, childbearing and childrearing are non-market activities for which there are few transaction prices to provide information to the outside observer about the cost and value of children to the suppliers (parents). This makes the definition of the

relevant constraints complicated. The varying motives for having children may also contribute to the difficulty of employing economic analysis. Children may be demanded because of the direct satisfaction they are expected to provide for their parents and/or because of the indirect satisfaction they may render by working in the household or in the family business, or for financial support they may give to their parents. Thus, fertility could be motivated by consumption, saving, or investment considerations, which presents a problem for the specification of the utility function of the decision-making unit. Consequently, a major problem in analyzing fertility as a form of economic behavior is how to define conceptually satisfactory measures of the costs and benefits of children in order to capture their special characteristics.

The economic models of fertility differ in terms of the rigor with which they are presented, the variables that are included, the treatment of time, and the population (differentiated by various socio-economic criteria) whose fertility they are intended to explain. Most of the early models were formulated with reference to urban, industrialized economies, but over the years they have been modified for both theoretical and empirical applications in developing economies. The following selection of studies

portrays the basic microeconomic theory of fertility, extensions to the initial framework, and some of the modifications that have made the theory relevant to the explanation of fertility behavior in rural traditional societies.

4.2: MICROECONOMIC MODELS OF FERTILITY

A substantial amount of work on the microeconomic theory of fertility followed Becker's 1960 and 1965 papers establishing the tradition of using the household demand and production framework to study fertility behavior. Most of these studies, for example, Willis (1973) and DeTray (1973), used a one-period, static model in which a husband and wife of given ages and characteristics adopt, at the outset of marriage, a utility-maximizing lifetime plan for childbearing, for expenditures of time and money on children, and for other sources of parental satisfaction. The couple is assumed to have perfect and costless control over their fertility and to possess perfect foresight regarding all relevant demographic and economic variables over the course of their marriage, so that the lifetime

plan adopted ex ante at marriage coincides with ex post observations of their completed fertility.

Stated formally, families are said to maximize a lifetime utility function of the form[2]:

(1) $U = U(c, s)$

where:

c is a measure of the services, monetary and psychic, derived from children. $c = nq$; n being the number of children, and q, the average quality per child.

s denotes "standard of living", an aggregate bundle of all other goods consumed by the household.

Commodities c and s are not directly obtainable from the market, but must be produced within the household using the production technology and scale of operation at the household's disposal.

Each commodity entering the utility function is

produced by a separate, independent production process with inputs of market-purchaseable goods (X_i) and household time (t_i), distinguished by household member.[3] Therefore,

$$(2) \qquad s = s(X_s, t_{m,s}, t_{f,s})$$

$$c = c(X_c, t_{m,c}, t_{f,c}, n)$$

where:

$t_{i,j}$ = time input of the ith family member [i = m(husband's time), f(wife's time)] into the production of the jth commodity (j = c, s)

X_j = index of purchased market goods required to produce s,c.

The scale of household operation is defined by the "full wealth" available to the family, full wealth being the total value of all the family's resources, including labor and non-labor income (Becker, 1965). The family's budget constraint may be written as:

$$(3) \quad R = V + (w_m + w_f)T = w_m \sum_j^T t_{m,j} + w_f \sum_j^T t_{f,j} + p \sum_j X_j$$

where:

R = full family income.

V = non-labor income.

w_m, w_f = unit value of husband's and wife's time, respectively.

T = total time available to each member of the household.

p = price of market goods.

The specification of R ignores the value of child time and assumes that the value of the husband's and wife's time is constant over their life cycle (DeTray, 1976). The household maximizes its utility (1), subject to (2) and (3). The economic variables of prices, wages and wealth determine the level of fertility and the amount of commodities consumed by the household.

The relationship between the quantity and quality of children has received considerable attention within this framework. The investments in child quality range from good

nutrition and health-care (which improve childhood survival chances) to education and various other aspects of social achievement such as adult earnings and socio-economic status (Nerlove, 1974; Schultz, 1981).[4] In their analysis, Becker and Lewis (1973) show that the shadow price of children with respect to their number (that is, the cost of an additional child holding quality constant) is greater, the higher their quality. Similarly, the shadow price of children with respect to their quality (that is, the cost of a unit increase in quality, holding their number constant) is greater, the larger the number of children. This result suggests that the quantity and quality aspects of children are closely related. In particular, the quantity-quality interaction serves to intensify the substitution effect away from quantity given an increase in the price for numbers of children, even when the substitution in consumption between quantity and quality is small (Willis, 1973; Becker and Tomes, 1976; Schultz, 1981).

Another issue commonly analyzed with the demand model is the relationship between female employment and fertility. A major point emphasised in the model is that time is a productive resource of the household. In analyzing the implications of time use, children are

generally taken to be intensive in their use of household time, compared to other commodities.[5] In particular, childrearing time is assumed to be provided largely by the mother.[6] If, in addition to this, it is assumed that for institutional or biological reasons, the husband has significant comparative advantage over the wife in the acquisition of market-purchasable commodities (Nerlove, 1974), some interesting results emerge from the theory. For example, a prediction consistently reported in the literature is that advancement in women's participation in labor force activities not readily combined with child-care will lead to a decrease in the demand for children.[7] Furthermore, an increase in the market value of wife's time will cause a substitution away from time-intensive goods such as children, and toward those requiring more inputs of market- purchased commodities. Willis (1973) and Becker (1981) suggest that the substitution effect would be much stronger in the presence of child quantity and quality interaction and is therefore more likely to offset the income effect with regard to quantity of children.

The static, one-period models of fertility determination have been criticized on a number of counts. One line of criticism relates to the assumption of a single household utility function, which effectively by-passes the

issue of interdependent utilities within the family (Nerlove, 1974; Griliches, 1974; Simmons, 1985).[8] As indicated earlier, the specification of the utility function is particularly difficult in the area of fertility behavior because children generate a variety of benefits and costs for their parents. The treatment of children as a household commodity does not appropriately distinguish them from any other good (Rosenzweig and Schultz, 1985; Griliches, 1974). The criticisms of Nerlove and Griliches center on whether children are arguments in the parental utility function or partial formulators of the family's preferences. Griliches suggests that more content needs to be added to the theory in order to determine parents' motive for having children. To this end, he posits three interdependent motives for having children: (1) economic security (current labor and old age pensions); (2) the provision of reciprocal caring; and (3) an attempt at immortality via one's offspring.[9] These criticisms emphasize the fact that an investigation of the utility-yielding characteristics of children is crucial to the study of the demand for children (DeTray, 1976).

Other critics have questioned the appropriateness of the perfect foresight, lifetime decision assumption. Essentially the problem arises from the condensation of a

sequential, dynamic set of decisions into a theory of choice based on the maximization of a single, static timeless utility function (Nerlove, 1974). Namboodiri (1983) argues that uncertainty about the ability to achieve or prevent conception, uncertainty about the sex composition of children, and infant mortality, as well as uncertainty about the household's future resource endowments, imply that decision making is inherently a sequential process rather than once-and-for-all at the beginning of marriage, as assumed in the static models.

In the static framework, as children are born, parents cannot change or adjust their plans on the basis of new information regarding their tastes for children; and as children grow, parents cannot alter investment strategies based on the ability or willingness of their children to participate in the investment process (Birdsall, 1980). However, according to the sequential decision-making process, each birth is influenced by a different set of motivational, cultural and economic conditions faced by the family; this suggests that children of different birth orders have different values and disvalues. Thus, proponents of this approach argue that an appropriate theoretical framework for fertility analysis should explicitly incorporate a sequential focus in which parents,

decide at each stage of their life-cycle, whether or not to have an additional child. This formulation also adequately accommodates the dynamic character of investment in child quality (Nerlove, 1974).

Another assumption of the basic model is the separability of productive activities; that is, there is no joint production, nor are there economies of scale in producing, or raising, children. This assumption rules out complementarity among different outputs in a multiproduct context. As Nerlove (1974) points out, the assumed absence of complementarities is very restrictive, especially in a situation involving several dimensions of child quality, such as early childhood health and physical development on the one hand and intellectual achievement in later years on the other. It is also questionable with regard to the allocation of parents' time and the use of some market-purchased inputs, such as clothing or housing, in rearing of children (Birdsall, 1980).

More recent work at the theoretical level has involved the integration of the earlier microeconomic theories of fertility and family behavior into the general equilibrium framework of overlapping generations.[10] The models that have evolved deal with a large variety of issues ranging

from the effects of variations in the rate of population growth on steady state per capita economic welfare and investment in human and physical capital, to the interaction between fertility and various macroeconomic variables (see for example, Razin and Ben-Zion, 1975; Arthur and McNicoll, 1978; Willis, 1980, 1982; Becker and Barro, 1985).

In its "general" form, the multiperiod model of fertility is based on the assumption that parents are altruistic toward their children; hence the utility of parents depends on their own consumption as well as on the utility of each child.[11] Relating the utility of each parent generation to the level of its consumption and the number and utility of the children leads to the derivation of the utility of an infinite number of generations or of a dynastic utility function. This, in effect, means that the first generation lives on forever through its offspring (Razin and Ben-Zion, 1975; Becker and Barro, 1985). Razin and Ben-Zion (1975) assume, as do others, that fertility is determined in order to balance the parents' welfare derived from additional children against that derived from the children's quality of life. The use of a dynastic utility function ensures that the concern of parents for their children extends well into the future.

One of the advantages of a multiperiod framework is that it accommodates intergenerational loans (transfers) whereby one generation can delay consumption by shifting it from productive to nonproductive periods. In general, there exists a durable good, capital, by which parents' savings may be transferred from one period to another (Willis, 1982; Becker and Barro, 1985). In addition, it is assumed that the distribution of the total product between generations is endogenous and often reflects the degree of altruism of the dynastic head (decision-maker) toward each descendant in the next generation.

Suppose that the family unit at a point in time is composed of three generations. Using Razin and Ben-Zion's notation, let superscript 1 denote parents and children; and superscript 2 denote the old generation who have retired and perform no economic functions. Assume that preferences are the same for each generation (implying that the dynastic head may make the choices for the entire time path; Becker and Barro, 1985), and can be represented by an additive utility function. At time t, the parents choose the number of children, current consumption for themselves and the children, their own next period consumption, as well as the amount of capital transfer to make to each child in the next period. The problem may be stated as

follows:

(4) $$V = \text{Max} \sum_{0}^{\infty} \beta^t U(c_t^1, c_{t+1}^2, \lambda_t);$$

$$0 \leq c_t^i \leq k_t$$

$$0 \leq \lambda_t \leq \bar{\lambda}$$

$$U_c > 0, \; U_{cc} < 0$$

$$U_\lambda > 0, \; U_{\lambda\lambda} < 0$$

subject to:

(5) (i) $\lambda_t k_{t+1} = f(k_t - c_t^1 - c_t^2/\lambda_{t-1})$

(ii) a given initial level of per capita physical capital, k_0

where:

V = intergenerational utility indicator

β = subjective factor by which the current generation discounts the utility of the next generation. Razin & Ben-Zion assume β to be constant

c_t^1 = current per capita consumption of parents and their children

c_{t+1}^2 = the parents' per capita consumption in the next period (i.e., when they are retired)

λ_t = number of children, born at time t, per parent

$\bar{\lambda}$ = maximum feasible number of births per parent

k_{t+1} = amount of capital left to each individual in the next generation

Equation (5) represents the budget constraint that parents face and it implies that for parents in period t, the amount of capital k_t (which they inherited from the previous generations) can be allocated in two ways: (1) to consumption, current and future; and (2) to bequests to the next generation.

In the short run, the first order conditions for optimization describe the optimum decision with respect to per capita levels of consumption, population growth and

next generation's per capita capital endowment. One of the findings reported by Razin and Ben-Zion (1975) is that the pension (old age consumption) is an increasing function of the rate of population growth λ_t, and the amount of saving made in the previous period by the now nonproductive generation. Becker and Barro (1985) report similar results, and using their definition of altruism they show, among other things, that fertility in any generation depends positively on the degree of parental altruism.

Important features of the steady-state equilibrium in an economy made up of overlapping generations are that the rate of interest, r, is equal to the rate of population growth, n,[12] and that per capita welfare is maximized. Willis (1982) analyzes the effects of variations in the rate of population growth on steady-state per capita economic welfare and demonstrates the crucial role played by the pattern of life-cycle production and consumption, and the direction of intergenerational transfers. To facilitate his analysis, Willis draws on Gale's 1973 classification of possible Golden Rule equilibria (when $r = n$) in an overlapping generations model (OGM).

The simplest version of an OGM (following the Samuelson tradition) is one in which identical individuals live for

two periods of time. At time t, the population consists of the "young" and the "old" in proportions determined by the rate of population growth. With labor as the only factor of production, each individual is endowed with an income of perishable (non-storable) goods during each period of his life. In the absence of any intergenerational transactions,[13] each individual in any generation will consume his endowment in each period of his life but attain a level of lifetime utility which can be shown to be less than the Golden Rule level of utility (see Willis, 1982).

Suppose, however, that there exists a competitive market in which borrowing or lending at the biological rate of interest can take place. Such financial network, by accommodating intergenerational transfers, permits the move from a lower level of utility to the Golden Rule level. The direction of these transfers depends on the individual's initial endowment point. Gale (1973) uses this fact to classify that Golden Rule state as either "Samuelson", "classical", or "balanced".

In the Samuelson case, the relatively well endowed young person is willing to be a lender at interest rate $r = n$, and to use the principal plus interest to increase his old age consumption. In this case, the intergenerational

transfers required to achieve the Golden rule are from the young to the old. The pattern is reversed in the classical case because the poorly endowed young person borrows to augment his consumption while young, and pays back (with interest) by reducing his old age consumption. The steady state is balanced if, due to the initial endowment packages, there is no need to borrow or lend in order to enhance the attainable utility level. Gale (1973) showed that these results generalize beyond two generations if the economy has a constant population growth rate. The main difference between the two-period case and the generalized case is that while the balanced equilibrium is autarkic in the former, it may involve intergenerational trade in the latter.[14]

In summarizing the above classification, Willis (1982) points out three underlying facts which determine whether an economy will be balanced, Samuelson, or classical: (1) the preferences of individuals for current versus future consumption; (2) the shape of the life-cycle income profile of individuals in each generation; and (3) the rate of population growth.

Arthur and McNicoll (1978) addressed the issue of whether an increase in steady-state population growth rate

increases or decreases the level of lifetime utility of a representative individual in the society. They point out that the conclusion depends on the model one uses. In the standard one-period neoclassical model of Solow, rapid population growth is harmful to economic welfare because an increase in population calls for greater investment to maintain a given level of capital per head, thereby diverting resources away from consumption and capital deepening. Since this "capital-widening" effect is always negative, the lower the rate of population growth the better. However, a different conclusion is reached in a world of overlapping generations. Using Samuelson's simple two-age model, a sustained increase in population growth expands the proportion of young productive people. As a result, the old people are more comfortably supported by the increased consumption transfers they receive. This positive intergenerational transfer effect repeats itself every generation as long as the high population growth rate persists.[15]

The main concern of Willis' 1982 paper is the determination of the direction of net intergenerational transfers. In order to consider the conditions for the economic and demographic transition from technologically primitive "pre-transitional" societies with high fertility,

high mortality, and low income to modern "post-transitional" high income societies with low fertility and mortality, he introduces his "parental altruism hypothesis" which draws a line of causation different from that of Caldwell.[16]

Stated briefly, the argument goes as follows. Suppose that an exogenous technological improvement is introduced into an initial pre-transition equilibrium in which children are net economic assets. The extent to which this improvement is translated into growth in real income depends on the response of real savings and investment to the new technology. This response, in turn, requires that the older generation be willing to reduce their own consumption in order to finance the investment in the human/physical capital with which their offspring will work, that is, the response depends on the degree of parental altruism. The rate of population growth caused by technological change is subject to the conflicting forces of a positive income effect (following a rise in family wealth) and a negative price effect which arises from an increase in the investment in human and physical capital per child. Eventually, the trend will be toward a reduction in the rate of population growth and an increase in wealth per capita as the transition to a steady-state is

completed.

It would be possible, then, to identify a number of distinguishing features among societies where parental demand for children is such that percentage expenditure per child is approximately constant, but which differ in technology and hence, in levels of income and wealth. For example, the pattern in the more technologically advanced society will reflect, among other things, (1) a lower rate of population growth; (2) a higher amount of per capita physical capital; and (3) a greater likelihood that parents would make positive net bequests to their children rather than relying on them for old age support. The converse would hold under primitive technological conditions where large family size and net economic returns from children are important to parents.

While Caldwell and Willis may differ in their identification of the change factors, they agree that the process of successful economic and demographic transition may involve a reversal of the direction of intergenerational transfers. They also agree that the family plays a crucial role in this process. Many of the multiperiod models of fertility behavior in developing countries take these facts into account. In particular, the

explicit inclusion of the economic contributions of children to household production and income over the life-cycle in some models enhances the usefulness of these models in understanding fertility decision-making in traditional pre-transitional societies.

4.3: FERTILITY MODELS FOR LDCs

An oft-cited motivation for childbearing in developing countries is the economic returns parents expect to get from their offspring (Leibenstein, 1974). This is the basis for the "old age security" hypothesis for the demand for children. Stated simply, old age security is likely to be an important motive for fertility when the relevant parent is both uncertain about his or her ability to be self-supporting in old age and dubious that there are other more reliable or more effective means of such support than his or her own children (Nugent,1985). In some social settings, children possess a number of desirable attributes that set them apart from whatever other alternative assets may exist for ensuring consumption during old age or in the event of disability. Nugent identifies several of these attributes.

In many developing societies, children's homes provide the setting in which parents grow old, and the nature of support that children provide may lack substitutes in the market. The absence or inefficiency of private or public old-age and disability insurance programs, especially in rural LDCs,[17] leaves the family as the sole solution to the problem of dependency during old age and prolonged periods of disability. Even if viable alternative means of asset accumulation and forms of old age insurance were available, access to them would be of little use if the goods and services that the elderly consume are not purchaseable in the desired form or at affordable prices. Without the aid of basic durable household appliances to facilitate self-help, satisfying daily subsistence needs of the old and disabled in the rural areas is a monumental task which only the presence of children can make possible (Cain, 1983, 1986; Nugent, 1985).

In societies where insecurity is rife and threats to income from alternative assets (e.g., land) are very real, for example among widows in south-east Asia, children may serve as the only means of insuring against the risk of property loss and protecting the productivity of other assets. In such situations, children are indispensible for the complementary role they play in a family's asset

holdings (Bulatao, 1979; Cain, 1981, 1985; Datta and Nugent, 1984). Stark (1981) examines the asset demand for children in an economy where grown children, as rural to urban migrants, take on the role of financial intermediaries in order to facilitate the technological transformation of the family's agricultural production.

The importance of children as security assets in these various circumstances lends support to the security motive as an explanation for the high level of fertility in traditional societies. Consequently, several multiperiod household models of fertility behavior applicable to rural agricultural areas where the pecuniary contributions of children are significant have been formulated and some have been tested using LDCs' data.[18]

Rosenzweig (1977) modifies the basic model by explicitly recognizing that children play dual roles as durable commodities which yield psychic returns, and as productive laborers who contribute to farm output. These roles change in relative importance over time. As in the usual formulations, parents are assumed to receive utility from the (discounted) flow of child services in each period, and also from an alternative composite commodity. In addition, however, Rosenzweig includes a depreciation

function which allows the initial number of children on the farm to change over time due to migration.[19] He uses the model to examine the effects of variables associated with the market for agricultural labor on the demand for farm children, including technical change, agricultural wage rates, and nonfarm employment opportunities. The relevant portion of the model is summarized as follows:

$$U = U(N, S) \tag{6}$$

where:

$N = \sum_{0}^{J} \gamma_j n_j$ = present value of the stream of child services, n

$S = \sum_{0}^{J} \gamma_j s_j$ = present value of the stream of services of the alternative commodity, s

γ_j = the discount factor in the jth period

J = the number of periods relevant for decision-making

$$N_j = \theta_j N_0 = \left(\prod_{0}^{j} \theta_i \right) N_0 \tag{7}$$

Equation (7) is the depreciation function such that N_j, the stock of children in period j is a scalar multiple of N_0 (the total desired number of children), and θ_j represents the proportion of children remaining on the farm in the jth period.

The productive services of farm children, n_{Fj}, are assumed to increase with age up to $j = m$, defined as the age of maturation, such that $n_{Fj} = a_j\theta_j N_0$, where a_j is the jth period rate of flow of productive services per child, and equals a_m for $j \geq m$.

Rosenzweig tested the complete model on aggregate U.S. farm population cross-sectional data covering the 1939-60 period. Among the empirical results, evidence is provided to indicate that a reduction in the pecuniary returns from children within the agricultural sector, associated with capital-biased technical change, and increases in nonfarm employment opportunities were significant factors in the post-war decline of U.S. farm birth rates. With modifications reflecting the LDC context, these findings suggest that the net profitability of mature children, who migrate and make remittances, would be positively related to the expected opportunity wage in nonfarm employment, and hence would have a positive impact on family size. This

positive effect on rural fertility might be quite strong since the (positive) income effect is proportional to the share of children's contribution to total family income.

Rosenzweig and Evenson (1977) build on Rosenzweig's earlier model but focus specifically on the economic activities of children in LDCs. Decisions which are jointly associated with child investment -- family size, schooling, and child labor force participation -- are examined simultaneously. This model was tested on district-level data from the 1961 census of India. The theoretical analysis shows that variables positively associated with returns to child labor are also positively related to fertility and child labor force participation, but negatively related to child schooling. For example, a compensated rise in the child wage rate would increase the demand for numbers of children and decrease both the schooling and leisure of each child, the strength of the effect depending on the child earnings intensity of each commodity.[20] The empirical results Rosenzweig and Evenson obtained led them to endorse the applicability of the household production approach in a developing country context and to suggest the importance of price effects in connection with the economic contribution of children.

A principal implication of the security motive for childbearing is that the introduction of alternative assets may reduce the demand for children (Neher, 1971; Nugent and Gillaspy, 1983).[21] It is supposed that the development of impersonal asset markets (e.g., for money, gold, or land) might encourage opportunistic investment behavior among young people and cause them to default on traditional family responsibilities. Such behavior would greatly reduce the reliability of children as a means of transferring income from one period to another and hence result in a reduction in their demand. Nerlove, Razin and Sadka (1985), however, posit that this conclusion does not always hold and set out to examine the conditions that may prevent the unambiguous reduction in fertility following the availability of better access to capital markets.

Using both microeconomic and macroeconomic examples, Nerlove, Razin and Sadka show that the arguments included in the parental utility function are crucial to the expected result. In particular, they demonstrate that when children and their welfare enter the parent's utility function, the introduction of a capital market may increase the demand for children, contrary to the old age security hypothesis. This is because better access to a capital market increases welfare, and therefore may create a

positive income effect which, in turn, may dominate the negative price effect on the number of children. They conclude that in order to obtain an unambiguous reduction in the demand for children following improved access to asset markets, it is crucial to assume that the number and welfare of children do not enter into the parental utility function.[22]

Earlier references indicate that Willis has been involved with various aspects of the development of the economic theory of household fertility behavior. His 1980 paper investigates the old age security hypothesis in the context of a simple agrarian society in which there is neither physical capital nor technical change, but one in which the land resource is abundant so that population growth is not limited by diminishing returns. Food, the only consumption good, is produced on family plots of land by adult family heads.

In accordance with the multiperiod framework,[23] each individual is assumed to live for three periods of equal length, first as a dependent child, then a productive adult and finally as a dependent elderly person. The food produced is non-storable and no other means are available for transferring consumption across periods. Consequently,

children are treated as pure capital goods, demanded by parents solely for the expected returns they will provide during the parents' old age. Parents ensure that these transfers are made by inculcating in children a sense of obligation and family loyalty during the period of childrearing. Willis represents this social norm by a "fixed distribution rule" under which a productive adult is obligated to transfer a fixed amount of food to his elderly parents, and this rule is transmitted from parent to child across generations.

The treatment of children as pure capital goods means that parents do not care about the welfare of their children beyond their survival. Hence, parents are further assumed to produce their children at least cost by setting the level of consumption per child at the minimum amount of food required for survival. As Willis points out, this definition of the cost of children ignores some issues; for example, it excludes child labor and effectively ignores the possibility that a child's productive capacity as an adult can be altered by investments in human capital in the form of education or health.

The typical adult in this society distributes his output toward three ends: his own consumption, expenditures

on his children, and transfers made to his parents. Willis shows that in this model, the optimal level of fertility is proportional to the level of old age consumption. In particular, he shows that the demand for births is derived from the demand for old age consumption, and hence expenditures on children measures, in effect, the level of saving by the adult (i.e., demographic saving).[24]

A model of fertility behavior for developing countries which precedes those already referred to in this section was the one formulated by Neher in 1971. While Neher's model is neoclassical, and therefore, similar to the other models in several respects, it is singled out for more detailed review because it captures some of the essential features of traditional societies described in Chapters 2 and 3. It is especially relevant for further theoretical, and possibly empirical extensions. In particular, it provides the background to the theoretical model presented in the next chapter.

The "social" setting of Neher's model is a technologically primitive economy where the only property is land, and the rights to the land are vested in families or extended families. This means that individuals do not have a claim to private property income and the produce

from the land is shared collectively. Children are the parents' only assets, and pension or old age security is the main motivation for having them . The income from agricultural production is distributed according to a "share-alike" principle whereby all members of the family have equal claim to the product whether they work or not.[25] This share-alike ethic could be interpreted as a particular manifestation of the complex pattern of socialization which often produces an intricate system of intrafamilial obligations, such as those discussed in Chapters 2 and 3. Since agricultural goods are non-durable and old age consumption is dependent on transfers from the working generation, the distribution principle guarantees an automatic pension.

Neher uses a multiperiod or extended family composed of three equally spaced generations: dependent children (S); retired, dependent grandparents (G); and an economically active parent generation (F). He specifies the following additive utility function for altruistic parents[26]:

$$U = U(c_1) + D.U(c_2) + E.U(c_3) \qquad (8)$$

where:

c is the per capita consumption; 1, 2, 3 are subscripts indicating time (measured in terms of generations)

D, E are discount factors

and,

$$U'(c) = \mu > 0; \quad U''(c) = \mu' < 0$$

In maximizing this utility function, parents are constrained by:

(i) the production relation: $X = f(F)$;

where

X = output,

$f' > 0; \quad f'' < 0$

(ii) intergenerational mortality conditions:

p = probability of a child surviving to adulthood.
q = probability of an adult surviving to old age.

(iii) exogenous future fertility[27]

(iv) the share-alike ethic.

(i)--(iv) are summarized in equations (9)-(11)

$$(9) \qquad c_1 = \bar{X}_1/P_1 = f(\bar{F}_1)/(S_1 + \bar{F}_1 + \bar{G}_1)$$

$$(10) \qquad c_2 = X_2/P_2 = f(pS_1)/(\bar{S}_2 + pS_1 + q\bar{F}_1)$$

$$(11) \qquad c_3 = \bar{X}_3/P_3 = f(p\bar{S}_2)/(\bar{S}_3 + p\bar{S}_2 + pqS_1)$$

P_i is the total population in each time period (i = 1, 2, 3) and the bars denote fixed and exogenous variables. The only choice variable available to parents is the number of children, S_1.

A steady state solution to the problem relates output per worker to the marginal product, as in equation (12):

$$(12) \qquad w^* = J(X/F)^*$$

where:

w^* = the steady-state marginal product of labor

$$J = (1/D).(1 + pD + pqE)/(1 + p + pq)$$

Equation (12) allows for an examination of the steady-state properties of the model. The Golden Age population enjoys the maximum sustainable level of per capita consumption (and the Golden Rule is observed) if J = 1. A sufficient condition for the Golden Rule to hold is a combination of parental farsightedness (D = 1) and altruism (E = 1). This combination (D = E = 1) means that parents attach equal weights to their own utilities (present and in retirement) and their children's utility.

Suppose parents are egoistic and D = 1, but E = 0. The steady-state ceases to be a Golden Rule equilibrium because equation (12) becomes,

$$(13) \qquad J = (1 + p)/(1 + p + pq) < 1$$

The steady-state consumption will be less than the Golden Rule level and the corresponding fertility level will lead to "overpopulation". The degree of overpopulation depends on the inter-generational mortality conditions and the production technology. Neher ascribes the occurrence of this overpopulation to market failure because the

consequences of fertility decisions made by current parents carry beyond their own life span.

Neher, like others, was also interested in exploring how the desired family size would change if alternative sources of pensions were available. He suggests, for example, that the availability of interest-earning bonds in a share-alike society would eventually eliminate the pension motive for childbearing, stating that the "good" asset (bonds) drives out the "bad" asset (children). However, he also pointed out that the impact of alternative pension schemes depends upon the extension of their markets beyond the bounds of the family unit, as well as the abandonment of the share-alike ethic. The adoption of new assets as media for savings would also depend critically on how parents assess their reliability; they must be seen as superior to children to be readily adopted.

4.4: SUMMARY

In this chapter we presented an array of theoretical models that employ the household demand and production approach to the microeconomics of fertility behavior. We examined how the initial one-period model has been extended

into a multiperiod framework, and subsequently modified to formulate models applicable to rural agricultural populations in the developed and developing areas. In the context of developing countries, the explicit recognition of the role of children as economic assets is shown to facilitate the "testing" of the old age security motive for childbearing, and to allow investigation of how parents in such societies may alter their fertility decisions when presented with alternative means of saving for retirement. In the next chapter, we examine the performance of children as assets by introducing elements of human capital investment into the model.

4.5: NOTES TO CHAPTER 4

1. There are two main approaches to fertility-related research in the economics literature. One is concerned chiefly with the determinants of fertility, stressing the preferences (utility) of parents, and treats the number of children born to a household as wholly demand-determined. Within the demand framework, changes in costs and wealth influence fertility decisions (e.g. Willis, 1973; DeTray, 1973; Becker, 1973, 1981). The second major research approach assumes that births are wholly supply-determined, and treats fertility as purely random and exogenous. The bulk of the theoretical literature reviewed in this chapter deals with the household demand or the "new home economics" framework.

2. In the early formulations of the model, the number of children n, entered directly into the parents' utility function, i.e., U = U(n,s). See Becker (1960). That initial model has evolved in many directions. One modification has been the incorporation of a number of attributes of children that parents desire, i.e., measures of child quality. Consequently, Willis, Becker and Lewis, Becker and Tomes, among others, re-defined parental utility as U(n,q,s); that is, child quality per child and child numbers separately enter the household utility function. The "condensed" form of the preference function (U(c,s)) used by DeTray, for example, suggests that parents may produce a given level of child services c, with different combinations of births and other child-related inputs (DeTray, 1973).

3. There are variants to this basic household production function. For example, DeTray (1976) suggests the incorporation of the concept of differing technologies among households as a means of capturing differences in production efficiency. This can be applied to efficiency in contraception and early investments in children. Willis (1973) assumes that the production

function for child services is homogeneous of degree one implying that parents always want to invest equal amounts of resources in each child they have. This is a simplifying but not necessary assumption; see DeTray (1973). Most of these models ignore the productive capacity of children.

4. Ben-Porath and Welch (1980) also consider other traits of children in which exogenous elements, rather than parental expenditure, dominate. In particular, they examine the impact of the sex of children on family size. Apart from a matter of tastes, parental concern over their children's sex may be rooted in differences in the economic costs or benefits associated with male and female offspring.

5. A household-produced commodity is said to be female or male time intensive if the female or male time value share of the full cost of the commodity exceeds the average value share of that person's time in all household commodities taken together (T.P.Schultz, 1981).

6. The specification of the production functions implicitly allows for assumptions to be made with regard to the time-intensity of the commodities. Hence, while it is customary to assume that young children are highly intensive in their use of the mother's time, it is also possible to conceive of the case of an "active husband" in child services production (see DeTray,1973).

7. Theoretical results postulating an inverse relationship between female (market) employment and fertility generally find support in empirical studies done for developed countries. However, based on time-budget data, several researchers have questioned the applicability of this finding in developing countries, particularly in the rural areas. For example, Mueller (1982) suggests that childrearing and employment may be

compatible in the following circumstances:

(i) when market work can be performed at or near home
(ii) when young children can go along with the mother to work;
(iii) when relatives or older siblings are available to take care of pre-school aged children; and
(iv) when the household can afford to hire cheap outside help.

All of these conditions are much more likely to be prevalent in low-income countries than in industrialized countries. See also Youssef, 1982, and Simmons, 1985.

8. While this assumption has received general criticism, it is challenged particularly by those involved in applied research in developing countries. They argue that a joint utility function obscures and ignores both the conflicts and complex complementarities that occur within, and divide members of the household, at least in the short run. But more importantly for project design, the concept of the utility function ignores the question of how decisions are made within the household (see the list of references cited in Galdwin, et al., 1986). Becker (1974) in his formulation of a marriage model, addresses this issue and shows that "caring" between family members is a sufficient condition for assuming that the family behaves as if it has a single utility function. See also Samuelson (1956) on the condition for the adoption of a group preference function.

9. See also Leibenstein (1957, 1974).

10. An original formal presentation of an overlapping generations model was Samuelson's 1958 Consumption-Loan model.

11. Becker (1981), Willis (1982), and other economists use altruism to refer to the voluntary in-kind or monetary transfers that cannot be explained as part of a past, current, or future quid pro quo exchange. According to this terminology, parents have altruistic preferences if they are willing to bear children, invest in their human capital, and make other transfers such as bequests to them even if they expect no current or future returns from their children (Willis, 1982). See Becker and Barro (1985) for the specification of an "altruism function".

12. Samuelson referred to r (= n) as the biological rate of interest.

13. In a two-period model, the co-existence of individuals belonging to different generations may result in barriers to trade, or what is also referred to as the overlapping generations friction. Take for example the case where in period 1 the young people are willing to lend when r = n. To whom do they lend? If they lend to the current old people, how do they get paid back since these borrowers would be dead in period 2? The only people who could repay the loan are the young people of the next period, but these people are yet unborn. The situation in which period 1 young people start as borrowers presents similar difficulties.

14. It should be pointed out that the unbalanced cases (Samuelson and classical) represent a puzzle, especially in the 2-period model, since they imply an incomplete accounting transaction (see note 13 above). To resolve this OG friction, Samuelson (1958) suggests the following three non-market institutions or "social contrivances":

    (1) a system of private intergenerational transfers within households;
    (2) a public tax and transfer system such as social security (e.g., a pay-as-you-go system); or
    (3) the creation of real or artificial assets such as money, gold, land, or government bonds that can serve as stores of value.

15. But as Arthur and McNicoll point out, this congenial outcome results from an accounting framework which ignores the child-dependency costs of population growth and simplifies the life-cycle into two ages, young and old, in which the young support the old through "consumption" loans.

16. Caldwell (1976,1978,1982) asserts that the direction of net intergenerational transfers shifts during the course of economic development and demographic transition from a pre-transitional situation, in which the younger generation makes net wealth transfers to the older generation, to a post-transitional situation, in which the direction of net wealth flows is reversed. The causes of this shift include a number of socio-economic changes, for example, a shift from familial to non-familial modes of production, and the introduction of mass education (or Westernization), both of which will raise the costs of children and destroy the moral basis of intergenerational relationships within the traditional family.

17. By 1977, about 102 LDCs had established some form of public programs of social security. However, very few such programs have been extended to rural areas (Nugent and Gillaspy, 1983).

18. The household demand framework represents only one set of models that have been used in this context. An alternative approach to modelling suggests that old age security be viewed as an integral package of economic and non-economic components. Following this idea, a class of decision models use lexicographic decision rules based on the criterion of "safety first", and hence are known as lexicographic safety first (LSF) models. Developed to study innovation-adoption behavior of farmers, LSF models assume that farmers, in making production decisions, are motivated not only by a desire to maximize net returns, but also by the condition that net returns not fall below some specified "disaster level". In the case of reproductive decisions, the disaster is income insufficiency in old

age (and/or other contingencies), and the choice variable is fertility (see Roumasset, 1976; Cain, 1983).

19. The stock of children could also depreciate due to child mortality. In the context of U.S. agriculture, Rosenzweig assumes that absent (migrant) children do not contribute significantly to rural family income. But he drops that assumption to reflect the case, in LDCs, where children of small landholders or landless laborers migrate to urban areas in part to contribute to family resources.

20. This result is predicated on some assumed signs of the cross-compensated substitution elasticities (see pp.1067-68 for details).

21. See also Entwisle and Winegarden (1984) who analyze both directions of effect; that is, they allow for the possibility that a diminished level of fertility could represent both the cause and consequences of increased (public) pension expenditures.

22. For proof and demonstration, see pp.247-248. These results are similar to those reported earlier. For example, see Becker and Lewis (1973); DeTray (1976).

23. The discussion of Willis' model is purposely kept verbal in order to avoid notational confusion and repetition with Neher's 1971 paper which is discussed later. The papers overlap in several aspects.

24. Willis examined the implications of the signs of the elasticities of the two demands with respect to variations in family income (or adult labor productivity), and also variations in the rate of

return to children. See pp. 59–62.

25. This is a major point of difference between Neher's model and most of the other models discussed earlier. For example, in Razin and Ben-Zion's model, the distribution of the total product between generations is endogenous and is affected by savings accumulated by the old generation during their productive years. In Neher's, the distribution rule is exogenous and applies equally across generations thereby also distinguishing it from Willis' fixed distribution rule.

26. The consequences of a fertility decision span three periods, and the parental utility, by assumption, reflects their concern for their own lifetime, and for the state of the world after they are dead.

27. The assumption of exogenous future fertility has been criticized by Southey (1973) who says that Neher allows for only a one-way externality and fails to incorporate the fact that the children will, in turn, impose an externality on their parents by having children and thereby reducing the grandparents' share.

CHAPTER 5

A THEORETICAL MODEL OF ASSET DEMAND FOR CHILDREN

5.1: INTRODUCTION

The importance of children as the poor man's capital and main source of support in old age was emphasized in the last chapter. This chapter takes the theoretical investigation of the security motive further by introducing into a Neher-type model two more components, education and migration, and examining how these variables affect the attractiveness of children as assets. The decision-makers (i.e., the parents) in the household decide how many children to have, and in addition to this fertility choice, they decide how much education each child should have. The choice of the level of education per child determines the costs and benefits to the household of that investment and also the location of the children.

In developing the model, we retain the overlapping generations framework for a rural agricultural society and

the assumption that parents have perfect knowledge of their future economic opportunities. We retain also the assumption that they know with certainty the mortality conditions in their environment at the outset of their married life. This premise may be unrealistic in a typical rural LDC society where there are a number of circumstances that cause insecurity and uncertainty. However, it is used here as a convenient simplifying assumption. The model provides a framework from which we derive predictions about how changes in education costs, child altruism towards parents, wages, and life-cycle mortality will affect the fertility decisions of households in a traditional society.

5.2: THE MODEL

The underlying assumption of the model is that children are pure capital goods in the portfolio of parents who reside in a rural society where collective ownership of land and its product is the prevailing social norm.

Assume that there exists an extended family unit made up of members from three generations, each of which lives an equal length of time. There are the dependent children

(N_1), the economically active adults (N_2), and the old (N_3) who are also dependent on the economically active adults. The adults make the key decisions about reproduction and production, and they are influenced by a concern for their own well-being, both now and in the future, as well as that of their children and their own parents. The principle of "share-alike" is observed so that the agricultural output is shared equally by all, and the impact of changes in the rural population and family size is also felt equally. Hence, each adult cohort is assumed to maximize a three-period utility function of the general form:

$$(14) \qquad V = V\left(U(c_1), U(c_2), U(c_3)\right)$$

where:

c = per capita consumption

$U'(c) > 0$; $U''(c) < 0$

The constraints faced by parents are identical to those suggested by Neher. They are re-stated here because of notational differences and also to specify the implications of the education and migration choices faced by the

household.

(i) The family's agricultural output (Q) is produced by the rural adults on family-owned land, i.e.,

$Q_t = f(\bar{N}_{2t})$,

where:

Q_t = output

$\bar{N}_{2t}$ = number of economically active rural adults

$f' > 0$; $f'' < 0$

(ii) The prevailing (exogenous) intergenerational mortality conditions are defined as follows:

p_0 = probability of a newborn infant surviving to childhood

p_1 = probability of a child surviving to adulthood

p_2 = probability of an adult surviving to old age

Hence, if b is the number of births per N_2, and B_t is the total number of children born in period t, the following equations define the number of

survivors in each generation at time t:

$N_{1t} = p_0 B_t = p_0 b N_{2t}$: children

$N_{2t} = p_1 p_0 b N_{2t-1}$: economically active adults

$N_{3t} = p_2 p_1 p_0 b N_{2t-2}$: old people

(iii) The share-alike distribution principle ensures that changes in per capita consumption are shared equally across generations.

(iv) In addition, we assume that some children stay in school beyond the primary school level; they are sent to schools in the cities and there is a cost to the family for this extended education.

(v) Those children who go to the city stay there after their schooling, find employment, and remit a fraction of their incomes to the family remaining in the village, thereby providing the motivation for the concept of family-induced migration.

Following Neher, constraints (i)-(v) are summarized in

equation (15) below:

$$(15) \quad c_t = \frac{f(\bar{N}_{2t}) + \alpha w N_{2t} - k N^*_{1t}}{N_{1t} + \bar{N}_{2t} + \bar{N}_{3t}}$$

The asterisk denotes people (migrant children and adults) living in cities and the bar denotes people living in rural areas, so that,

$N_{1t} = \bar{N}_{1t} + N^*_{1t}$ = total number of children

$N_{2t} = \bar{N}_{2t} + N^*_{2t}$ = total number of economically active adults

w = urban wage rate

α = (positive) fraction of urban wage remitted

k = cost of extended education per child

$N_{1t} + \bar{N}_{2t} + \bar{N}_{3t}$ = the population relevant for share-alike. It includes all children born in period t, and all rural adults (parents and grandparents).

The definition of the denominator in equation (15) reflects an underlying assumption in the model that city children are permanent migrants who, although they continue the family tradition of financial obligations through remittances, do not themselves take part in the actual sharing. One rationalization for the assumption is that urban income enables city workers to save enough for their retirement; alternatively, they may be potential beneficiaries of social security programs that are available only in the city.

The specification of equation (15) explicitly allows for the possibility that a child's productive capacity as an adult can be enhanced by investments in his/her education. In this sense, it represents an improvement on Willis' fixed distribution rule and his assumption of parents' minimum cost of child production. Since children are assets, and parents see the education of their children as an investment from which they (the parents) may profit, it may be beneficial from the parents' perspective to have many children and to provide for the education of a large fraction of them.[1] For the benefits to be reaped, however, the returns from education must exceed its costs. As indicated in Chapter 3, the presence of a viable "sibling education-chain" may help defray these costs. Who among the

children to send to the city for further education may be governed by a number of conditions.[2] It is plausible to assume that those children with the greatest potential to succeed in school and also most likely to remain "loyal" to the family are chosen. Let s_t be the fraction of children sent to the city, that is, $s_t = N^*_{1t} / N_{1t}$. When this definition and the mortality conditions are incorporated, equation (15) becomes

(16)

$$c_t = \frac{f(p_1p_0(1-s_{t-1})b\bar{N}_{2t-1}) + \alpha w p_1 p_0 s_{t-1} b\bar{N}_{2t-1} - kp_0 s_t b\bar{N}_{2t}}{p_0 b\bar{N}_{2t} + p_1p_0(1-s_{t-1})b\bar{N}_{2t-1} + p_2p_1p_0(1-s_{t-2})b\bar{N}_{2t-2}}$$

In maximizing the utility function (14), parents have two choice variables: the total number of children to have, b, and the fraction to send to the city, s.

The expression in equation (16) simplifies greatly if it is applied to a stationary state and expressed in per rural adult ($\bar{N}_2$) terms. (Stationary-state conditions in the rural area imply that all "excess" rural children are sent to the city.) With these assumptions the equation can be re-written as

$$(17) \quad c^{*} = \frac{f(\bar{N}_2)\bar{N}_2^{\alpha} + \alpha w p_1 p_0 s b - k p_0 s b}{p_0 b + p_1 p_0 (1-s) b + p_2 p_1 p_0 (1-s) b}$$

where:

$f(\bar{N}_2)/\bar{N}_2$ is a rural average productivity measure

c^{*} is stationary-state per capita consumption

Starting from

$$\bar{N}_{2t} = p_1 p_0 (1-s) b \bar{N}_{2t-1}$$

the assumption of stationary equilibrium implies

$$\bar{N}_2 = p_1 p_0 (1-s) b \bar{N}_2.$$

From this expression we may specify the number of births per rural adult as follows:

$$(18) \quad b = 1/(p_1 p_0 (1-s))$$

Therefore, we can write

$$(19) \qquad c^* = \frac{p_1(1-s)g(\bar{N}_2) + \alpha w p_1 s - ks}{1 + p_1(1-s) + p_2 p_1(1-s)}$$

where:

$$g(\bar{N}_2) = f(\bar{N}_2)/\bar{N}_2.$$

The proportion of urban income remitted, α,[3] is likely to be influenced by the strength of the social and economic ties that a migrant maintains with the rural-based family. Since some migration is family-initiated as a strategy for benefitting from an alternative income source, it is to be expected that α in that case will vary directly with the schooling completed by the migrant and the duration of his/her urban stay. However, it is also likely that prolonged stay in the city exposes the migrant to non-traditional values of urban life-style and enables him/her to develop the means to become socially and economically secure (Rempel, 1981). As a result, the need to ensure a rural alternative may diminish, and this may effectively reduce the fraction of income remitted. As successful migrants are joined by siblings and as they form their own urban families, loyalties are likely to shift away from the

extended family and be replaced by urban substitutes. The knowledge that more siblings are contributing remittances is likely also to induce a reduction in the amount that each one feels obligated to provide. These considerations lead us to specify α as a decreasing function of the number of migrants.

As a first step, we assume that α is a function of the number of surviving children (now adults) per $\bar{N}_2$ member, and the proportion who are living in the cities, that is,

$$\alpha = \alpha(s,\ p_1 p_0 b) \tag{20}$$

To allow for a reduction in the obligation to remit as more children per rural adult go to the city, we adopt a specific form for α.

Let

$$\alpha(s,\ p_1 p_0 b) = \pi + \theta(1-s)^{\xi}(p_1 p_0 b)^{\epsilon} \tag{21}$$

where:

$$\pi,\ \theta,\ \xi > 0;\ \epsilon < 0$$

This functional form is chosen because of its convenience

and desirable properties. Substituting the stationary-state definition of b from equation (18), α can be written as a function of s:

$$(22) \qquad \alpha(s) = \pi + \theta(1-s)^{\xi-\epsilon}$$

which suggests the restriction $\xi-\epsilon > 0$.
Letting $\delta = \xi-\epsilon$, equation (22) can be re-written as

$$(23) \qquad \alpha(s) = \pi + \theta(1-s)^{\delta}$$

Thus,

$$\partial\alpha/\partial s = -\delta\theta(1-s)^{\delta-1} < 0$$

Finally, equation (19) becomes

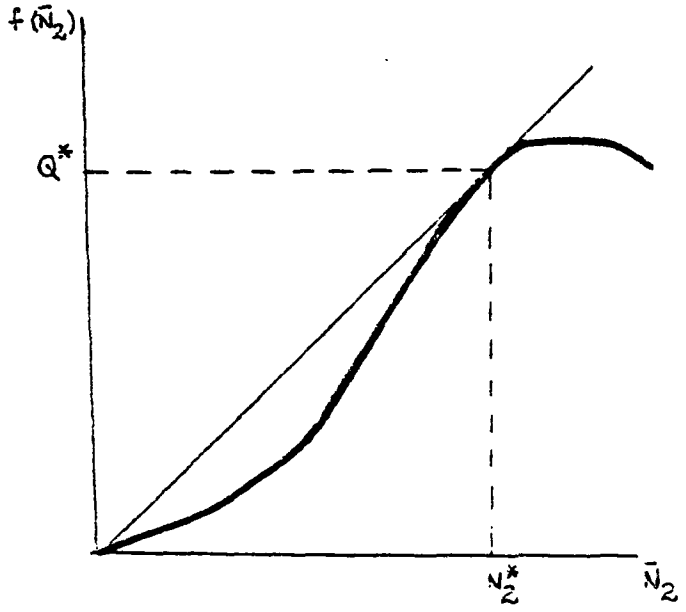
$$(24) \qquad c^{*} = \frac{p_1(1-s)g(\bar{N}_2) + [\pi + \theta(1-s)^{\xi}]wp_1s - ks}{1 + p_1(1-s) + p_2p_1(1-s)}$$

The attainment of c^{*} requires the optimal choices of the interrelated variables b and s. It is required that $0 \leq s < 1$. If $s = 0$, this model reverts to Neher's model; $s = 1$

is not admissible because it implies that the rural population will die out.

The formula used in the simulation experiments of Chapter 6 is derived from the optimal choices of b and s, as well as $g(\bar{N}_2)$. In the model, variations in rural agricultural output can be achieved only by varying the number of $\bar{N}_2$ employed on the land. The restrictions imposed on the production function (over the relevant range; see page 111) imply that the maximizing value of $\bar{N}_2$, and hence, maximum $g(\bar{N}_2)$, occur at a tangency point such as that as depicted in Figure 1 below:

FIGURE 1



The asterisk denotes maximizing values.

Since any $\bar{N}_2$ can be sustained with the proper choices of s and b, the maximizing value of $\bar{N}_2$ is therefore determined independently of s and b. The following describes the maximization of c with respect to s.

Let

$$g(\bar{N}_2) = A, \text{ and}$$

$$p_1(1 + p_2) = D$$

Equation (24) may be re-written as

$$(25) \quad c = \frac{p_1(1-s)A + mwp_1s + \theta(1-s)^{\delta}wp_1s - ks}{1 + D(1-s)} = X/M$$

$$\partial c/\partial s = (MdX/ds - XdM/ds)/M^2 = 0$$

$$Mdx/ds = (1 + D(1-s))[-p_1A + mwp_1 + \theta(1-s)^{\delta}wp_1 - \delta\theta(1-s)^{\delta-1}wp_1s - k]$$

$$= (1 + D(1-s))[-B + mwp_1 + \theta(1-s)^{\delta}wp_1 - \delta\theta(1-s)^{\delta-1}wp_1s]$$

where:

$$B = p_1A + k$$

$$XdM/ds = -D\left(p_1(1-s)A + \pi w p_1 s + \theta(1-s)^{\delta} w p_1 - ks\right)$$

$$= -D\left(p_1 A - (p_1 A + k)s + \pi w p_1 s + \theta(1-s)^{\delta} w p_1 s\right)$$

$$= -D\left(p_1 A - Bs + \pi w p_1 s + \theta(1-s)^{\delta} w p_1 s\right)$$

So,

$$\left(1 + D(1-s)\right)\left[-B + \pi w p_1 + \theta(1-s)^{\delta} w p_1 - \delta\theta(1-s)^{\delta-1} w p_1 s\right] = -D\left(p_1 A - Bs + \pi w p_1 s + \theta(1-s)^{\delta} w p_1 s\right)$$

Dividing through by $(1+D)wp_1$, and re-arranging terms results in

$$(26)\quad \left[D/(1+D)\right]\delta\theta(1-s)^{\delta-1}s^2 - \delta\theta(1-s)^{\delta-1}s + \theta(1-s)^{\delta} = E - \pi$$

where:

$$E = \left(B - p_1 AD/(1+D)\right)/wp_1$$

Equation (26), incorporates the key variables and parameters that influence the well-being of a rural adult in the model, namely mortality rates, the urban wage rate, the youth migration rate (s), and the parameters π and θ which determine the level of remittances.

It is expected that the value of α will be sensitive to the combinations of δ and s and, in turn, will affect the fertility rate b. This is illustrated as follows for values of s and δ.

$$\alpha = \pi + \theta(1-s)^{\delta}; \quad 0 \leq s < 1$$

s	$\delta = 1$	$\delta = 2$	$\delta = 3$
0.00	$\pi + \theta$	$\pi + \theta$	$\pi + \theta$
0.25	$\pi + 0.75\theta$	$\pi + 0.56\theta$	$\pi + 0.42\theta$
0.50	$\pi + 0.50\theta$	$\pi + 0.25\theta$	$\pi + 0.0125\theta$
0.75	$\pi + 0.25\theta$	$\pi + 0.0625\theta$	$\pi + 0.0156\theta$
0.99	$\pi + 0.01\theta$	$\pi + 0.0001\theta$	$\pi + 0.00000001\theta$

The fewer the number of family members that go to the city, the larger the value of α; hence $\alpha \rightarrow \pi + \theta$ as $s \rightarrow 0$. On the other hand, as the proportion of children who migrate increases, i.e., as $s \rightarrow 1$, the value of α falls toward π. This result follows directly from the share-alike

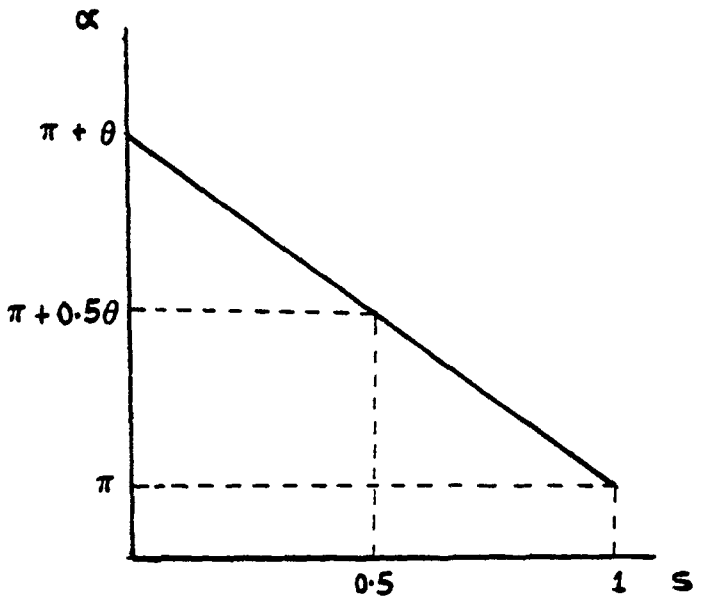
distribution principle and the specific form of the α function.

When all family members reside in the village, the family does not incur any additional educational costs nor does it earn any urban income. In this case, equation (24) becomes

$$(27) \qquad c^* = \frac{p_1 g(\bar{N}_2)}{1 + p_1 + p_1 p_2}$$

Equation (27) is identical to Neher's equation (9). According to the sharing rule, everyone in the rural household contributes his/her "full" output to the family pot and gets an equal share of the total family output. As more children go away, the fraction remitted by each decreases, reflecting a declining obligation to remit. This accounts for the negative slope of the α function. The case of $\delta = 1$ is depicted below.

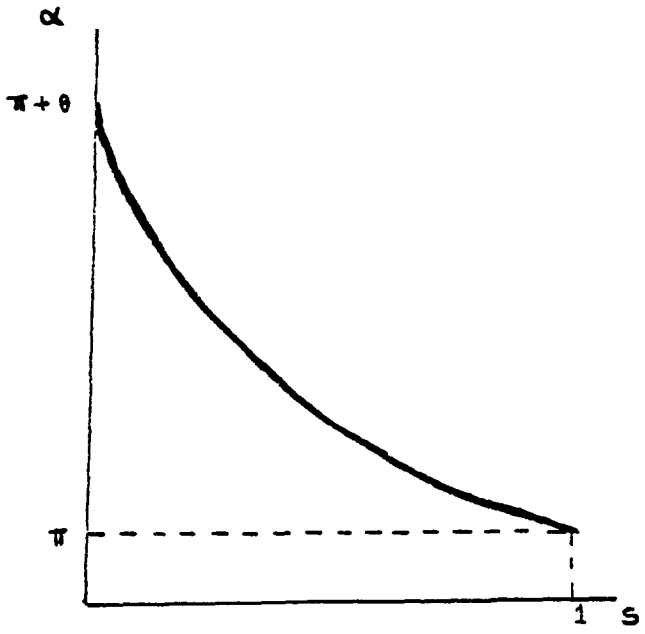
FIGURE 2



For $\delta = 1$ as well as for higher order polynomials ($\delta = 2$, 3, ...; note that values of δ need not be integers, integer values are used here for illustrative purposes) the smallest possible value for α is π. This substantiates the notion discussed earlier that migrants do not completely break their rural ties; π keeps a rural option open in case of failure in the city but does not necessarily hinder the pursuit of urban life-style.

Figure 3 below shows combinations of α and s for $\delta = 2$. The basic negative slope of the α function is retained but the shape is curved.

FIGURE 3



5.3: SUMMARY

In this chapter, we have described a theoretical model of asset demand for children in rural households. Parents decide how many children to have, and how much educational investment to make in each child. The amount of education per child determines the net return to the household associated with that investment; it determines also the proportion that migrates. In the next chapter, we explore the implications of different sets of parameter values within the context of this model.

5.4: NOTES TO CHAPTER 5

1. For example, Anker and Knowles (1982) observe that in the rural areas of Kenya, higher levels of school attainment seem to have a stimulative effect on fertility, and parents view education for their children as a good investment.

2. For example, Gomes (1984) uses the rates of return to education as a determinant of child investment in her analysis of Kenyan data, stating that for each parent, the distribution of investment among children will be influenced by the prevailing rates. If the rates of return to education decline with additional years of education (that is, if they are highest at the lowest level of schooling and decrease thereafter) then parents will maximize the return on their investment outlays by equalizing the investment across their children. On the other hand, if the rates of return rise parents will do better to invest in some children, preferably those most likely to succeed, at the expense of others.

3. The remittance assumption maintains the tradition of Neher and others that children,in general, will automatically make these transfers. Stark, however, introduces the notion of discretionary, rather than automatic, transfers. With discretionary transfers, parents find it advantageous to engage in acts to enhance the will of their children to confer benefits, that is, in acts enhancing their bargaining power vis-a-vis their children. For example, the presence of another child (in the absence of a stable coalition among the children), weakens the bargaining power of a given child, so parents have an incentive to bear more than one child. If the will to deliver old-age support (a child-specific service that parents greatly desire), is negatively correlated with the capacity to do so, parental investment in furthering such a capacity will be constrained (Stark, 1984).

CHAPTER 6

IMPLICATIONS OF THE MODEL: SOME SIMULATION EXPERIMENTS

6.1: INTRODUCTION

The notion that rapid population growth rates could jeopardize national development objectives has not always received much consideration in countries in the developing regions, particularly in Africa (Ekanem, 1982). In countries that have shown concern, there has not been uniformity in the approaches taken to deal with the issue. Of the 13 sub-Saharan African countries that participated in the WFS surveys, the governments of five of them (Benin, Cameroon, Mauritania, Senegal, and North Sudan) do not approve of intervention to alter the rates of population growth. Of those that would intervene, two would do so to maintain or raise their population growth rate (UN, 1986).

However, the increasing difficulties governments face in meeting their core responsibilities, such as provision of adequate health care services, housing, education, and

employment opportunities for a rapidly growing population are forcing policy-makers to revise their position. By 1983, of the six WFS African countries that considered their population growth rate to be excessive, three (Egypt, Ghana, and Kenya) would set a target year for lowering it (UN, 1986). Recently the Nigerian government also announced a set of target dates in its draft policy on population and development.[1] In contrast to the African case, most of the governments of WFS countries in the Asian and Pacific region have, as an on-going concern, the establishment of the small family as the norm, the achievement of a higher age at first marriage among women, and improvements in infant and child survival (UN, 1986).

While only a few of the WFS African countries are willing to "interfere" with couples' fertility decisions, almost all the governments of these countries have shown concern for, or have policies relevant to maternal and child health and the level of mortality, particularly that of infants and children (UN, 1986). In fact, the emphasis of the population policy in most of these countries has always been on the reduction of mortality rates, while implicitly assuming that the socio-economic changes resulting from increased economic growth would lead to reduced fertility rates in the long run (Ekanem, 1982).

It is likely that as more governments in Africa perceive population-related issues as requiring more urgent attention, they will initiate more direct measures for effectively influencing their demographic patterns. A factor that may facilitate such action is the increasing expression of concern from various international agencies with whom these governments have to co-operate on a number of development projects. There is a consensus in the literature that the design and implementation of any effective population policy package, though essentially a political exercise, would benefit greatly from a clear understanding of the socio-economic, biological, and other proximate influences on the components of population growth in the particular society (Bongaarts, et al., 1984; Bulatao, 1984; UN, 1986; Warwick, 1982). It is for this reason that the following discussion will draw in a general way on the experience of sub-Saharan Africa, instead of developing countries as a whole.

In Chapter 5, we presented a conceptual framework of the relationships among socio-economic and demographic variables in a rural traditional setting. It was argued that by having many children, parents act in their own self-interest. Therefore, any attempt to alter the prevailing fertility level must address the social and

economic incentives to have large families. The model provides a basis for examining a number of policy options in a high fertility rural society.

6.2: CHOICE OF PARAMETER VALUES

To perform the simulation experiments requires values for survival probabilities, p_0, p_1, and p_2, the urban wage rate, w, cost of education per child, k, and the parameters π, θ, δ in the remittance function. The "standard" values are reported in column 1 of Table 6.1. Although these values are not intended to reflect with precision the situation as it exists in any specific developing country, they have been chosen so as to correspond roughly with the experience in sub-Saharan Africa.

The values of p_0, p_1, p_2 are derived from the United Nations' model life tables for developing countries where the life expectancy at birth is 45 years for males, and 50 years for females (UN, 1982). As the rural area is our main concern, we also took into consideration the fact that rural survival rates are generally lower than the urban (or national) rates. For example, the starting value of p_0 = 0.8 means that 80 percent of children born in the rural

area would survive infancy, p_1 = 0.85 means that 85 percent of those who survived infancy would reach adulthood, and p_2 = 0.70 means that 70 percent of adults would reach old age. Stated differently, these values imply approximately even odds that a newborn child would live till old age.

The agricultural wage rate is set equal to the average rural product, A, and normalized to 1 and the values for k and w are set in relation to A. The urban wage rate, w, is the ratio of the wage rate in non-agricultural activities to the agricultural wage rate. It could be interpreted as the migrant's "expected wage rate", i.e., that value of w which balances the probability of urban unemployment against the positive differential between urban and rural wages, in the migrant's decision to move (Harris and Todaro, 1970). Based on available data on wage rates for the 1976-84 period from three sub-Saharan African countries we observe that the wage rate in non-agricultural activities ranges from 1 to 3 times that in agriculture (ILO, 1986). Accordingly we chose w = 2 as a reasonable standard value. The choices of standard values of π and θ are determined by the evidence in the literature indicating that migrants typically remit between 15 and 30 percent of urban earnings to their rural families (For example, see Knowles and Anker, 1981; Caldwell, 1982). The standard

value of δ is arbitrarily but plausibly set at 1. In the context of our model these values imply that for a family with four surviving children, if one was sent to an urban area, that child would remit 30 percent of his/her urban wage, if two were sent each would remit 25 percent.

6.3: DISCUSSION OF RESULTS

The standard parameter values discussed above are used in equation (26) to obtain the solution for the key variable, s, which is the youth migration rate and, in turn, the solutions for the other variables shown in column 2 of Table 6.1.

The value 0.23 for s means that a little less than one quarter of children are sent to the cities. The number of children per $\bar{N}_2$, b = 1.92, implying that, on average, an adult woman in the rural area has 3.8 children. Each migrant child would remit 30 percent of his/her earnings. This implies that after meeting the costs of education, each rural adult would be left with a net gain of 14 percent additional income from remittances. As was indicated earlier, it is not the intention that these figures should reflect the experience in an actual

population; any comparison with actual birth rates, for example, is complicated. The standard case presented here serves mainly as the benchmark for subsequent experiments.

We carried out some simulation experiments to assess the effects on the steady state rural fertility rate of alternative values of the parameters relating to changes in education costs, child altruism towards parents, the urban wage rate, and changes in rural agricultural productivity and mortality conditions.

6.3.1: Cost of Education

A policy measure often suggested in the literature is that governments in developing countries should institute specific incentives and/or disincentives to alter the benefit-cost ratio implicitly associated with childbearing and childrearing. For example, disincentives might be introduced that would increase the costs of having large families. Depending on the situation, there are many ways of doing this.[2] In our model, a policy instrument to use would be k, the cost to parents of further education per child. Most governments in Africa pursue the policy of subsidizing schooling at all levels. Across the continent, compulsory and fee-free primary education is advocated and

in operation.[3] Part of the implementation has been the expansion of primary schools in rural areas. The main rationale for this action is the empirical evidence, gathered mainly from other countries, which demonstrates an inverse relationship between education and fertility (Cochrane, 1979; De Tray, 1976). This finding lends support to the view that the promotion of educational opportunities for children of both sexes will reduce the work-time of children in the household, expose them to modern ideas about fertility regulation, and generally make it more likely for the children to adopt "non-traditional" lifestyles as adults.

However, while a subsidy program may be politically desirable, it may also be an important factor contributing to the observed high level of fertility in the rural areas. A look at the way k enters the calculation of parents makes this clear.

If education is completely subsidized by the government (i.e., $k = 0$), while all other parameter values are maintained at the standard levels, this has the effect of encouraging rural fertility. Compared to the "standard" birth rate, a full educational subsidy would stimulate childbearing by over half a child per $\bar{N}_2$ -- that is, by

more than one child per family (see row 1 of Table 6.2). More children would be sent to the city (s goes up), and the returns reaped by the rural household (via remittances) would increase without the families having to bear any direct costs of the higher educational investment. Or, in the case of a country like Kenya where parents bear some of the costs, as long as the rates of return to education rise with increased schooling, and as long as educationally advantaged children can be induced to make income remittances to parents, the parental budget constraint that operates to restrict family size is weakened (Gomes, 1984).

As is evidenced from the figures in the table, increases in the cost of education borne by parents have the effect of reducing the number of children they would have, ceteris paribus. Were the cost of educating each child to use up, say, one-quarter of a productive rural adult's output (i.e., k = 0.25), this increased expense would reduce the rural birth rate to a level consistent with stationarity of the rural population. This would eliminate the out-migration of children, and consequently, completely wipe out expected remittances originating from urban employment.

These results seem to suggest that extension of formal

schooling may not be a straightforward policy instrument for reducing family size in the context of a rural African society. In particular, a policy of full subsidization of the educational system may not be without its undesired side effects for those African governments that wish to bring about a reduction in fertility.

6.3.2: Urban Wage Policy

The relationships between different government policies are sometimes not obvious; hence, a major analytical objective is to clarify the complexities involved in such cases so that their actual impact can be empirically determined or verified. Take, for example, a wage policy that favors the urban modern sector with relatively high and steady wages but allows the rural agricultural sector to stagnate. The higher wages in the cities are an oft-cited pull factor in migration literature. According to our model, changes in the urban wage rate, w, have significant effects on all other variables.

Increases in w have a strong positive impact on the rural birth rate, stimulate rural emigration, and effectively ensure bigger returns to the rural family. For example, were the urban wage rate to go up by 50 percent

(from 2.00 to 3.00), the number of children born would go up by over one child per $\bar{N}_2$ — about a 60 percent increase; also, the proportion of children migrating to the cities would more than double and the net return to the rural household would be almost five times that of the standard case (see row 2 of Table 6.2).

Cut backs in the urban wage rate also produce some interesting results. A relatively small cut of 10 percent in w brings about significant drops in the birth rate and migration which, in turn, cause net returns enjoyed by the family to decrease.

Given the strong impact of the urban wage rate and the cost of education on the other variables, especially the rural birth rate, it is not surprising that the combination of a high educational subsidy and a high urban wage rate would provide a considerable incentive for parents in rural areas to have many children and send several of them to the cities, in the hope of enjoying substantial returns. If parents were to pay only 5 percent of the cost of educating a child, while migrant children enjoyed a relatively high urban wage rate, the rural birth rate would be almost double the rate under standard conditions (row 3 of Table 6.2). On the other hand, an increase in educational cost,

coupled with a slightly smaller urban-rural wage differential, produces a less drastic positive impact on all the variables (see row 4 of the table).

6.3.3: Measures of Child Altruism

A large part of our "impact analysis" hinges on the existence of financial transfers, voluntarily made or as prescribed by tradition, between migrant children and the rural household. To the extent that these children are successful in the city and remain loyal to the home family, some income remittance to parents will take place. In our model, π measures the degree of child altruism towards parents and, as the results in row 1 of Table 6.3 show, changes in π have a very significant impact on the rural birth rate and migration. For example, if as a result of some exogenous circumstances, the value of π were double the standard level, the number of children born per rural adult would increase by more than four from 1.9 to 6.2 children. Over three quarters of these children would be sent to the cities and there would be a large increase in the net returns received by rural households.

On the other hand, a drop in child altruism prompts a sharp decrease in the rural birth rate. This result appears

to support the thesis referred to in Chapter 3,[4] which argues that a root cause of fertility decline in a traditional society is the concentration of expenditures and obligations in the process of family nucleation. As indicated in that context, some historical studies in rural England and the United States provide empirical support for that thesis.[5]

A factor reported to influence the amount of remittance made by migrant children is the level of their urban income;[6] it is therefore of interest to explore the combined effect of changes in w and π. The figures in rows 2 - 4 of Table 6.3 confirm the suspected directions of impact. Take, for example, the case where a marked increase in the urban wage rate (w increased to 3.00) is accompanied by a similar proportionate increase in child altruism. The result is a phenomenal increase in the number of children per rural adult, a huge exodus of young people from the rural areas, and a tremendous rise in the net returns that accrue to the rural household. It is noteworthy that in spite of the large expansion in family size, the cost of education borne by the rural family does not increase dramatically. It would appear that the migrant children, through their heightened feeling of altruism, are able to collectively reduce the adverse financial impact that

otherwise would have resulted.

Suppose, however, that the large urban wage increase makes the migrant feel more socially and economically secure in the urban way of life, and hence less obligated to send money to his/her rural-based family -- the case made for the specification of the α function in Chapter 5. This situation is reflected in the figures in row 2. They show much moderated increases in birth rate and migration, and the expected reduction in the fraction of urban wage remitted when compared to the standard case.

While θ is not a direct a measure of child altruism, it is related to the number of children left in the rural area, i.e., those children who make their contributions to the family by working on the farm. Changes in this variable affect the remittance function and, therefore, have implications for the welfare of the parents. A decrease in the value of θ reduces the birth rate, out-migration and the net returns that parents enjoy; an increase in θ produces the reverse effect (see row 5 of Table 6.3).

6.3.4: Rural Agricultural Productivity

Many researchers refer to the state of agricultural

productivity in Africa as indicative of an "imminent food crisis" and cite, among a host of contributing factors, rapid population growth and the continuation of colonial approaches to development that facilitated surplus extraction in the form of minerals and export crops but neglected investments in national and regional research stations devoted to food crops (Eicher, 1982; Baldwin, et al., 1987).[7] Suppose that this growing concern leads to the introduction of schemes that boost agricultural productivity; our model allows for the examination of the impact of changes in rural productivity as measured by A (see row 1 of Table 6.4). A 25 percent increase in productivity reduces the rural birth rate, cuts out-migration significantly, and reduces the reliance on remittances.

It is noteworthy that while improvements in rural productivity and a 10 percent cut in the urban wage rate separately have the effect of reducing rural birth rate, the former generates a stronger impact on all variables, ceteris paribus. The joint implementation of improvements in rural agriculture and slight decrease in the urban wage rate would result in a significant reduction in the rural birth rate, lowering it to a rate consistent with population stationarity (see row 2 of Table 6.4). However,

a persistent neglect of the agricultural sector in general, and food production in particular, would encourage large family size, and youth out-migration.

6.3.5: Rural Mortality Conditions

As indicated in Chapters 2 and 3, mortality conditions have improved throughout the developing world, including sub-Saharan Africa. However, the comparatively high levels of infant and child mortality prevailing in the SSA region suggest that wide scope for improvements still remains, particularly in the rural areas. Experts continue to advocate that efforts to set up and extend pre-natal care and reduce health risks associated with pregnancy and child delivery should not be relaxed.[8] Several studies have found a strong correlation between levels of infant and child mortality and of fertility. For example, analysis based on WFS data show that women who had had one or more children die were more likely to want an additional child than if they had not lost a child (UN, 1981; World Bank, 1982). Since, as these studies suggest, high mortality accounts for a portion of the high fertility, increasing the chances of survival of infants and children is not only socially desirable, but could also work to reduce the need for

couples to have many children.

In our model, the survival probabilities are represented by p_0, p_1, p_2. Changes in mortality conditions over the life-cycle, especially in infancy, p_0, influence the number of births as expected, but not dramatically (rows 3 - 5 of Table 6.4). An interesting result, however, is that if people are more likely to live well into old-age (increase in p_2), they do not significantly revise their childbearing decision. This could be a manifestation of the point made by Datta and Nugent (1984) and Caldwell (1982) that the expectation and receipt of remittances from one's children is not necessarily conditional on old age. In other words, it is not necessarily the case that the desire for "old-age" security coincides with retirement.

6.4: SUMMARY

In this chapter, we have examined the impact of changes in the key variables of our theoretical model and their significance for the welfare of the parents who reside in the rural areas and for whom children constitute pure capital goods. The results from the simulation exercises portraying the strength and direction of interrelationships

among the variables allowed us to consider some implications of different policy options.

There is the need to acknowledge the inherent complexity involved in the design and implementation of population-related policies since consequences often tend to overlap. An educational sudsidy program designed to promote schooling among the citizens may solve the problems of illiteracy and ignorance, but compound the population growth problem in a society where relatively cheap education enhances the asset value of children to their parents. This issue emphasizes the need to understand the underlying socio-cultural structure of the society for which any policy measure is being recommended.

One conclusion that can be drawn from this chapter is that as long as the old age security motive for childbearing persists in combination with the traditional family-based system of obligations ensuring a net upward intergenerational flow of wealth, such policy instruments as the extension and subsidization of schooling may not produce the expected impact on family size in traditional societies.

6.5: NOTES TO CHAPTER 6

1. Nigeria's draft policy on population and development, like those of several other sub-Saharan African countries, seems to be quite ambitious. This policy document includes targets for four major policy goals: improved living standards; preventing premature death and illness among high-risk groups of mothers and children; reducing population growth rates through voluntary family planning; and a more even distribution of population between urban and rural areas. With regard to fertility and mortality, the specific targets are:

   — To halve the proportion of women having more than four children by 1995, and to reduce it by 80 percent by the end of the century.

   — To extend family planning services to half the women of childbearing age by 1995, and to 80 percent of them by 2000.

   — To reduce the likely completed family size from over 6 to 4 per woman by the end of the century and to bring down the rate of population growth from about 3.3 percent a year to 2.5 percent by 1995 and 2 percent by 2000.

   — To cut infant mortality (from about 90 deaths per 1,000) to 50 by 1995 and 30 by the year 2000; and to reduce the crude death rate (from 13-16 per 1,000) to 8 by the century's end (UN, 1987).

   Looking at the current demographic situation of the country (as described in Chapter 3), it is very doubtful that any of the objectives targeted for 1995 will be realized. In that sense, the main value of the document lies in its expression of the concern of the Nigerian government about the evolving demographic trends in the country, and its desire to do something to influence the pattern along certain lines. The actual implementation of this policy will require a lot of planning and the commitment of large financial resources, both of which will take much longer than

1995 to achieve. In addition, the voluntary nature of the proposed fertility regulation schemes makes compliance to set targets doubtful at this stage.

2. Bulatao cites the example of Singapore which has introduced a very comprehensive set of disincentives for those with large families, including such measures as delivery fees that rise with parity, priorities in school admission for children from smaller families, and public housing allocation policies that explicitly disregard family size. Studies suggest that these disincentives, and particularly the school admission policy, are more influential in Singapore than the more common tax and maternal leave disincentives, which in practice affect few people (Bulatao, 1984).

3. One exception to this practice is Kenya where Gomes reports that basic education receives lower government subsidies than either secondary or tertiary education. As a result, private costs of schooling at the primary level are equal to or higher than at the higher levels, but with much lower earnings benefits. The higher private outlay at the primary level of schooling and the relatively lower private outlay at the secondary and higher levels are central to explaining the finding of a trend of rising private rates of return to incremental education in Kenya (Gomes, 1984).

4. See Chapter 3, note 10

5. See studies done by Ransom and Sutch (1986), and Williamson (1985) referred to in Chapter 3.

6. See Chapter 2 for a list of the factors that determine the volume of remittances.

7. One reason commonly suggested in the development literature for this continued neglect of the food production aspect of agricultural development is the fact that the bulk of the work force in this sector is made up of women and children who also constitute the segment of society that have little or no input into policy formulation (Boserup, 1985).

8. It is often mentioned in WFS reports that many of the problems of health in high risk countries are related to the early age at which young women marry and begin to have children (UN, 1986). This explains the focus of concern in the design of preventive measures.

TABLE 6.1. BENCHMARK FOR SIMULATION EXPERIMENTS

STANDARD VALUES		STANDARD RESULTS	
P_0	= 0.80	s	= 0.23
P_1	= 0.85	b	= 1.92
P_2	= 0.70	α	= 0.30
A	= 1.00	Total Returns from Remittances	= 0.18
k	= 0.10	Costs of Education	= 0.04
w	= 2.00	Net Returns	= 0.14
θ	= 0.20		
π	= 0.15		
δ	= 1.00		

NOTE: A, b, total returns from remittances, costs of education, and net returns are expressed per $\bar{N}_2$; α is expressed per migrant child.

TABLE 6.2. SIMULATION EXPERIMENTS INVOLVING CHANGES IN EDUCATION COSTS AND URBAN WAGE RATE

Parameter Values	s	b	α	Total Returns	Costs	Net Returns
STANDARD	0.23	1.92	0.30	0.18	0.04	0.14
(1)						
k = 0.00	0.42	2.51	0.27	0.39	0.00	0.39
k = 0.05	0.32	2.17	0.29	0.27	0.03	0.24
k = 0.20	0.07	1.58	0.34	0.05	0.02	0.03
k = 0.25	0.00	1.47	0.35	0.00	0.00	0.00
(2)						
w = 1.80	0.15	1.73	0.32	0.10	0.02	0.08
w = 2.50	0.39	2.43	0.27	0.43	0.09	0.34
w = 3.00	0.51	3.03	0.25	0.79	0.12	0.67
(3)						
k = 0.05						
w = 3.00	0.59	3.56	0.23	0.99	0.08	0.91
(4)						
k = 0.15						
w = 2.50	0.32	2.16	0.29	0.34	0.08	0.26

TABLE 6.3. SIMULATION EXPERIMENTS INVOLVING VARIATIONS IN CHILD ALTRUISM

Parameter Values	s	b	α	Total Returns	Costs	Net Returns
STANDARD	0.23	1.92	0.30	0.18	0.04	0.14
(1)						
π = 0.10	0.09	1.62	0.28	0.06	0.01	0.05
π = 0.30	0.76	6.24	0.35	2.26	0.38	1.88
(2)						
π = 0.10						
w = 3.00	0.35	2.25	0.23	0.37	0.06	0.31
(3)						
π = 0.20						
w = 2.50	0.57	3.41	0.29	0.96	0.16	0.80
(4)						
π = 0.25						
w = 3.00	0.96	33.77	0.26	17.20	2.59	14.61
(5)						
θ = 0.15	0.13	1.69	0.28	0.08	0.02	0.06
θ = 0.25	0.30	2.10	0.33	0.28	0.05	0.23

TABLE 6.4. SIMULATION EXPERIMENTS INVOLVING SELECTED CHANGES IN RURAL CONDITIONS

Parameter Values	s	b	α	Total Returns	Costs	Net Returns
STANDARD	0.23	1.92	0.30	0.18	0.04	0.14
(1)						
A = 0.75	0.39	2.41	0.27	0.35	0.08	0.27
A = 1.25	0.09	1.62	0.33	0.07	0.01	0.06
(2)						
A = 1.25						
w = 1.80	0.00	1.47	0.35	0.00	0.00	0.00
(3)						
p_0 = 0.70	0.23	2.19	0.30	0.18	0.04	0.14
p_0 = 0.88	0.23	1.74	0.30	0.18	0.04	0.14
(4)						
p_1 = 0.80	0.20	1.96	0.31	0.16	0.03	0.13
p_1 = 0.95	0.29	1.86	0.29	0.24	0.04	0.20
(5)						
p_2 = 0.63	0.22	1.88	0.31	0.17	0.07	0.10
p_2 = 0.82	0.26	1.98	0.30	0.21	0.04	0.17

CHAPTER 7

CONCLUSION

7.1: CONCLUDING REMARKS

It is generally recognized in the literature that the determinants of fertility vary from country to country and across regions within a country. The usefulness of broad generalizations in terms of predictions and policy measures is therefore limited. What we have done in this study is to identify a rural traditional society by drawing on demographic and socio-economic features that are observable in rural areas of LDCs. We note the persistence of high fertility rates, the relatively high levels of infant and child mortality, and the very low use of modern methods of fertility regulation. One of the themes that is obvious from the early chapters of the thesis is the fact that high fertility has strong socio-cultural and economic roots. The pattern of family formation and the nature of familial obligations provide a basis for parents to view their children as desirable assets.

A theoretical economic model in which fertility, children's schooling and migration are jointly determined by rural agricultural households is formulated. Implications of the effects of changes in education costs, urban wages, child altruism towards parents, and rural living conditions are derived from the model.

While it is impossible to incorporate all the intervening factors, a main concern of the simulation experiments was to identify how seemingly unrelated government policy measures overlap and generate demographic consequences. If the framework presented in the thesis is representative of the background to decision-making, then it could be useful to governments in the determination and design of effective population policy, especially in the face of resource constraints. For example, do certain educational policies conflict with broader development objectives? We showed how the existence of a "share-alike" principle which works, for instance, through a sibling educational-occupational chain, can undermine the direct (negative) relationship between high fertility and education cost. If parents consider children as assets, to what extent can policies related to the cost of public education for children be used to motivate smaller family-size choices? It is vital that the underlying socio-

cultural structure of society be understood because as some of the simulation results showed, the most common policy instrument of educational subsidy may produce an "unexpected" impact on family size.

The state of the rural economy is also significant in the decision-making process. Historically in many LDCs, especially those in Africa, the rural sector has been grossly neglected in socio-economic development efforts although it continues to be the source of local food supply. Continued stagnation of the rural economy has strong implications for both fertility and out-migration. Consequently, policy measures aimed at improving rural production and living standards are desirable.

7.2: SCOPE FOR FUTURE RESEARCH

One of the advantages of our model is the fact that it can be extended for further theoretical and empirical analyses. Perhaps a general theme for future research along these lines should be more problem-oriented. Such a focus would require the inclusion of more "realism" into the specification of the model. For example, it may be necessary to re-define the rural production function to

explicitly include children as productive agents and also make gender distinctions among children and decision-makers. These modifications have implications for the economic value of children and the status of women, both of which influence fertility levels.

It would appear from our model that permanent rural out-migration has in it elements that may produce changes in familial obligations which, in turn, may affect rural family size. There is a broad scope for the examination of the relationship between migration and fertility in rural areas. The interactions among migration, urban wage rate, and urban unemployment (and hence remittances), may be further explored by explicitly incorporating the urban sector into the model. Needless to say, a meaningful empirical investigation requires detailed, reliable cross-district or panel data. While such data are notoriously lacking in many developing countries, there is a growing pool of household survey data which may provide a starting point. Data availability will also permit the testing of the impact of other assets on the demand for children, that is, a test of the security motive. Combined with declining expectations of support from migrant children, how would these alternative assets change rural family size preferences?

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