

Socio-economic and Cultural Factors Affecting Fertility:

A Replication of Easterlin and Crimmins

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to the required standard


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ABSTRACT

Earlier theoretical and empirical work showed that there is little consensus on a single theory of human fertility behavior. In 1983, Easterlin advanced a synthetic framework for explaining the socio-economic and cultural impact on fertility control and fertility via three intervening variables: demand for children, supply of children and costs of fertility control. In 1985 the model was tested with the World Fertility Survey (WFS) data for Sri Lanka and Colombia. The current study is a replication of the test of Easterlin's model with the use of the WFS data for South Korea. A total of 1,572 South Korean women were included in the analysis. In keeping with Easterlin and Crimmins' work, similar statistical modeling and operationalization procedures were employed. Multiple regression was the major statistical method used in the data analysis.

The test of the Easterlin model went through three inter-connected stages. In stage 1, the model attempts to clarify the linkages between cultural and modernization variables on the one hand, and demand, supply and costs of fertility control on the other. In stage 2, the model looks at the effects of women's motivation for fertility control and costs of fertility control upon the duration of contraceptive usage. In stage 3, the model focuses on the explanation of observed fertility through a "proximate determinants" approach, as advanced by Bongaarts (1978). The findings of this study provided weak support for the stage 1 analysis and mod-

and moderately strong support for the other two. It was concluded that more work needed to be done to improve the linkages in stage 1 of the Easterlin model, and that the model needed further empirical testing.

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Chapter 1

LITERATURE REVIEW

1.1 Introduction

World population in early 1988 is 5.1 billion and is increasing at a rate of 1.7 percent per year.¹ However the peak of growth experienced in the 1960s has now passed. World population growth is slowing. Efforts to control world population have concentrated on reducing fertility, which is apparently declining in many developing nations (Kirk 1979).

Elucidating the reasons for the fertility decline has been "one of the foremost challenges to social science" (Easterlin & Crimmins 1985:xvii). Since the commencement of the earliest fertility decline in Western Europe,² population researchers have constructed a variety of models and theories in attempts to isolate the causes of fertility levels and their changes. However, their findings often "differ not only in magnitude but even in direction in different settings and at different times" (Bongaarts, 1978:105). No single theory of human fertility behavior appears to be accepted by demographers.³

In 1983, Easterlin advanced a synthetic theory of fertility,⁴ which combines the traditional approach (i.e. the demographic transition theory, assuming a close link between modernization and fertility), with a model of "proximate determinants" as suggested by Bongaarts (1978)⁵ extending the thought of Davis and Blake

(1956). Easterlin supplements this combination by insertion of an additional set of variables (supply of children, demand for children, and costs of fertility control) between modernization and the deliberate fertility control and fertility. (These aspects of the Easterlin model will be described in detail later in this chapter.)

Because of its synthetic nature, the Easterlin model has become the most popular theoretical approach in the past few years among the students of fertility. One indication of the importance of the Easterlin model is the fact that, in 1983, the United States National Academy of Science solicited the help of 42 leading demographers around the world to prepare individual papers on a massive study of determinants of fertility in developing countries. The theme of these papers was the Easterlin model (Cleland and Wilson 1987:80, cf. Bulatao and Lee 1983).

In 1985, Easterlin's synthetic model was tested with the World Fertility Survey data for Sri Lanka and Colombia (Easterlin & Crimmins 1985). Easterlin and Crimmins reported that the data support the theory. The current research replicates a test of Easterlin's theory with the use of the World Fertility Survey data for South Korea⁶. It attempts to see whether the Easterlin model holds in another setting. (It will be explained in Chapter Two why South Korea represents a particularly appropriate country in which to test the Easterlin model.)

The remainder of this chapter will review the literature on fertility theories. Some leading contemporary theoretical approaches to the study of fertility will be described and criticized. In Chapter Two, the data and research methodology will be discussed. Chapter Three will examine the results. The fourth and final chapter contains a brief discussion and conclusion.

1.2 Demographic Transition Theory

In the early 20th century, when data were meager and earlier population principles, for example Malthus' theory,⁷ worked poorly in industrial societies, a new kind of demographic explanation gained ground. It asserted that socioeconomic development depresses fertility. Its different variants are commonly called the theory of demographic transition (Thompson 1929, 1944; Notestein 1945, 1953; Blacker 1947, Coale and Hoover 1958, Cipollar 1962, Casetti 1968, Bogue 1969, Woods 1979, Grigg 1982, Coale 1984).

This theory was first formulated by Thompson (1929). He gathered data from certain countries for the period 1908-1927 and showed that the countries fell into three main groups according to their patterns of population growth. The first group included countries in northern and western Europe and the United States. From the mid-19th century to the first quarter of the 20th century these countries "have passed from the state of having a very high rate of natural increase into the state where they have quite low rates of increase and will shortly become stationary and start to decline in numbers" (Thompson 1929:968).

The second group consisted of Italy, Spain, and the "Slavic" peoples of central Europe. Thompson suggested that the death rates in these countries would decline as fast or even faster than the birth rates for some time yet. The conditions in these countries were much the same as existed in the first group countries thirty to fifty years earlier (Thompson 1929:968-969).

The third group included the rest of the world, which constituted about 70 to 75 per cent of the world population. Based on the vital statistics for Russia,

Japan and India, Thompson saw little evidence that either birth or death rates were declining in any significant portion of these populations. Like Malthus, Thompson believed that the growth of these populations would vary according to "the opportunities they have to increase their means of subsistence" (Thompson 1929:971).

Based largely on the threads of Thompson's thesis, early versions of the demographic transition theory posited three general phases, which in Riesman's words, are pegged into a "population S-curve" (Riesman et al. 1970:8): 1) a pre-industrial phase when there is low growth because both birth and death rates are high; 2) a transitional phase with continuing high birth rates, but declining death rates and consequently high rates of natural increase; 3) an industrialized-urbanized phase, with low birth and death rates and near-zero rates of natural increase (cf. Thompson 1929, Riesman et al. 1970, Namboodiri 1980). The model was later refined by Notestein (1945) to include the prognosis that, after stage three, the generally low birth rates may decline below the level of death rates, which cease to decline, and so the population begins to diminish (Blacker 1947), as is true in West Germany today (Merrick 1986). On this basis Western populations are described as in the stage of "incipient decline".

These, however, were not theories explaining demographic changes; they were merely descriptions of the demographic changes. But, by the 1950s and the 60s, rapid population growth aroused world-wide concern. Demographers who were working on the demographic transition model found that each new country they observed seemed to fit this model. It seemed that some lawlike perspective of demographic trends had been discovered. This perspective might be "best

expressed by the sentiments 'take care of the people and population will take care of itself' or 'development is the best contraceptive'" (Teitelbaum 1975, cited in Weeks 1981:37).

In summary, as an evolutionary scheme, the demographic transition theory draws upon the experience of countries that have gone through the transition and views high fertility as a reaction to high mortality. The importance of economic and social development is emphasized and understood to have played an important role in the transition from the pre-industrial (having a high mortality rate) to the industrialized-urbanized stage (having a low mortality rate). The logic of the theory is that when a country is developed and the standard of living is raised, mortality will decline, which will in turn, result in a reduction of the fertility rate.

Population researchers today readily show their dissatisfaction with the demographic transition theory (Namboodiri 1980, 1986; Andoka 1978, Woods 1982, 1986; Coale and Watkins 1986, Handwerker 1986a, Srinivasan 1986, Teitelbaum 1975, Johnson 1984 etc.). Starting over two decades ago, Ansley Coale "led his Princeton-based group in a massive compilation of evidence on demographic change in politically defined subdivisions of national states throughout Europe, concentrating on the presumed period of fertility decline, in the nineteenth century," (Tilly 1986:323). One aspect of this compilation was the Princeton European Fertility Project⁸, two goals of which were summarized by Coale and Treadway as follows:

The Project was designed with two principal purposes--to create a detailed quantitative record of fertility in each of the several hundred provinces of Europe, during the period of major decline, and to

determine the social and economic conditions that prevailed when the modern reduction in the rate of childbearing began (Tilly 1986:32).

Based on their early findings of the project, Coale and his associates cast doubt on the relation of socio-economic development to fertility decline (Coale, 1965,1973), even though their original attempt was to verify the demographic transition theory. They found that the results of the project did not support the theory because there was no exact threshold at which the decline of fertility began. Based on the data from the same investigation, Van de Walle and Knodel (1967) reported that at the time of the beginning of fertility decline the levels of mortality and economic and social development varied greatly from one country to another. For example, they found that parts of France experienced fertility decline well before the spread of industrialization and urbanization and simultaneous with or prior to mortality decline. In Germany and England, however, fertility began dropping only after industrialization and urbanization got well underway. They concluded that "a simple statement of the threshold hypothesis and of the demographic transition was incapable of describing the actual experience of Europe" (Van de Walle and Knodel 1967:47-55).

Based on the new findings of this project, Watkins (1986) concludes:

The decline in marital fertility can precede significant modernization, simply defined, as it did in France and among some forerunners elsewhere: the European experience suggests that modernization is sufficient but not necessary. Nor is the response of fertility to the changes that define or accompany modernization always immediate: the lag may be quite variable and seems to be associated with long standing cultural differences. The findings that contiguous provinces that shared a cultural as well as geographical location had similar levels of nuptiality and fertility and similar patterns of decline give reasons to believe that the set of preexisting regional conventions by which reproduction is articulated with other social arrangements may mute for one group of provinces or enhance for another the impact of changes associated with the usual measures of modernization (Watkins 1986:448).

To conclude, the demographic transition theory offers only an imprecise description of levels and lags in the transition from high to low mortality and fertility. It does not explain the decline in fertility when mortality is reduced--nor does it explain the delay to varying degrees in different countries. New findings have suggested that, aside from economic factors, sociocultural factors are involved. It is implied by many demographers working on the demographic transition theory that conscious limitation of fertility is also involved in deciding family size. Although this is true, "it is ethnocentric to believe that people everywhere think and respond to the social world in the same way that we do" (Weeks 1981:39).

One attempt to go beyond the usual explanation offered by the demographic transition theory is made by Kingsley Davis (1963) and his theory of the multiphasic response.

1.3 The Theory of the Multiphasic Response

In his 1963 paper, "The Theory of Change and Response in Modern Demographic History," Davis analyses people's various responses to mortality decline in given situations. He studies several societies, confronts the analysis of macro data (aggregated statistical information) and proposes what appears to be invariant stimulus conditions and response consequences to account for modern demographic history.

Davis' theory begins with the assumption that "no society has been geared to a sustained high rate of natural increase except by conquest" (Davis 1963:352). Thus, when mortality begins to decline, natural increase will grow. In consequence, people will give some response to this demographic change. But the basic motivation of this response is not the direct fear of poverty which, Davis claims, inadequately explains the "response" of lower fertility. He notes that the northwestern Europeans and the Japanese were not "pushed" by rising poverty:

The answer to the central question about modern demographic history cannot be posed, then, in the framework of ordinary population theory, which assumes the sole "population factor" to be some relation between the population-resources ratio and the collective level of living. It is doubtful that any question about demographic behavior can be satisfactorily posed in such terms, because human beings are not motivated by the population-resources ratio even when they know about it (which is seldom) (Davis 1963:351).

Then by what are people motivated? Davis (1963) argues that it is the prospect of rising prosperity that will motivate people to limit the number of children. When mortality begins to decline, people become aware of the fact that large families handicap their efforts to take advantage of the opportunities in economic and social development. This was the situation in northwestern Europe during the late 19th and early 20th centuries, for example, as well as in Japan after World War II. More children means that the resources and property of the parents must be divided more, and thus each child will have fewer resources with which to start his or her own family and to provide for educating his or her own children. Parents are soon aware of this. Thus when mortality declines and more babies survive to adulthood, they try to accommodate themselves by different responses. Davis lists a variety of responses parents might give: 1) increased celibacy; 2) postponed marriages; 3) use of contraception, 4) induced abortion; and 5) outmi-

gration, which might take the form of migration within a given country to other areas or of emigration to other countries.

In the case of a rural society, Davis argues that declining mortality leads to a sustained natural increase, which, in turn, leads to land scarcity and changes land distribution patterns for young adults planning to get married. Consequently, marriages are postponed and the migration of rural youth occurs. Davis found that this was true in the peasant societies of western Europe. However, in an industrial society, people have different responses. For example, the Japanese after World War II responded to the decline in mortality first by induced abortion and later, by contraception.

One of Davis' most important contributions to updating the demographic transition theory is, as Cicourel puts it, that he "seems to rely on an implicit model of the actor who makes everyday interpretations of perceived environmental changes" (Cicourel 1974:8). Moreover Davis suggests an important link between the everyday lives of individuals and the kinds of population changes that take place in society (Weeks, 1981). He gives much attention to conditions external to daily family life, such as knowledge and technology, because they can influence mortality decline, industrialization, and economic development (Cicourel 1974).

Despite these strengths, the theory has been severely questioned. Andorka (1978:26) complains that Davis ignores the fact that "all the different responses are not equally inconvenient, their psychological cost is different, and populations probably tend to choose the relatively less inconvenient responses." Furthermore, according to Davis, children handicap their parents in taking advantage of the

opportunities offered by economic development. Hence there is no economic reason that parents want children at all (Namboodiri 1986). But, evidence shows that in traditional societies children are valued for their economic worth. They are an important source of labor and income, and the main source of security in old age (Murdoch 1980). Reproduction, therefore, can be an economically rewarding activity (Leibenstein 1957, 1974). Thus, at the minimum, Davis' theory does not apply to the rural areas of most less developed countries.

Taking into account the limitations of the demographic transition theory, Caldwell (1976a), a population anthropologist, proposed a restatement of the theory, which he calls "wealth flows" theory.

1.4 "Wealth Flows" Theory

To develop his "wealth flows" theory, Caldwell takes threads from demographic transitional theory, Goode's World Revolution and Family Patterns (1963), and microeconomic models of fertility. He shapes them with the grit from his more than twenty years experience of observing and researching in many African and Asian villages, and ends up with surprisingly original findings, from which he builds his grounded theory (Udry 1983).

The concept of "wealth flows", which Caldwell (1982:333) defines as "all the money, goods, services and guarantees that one person provides to another," has appeared in a variety of his earlier research papers published from 1976 onward by

Caldwell (1976a, 1976b, 1977a, 1977b, 1978, 1980a, 1982, 1983). It has been used to explain both stable high fertility and the threshold of sustained fertility decline.

To begin with, Caldwell rejects two basic premises of the demographic transition theory: 1) that the poor peoples in the developing world are not rational; and 2) that industrialization is a precondition of the demographic transition. He then advances two alternative propositions: 1) fertility behavior is rational in societies of all types and development of all stages (Caldwell 1978:533); and 2) the decline of fertility is not dependent on the rate of economic development. It is the consequence of emotional and economic nucleation of the family (Caldwell 1981).

To defend his theory, Caldwell (1980a) argues that people make rational choices to have many children when they are better off with more children. They have few children or none when their lives are worse with more children. In underdeveloped societies, (e.g. in sub-Saharan Africa), and in traditional societies, (e.g. in India), people tend to have large families; for, the larger the family size, the more powerful and wealthy is the head of the family. High fertility is therefore economically rational when the direction and magnitude of intergenerational wealth flows from children to parents. In modern societies, family life is organized in the way that wealth flows from parents to children. Economic rationality would require a minimal number of children (essentially none), but there are social and psychological satisfactions to be had from rearing a child or two.

What causes a reversal of "wealth flows" to occur in developing countries? To follow Goode's (1963) approach, Caldwell argues that the mass infusion of "Westernization" changes the direction of wealth flows. Introductions of mass educa-

tion and mass media provide a mass infusion of Western concepts of the family which emphasize equality by sex, the rights of children and of wives, and parental obligations to children rather than the other way round (Caldwell 1980b). The family will first become nucleated emotionally; then it will become nucleated economically and "considerable amounts of both are required before parents are free to indulge in ever greater expenditures on their children (Caldwell 1982:152)."

To economists' disappointment, Caldwell (1982:152) argues the reversal of the "wealth flow" does not depend on the degree of economic development. Economic approaches on their own can do nothing to predict the timing of the "great divide" (when the direction of wealth flows changes) and very little to explain the levels of fertility either before or after the transition.

Caldwell is one of the first to criticize the consensus that the reason fertility was high in poor populations was their lack of access to modern contraceptive techniques. Moreover his approach is "diametrically opposed to mainstream sociologists, to quantitative survey researchers, and to many misguided schools of economic demographers" (Schultz 1983:162).

In the past decade, his theory has received considerable support from the findings of many population researchers (e.g. Nag et al. 1978, Bulatao 1980, Cain 1977, 1981, 1982; Hull and Hull 1977, Arnold et al. 1975, Ross 1986, Alexander 1986, Handwerker 1986b, Dorjahn 1986, Whiteford 1986, Weil 1986, Schumann 1986, Odell 1986, Cleveland 1986). However, his theory also has been severely criticized.

Freedman, for example, doubts the validity of Caldwell's propositions that fertility declines only if the family becomes nucleated. He argues that adoption of the western nuclear model and abandonment of traditional familial values is not necessarily a prior condition for large-scale adoption of contraception and a fertility decline (Freedman 1977:6). Moreover, empiricists show their dissatisfaction with the slim empirical support Caldwell adduces and complain that Caldwell does not even show how he measures "wealth." Marxists find "the ideological engine of the theory distasteful" (Udry 1983:239). Not surprisingly, the most severe attacks come from economists.

Willis (1981) suggests that Caldwell reverse the direction of causation between family change and economic development. T.P. Schultz, in his "Review of Theory of Fertility Decline," criticizes Caldwell for not explaining the strength of parental demand for their children's education in poor countries, and suggests that his "cultural compatibility with Westernizing mass education is too vague" (Schultz, 1983:166). Moreover, there are no firm empirical magnitudes for many of Caldwell's concepts, and no comprehensive framework from which these empirical magnitudes can be deduced. This might result from the fact that his concepts are always "more expensive and much less tractable to eventual empirical analysis"(Schultz 1983:167). Schultz concludes that Caldwell's "wealth flows" theory "is not complete...it must confront systematically the empirical record" (Schultz 1983:167).

Demographic economists' disagreement with Caldwell's theory impels us to take a look at economic theories of fertility.

1.5 Micro-economic Theories of Fertility

Leibenstein's Pioneer Approach

The notion that economic factors have a strong effect on fertility behavior is hardly new (Robinson and Harbison 1980). For example, ninety years ago Alfred Marshall in his Principles of Economics (1898) discussed the associations of economic factors and demographic processes. He claims that "given the climate, the average age of marriage depends chiefly on the ease with which young people can establish themselves, and support a family according to the standard of comfort that prevails among their friends and acquaintances "(Marshall 1898:258, cited in Andorka 1978:27). The demographic transition theory discussed earlier refers to the decline in the economic value of children as one of the mechanisms by which modernization drives down fertility levels (Notestein 1953). However, the underlying economic logic of the demographic transition theory was loose and unclear. Leibenstein (1957) notes:

The shortcomings of the explanatory parts of the demographers' theories are of a methodological nature. These and other explanations are not incorrect but they do not possess a unified and distinct logical structure. As a consequence, it is not possible from this sort of theory to deduce the set or sets of conditions necessary and sufficient to achieve secular fertility declines. Indeed, it is very difficult to know what can and what cannot be deduced from explanations in this form (Leibenstein 1957:158, cited in Robinson and Harbison 1980:202).

Dissatisfied with the imprecise nature of the theory of demographic transition, Leibenstein (1957) put forward a more formal explanation of fertility decline (Nag 1981), which laid the groundwork for a so-called economic theory of fertility (Robinson and Harbison 1980). The economic theory of fertility, as Lei-

benstein later defined it, "is a special version of the microeconomic theory of decisions, applied to the decision of a couple to have a child" (Leibenstein 1980:37). In his theory, he distinguishes three types of utility of children: work or income utility, old age security utility, and consumption utility; and two types of costs: direct economic costs of raising children and indirect opportunity costs--opportunities of wife foregone for labor force participation (Leibenstein 1958). The thesis of his theory is built on the assumption that parents will balance the value and costs they ascribe to an nth child in order to decide whether they want that child. The emphasis is on the higher birth orders. According to Leibenstein, the consumption utility of a child is constant with respect to household income, while work and old-age security utilities decline with income. The direct costs rise with the level of income, and indirect costs may or may not rise with income. Although it might not be possible to deduce from his theory that couples necessarily demand fewer children as their income grows, the theory can be employed as a tool to explain the reduction of high parity children as per capita income grows (Leibenstein, 1957, 1958).

New Home Economics

Becker's (1960) adaptation of Leibenstein's theory became quite widely-known, though it differed very little from the original (Robinson and Harbison 1980). Becker's 1960 article, "An Economic Analysis of Fertility," initiated an approach which becomes the core of the New Home Economics and was extended and modified by Mincer (1963), T.P. Schultz (1969, 1976, 1978a), Willis (1973), Turchi (1975).

Becker points out Leibenstein's failure to make the statistical distinction between quality and cost expenditures. He argues that in addition to the number of children, their quality also influences the satisfaction of parents. As family income increases, parents not only want more children, but also want "higher quality" children so as to enhance their quality. He summarizes his theory as follows:

Children are viewed as a durable good, primarily a consumer's durable, which yields income, primarily psychic income, to parents. Fertility is determined by income, child costs, knowledge, uncertainty, and tastes. An increase in income and a decline in price would increase the demand for children, although it is necessary to distinguish between the quantity and quality of children demanded. The quality of children is directly related to the amount spent on them (Becker 1960:231).

Becker's hypothesis that with the rise of income parents would want more and higher quality children "stimulated a good deal of theoretical and empirical research among a group of economists, sometimes referred to as the Columbia-Chicago School" (Nag 1981:285, cf. Mincer 1963, Simon 1969, 1974; T.P.Schulz 1969, 1976, 1978b; Willis 1973, 1974; Michael and Willis 1975, DeTray 1973, Becker and Lewis 1973, T.W. Schultz 1974).

Mincer (1963), for example, suggested that the variation of indirect costs of children has an equally important effect on the levels of fertility as that of income. He argues, however, that the opportunity cost of the wife tends to be low in the developing countries where the low educational levels of women accompany low wages. But, when a country is developed, both the education and wage differential of women and men is getting smaller; thus the wife's income may become an important component of the family income. Supported by the empirical evidence in developed countries, Mincer maintains that the opportunity costs of the wife's time was negatively related to fertility. Following Mincer, Becker's

later articles stress the association between the female labor force participation and their levels of fertility, by incorporating time constraints of the family into his micro-economic theory (Becker 1965, 1974).

Simon (1969, 1974, 1977, 1986) attempted to "incorporate the cases of the observed positive and negative relationships of fertility to income into a more general theory of fertility," though his initial intention was to develop Becker's theory (Andorka 1978:35). Simon (1969) listed four economic and social factors which, he believes, affect fertility: 1) income, 2) costs of child-raising, 3) investment value of children, (e.g. for the sake of old security), 4) a complex factor of modernization, including education, urbanization, child mortality and contraceptive knowledge (Andorka 1978:35). After examining data from attitudinal surveys, longitudinal and cross-sectional studies, he concludes that for more developed countries (MDCs), income positively influences fertility in the short term. In the long run, however, an increase in aggregate income can have certain indirect effects, such as on women's education, which negatively affect fertility (Simon 1974). For less developed countries (LDCs), Simon (1974) finds positive effects of income and modernization on fertility in the short run, while the longer term effect of improvements in economic conditions gives an initial rise in fertility--because modernization does not ensue in two or three years--followed by a more sustained decline (cf. Fox 1976:757).

More recently, in his 1977 book, Simon advances a "population push" theory of innovation as a response to a neo-Malthusian argument that "innovation is merely a stopgap, providing temporary gains that are eventually eaten up by the additional population increase that they permit" (Merrick 1978:60). Basically, he believes

that innovation is a response to population pressure. The empirical evidence which he accumulated from both the MDCs and LDCs has shown that moderate population growth, in the long run, is desirable. His position has been well summarized in his most recently published book:

Both Malthusian statics and growth-theoretic dynamics conclude that additional people have negative effects upon the standard of living. The operative mechanism is capital dilution, plain and simple, in both those sorts of analyses. But when various feedbacks of population size are brought into the models--especially the creation of new technology in response to increased demand, and as a result of there being more knowledge creators--the conclusions are altered radically. Additional people are then seen to have a positive effect in the long run (Simon 1986:169).

The approaches of the Columbia-Chicago School have been questioned by a number of sociologists and economists. Sociologists argue that, given the exogenous factors such as the educational level and income, parents "have a very narrow range of choice regarding child bearing and the expenditures on children "(Nag 1981:285).

As early as three decades ago, Okun (1958) refuted the explanation of fertility in terms of the simple consumption theory by saying that there is a fundamental distinction between children and commodities. The price of commodities is identical for all families, but the price of children is a function of the family income and status. Thus, parents do not have a choice of deciding "the cost of children of given quality." He claims that "it is almost impossible to conceive of a child who is raised at a much lower level of living than that of parents;" because "when parents raise their own level of living, their child's is also raised, and quality expenditures per child must rise" (Okun, 1960:236).

Blake (1968) holds a similar view. She argues that children cannot be treated analogously to consumer durables for four reasons. Firstly, there is some "strong institutional pressure to marry and start a family," and people are even encouraged to do so in the face of financial difficulties" (Blake 1968:16); on the other hand, "there are normative prescriptions to produce some minimum level of quality" (Blake 1968:18). Thus parents are not free to choose the number of their children as they decide to buy consumer durables. Secondly, parents are not free to choose the initial quality of their children, since this depends on many other (e.g. biological) factors. Thirdly, parents are not free to change their children (as they may change consumer goods) if they are not satisfied with the number and quality of them. Finally, parents cannot be free to use (and abuse) their children; because "parents do not 'own' children, and, as guardians, they are legally required to keep them in minimum repair, not to abuse them physically or mentally, or, through negligence, allow them to be victimized by accidental violence and the like" (Blake 1968:17). In consequence, Blake rejects a positive relation of fertility to income. Her empirical evidence from American experiences support her idea (Andorka 1978:36-37).

More recently, Simmons (1985) points out that most models in the New Home Economics tradition are static. Parents "are assumed to have stable utility functions and to know at a very early stage, perhaps even before marriage, their future income and occupation" (Simmons 1985:40). They neglect the subjective benefits and costs of childbearing change in the process of modernization (Simmons 1985). Furthermore, income, as referred to by these models, has not been properly defined and measured when the period of measurement is a lifetime rather than a market period (Simmons 1985:41).

Sociologists' rejection of economic theories of fertility shifts our attention to their approach to the understanding of human fertility behavior.

1.6 The Normative Approach

Freedman states in a recent article that:

One reason for our failure to identify and explain the determinants of fertility more successfully may be our concentration on micro level variables to explain phenomena that are social in character. The problem, too, is social.... the important question is not why couples in a particular country have two, four or six children but why the frequency distribution and mean of family size is different as between countries A, B, C, or D (Freedman 1986:31).

The normative approach focuses its attention on macro level variables which characterize the community, its subgroups, the region, or the nation, rather than on household level variables on which most economists are working. Therefore, the normative approach is sometimes referred to as the sociological theory of fertility.

Human population has been a sub-area within the scope of sociology for a long time. Early authors, such as Davis (1956, 1959), Blake (1956), Freedman (1963), Hawthorne (1970) and Goldberg (1975), have shaped theoretical frameworks for explaining fertility behavior in terms of the normative and structural constraints on individual behaviors. The normative approach starts with the assumption that "human society regulates the behavior of members, through norms" (Ryder, 1980:198). More specifically, as Freedman noted more than twenty years ago:

...when many members of society face a recurrent common problem with important social consequences they tend to develop a normative solution for it. This solution, a set of rules for behaviors in a particular situation, becomes part of its culture and the society indoctrinates its members to conform more or less closely to norms by implicit or explicit rewards and punishments (Freedman 1963:4).

Then how do norms affect fertility patterns? Mason (1983) provides two possible ways in which "family-size desires can be normatively constrained:

a) by direct prescription of the numbers of children that parents may bear; and b) by indirect prescription of particular social, economic, political, or religious obligations between parents and children, husbands and wives, clients and patrons, or citizens and the state, obligations that in turn affect the value of children to parents (Mason 1983:396).

Mason (1983) argues that norms are not directly associated with fertility; in other words, they are not directly related to the proximate determinants identified by Davis and Blake (1956) and Bongaart (1978). But norms constrain and influence the desire for children in a given social group (Mason, 1983).

Freedman uses the normative approach to explain the European fertility transition. He notes:

...changes in macro-development variables--urbanization, industrialization, literacy, and the like--resulted in a shift from a major dependence on relatively self-contained local institutions to dependence on larger social, economic, and political units ...the family gave up many functions to larger, specialized institutions (and) the new nonfamilial institutions were of growing importance.

(Consequently,) the costs of children increased, partly because they interfered with the new nonfamilial activities and partly because that improved standards of living, the increased education, and the opportunities in the new expanded system... led to rising aspiration. Parents wanted more for themselves and their children (Freedman 1977:2).

Sound familiar? That is the same interpretation presented by the micro-economic theory: parents balance the perceived utilities and disutilities in deciding if they

will have another child. But the crucial distinction here is the level of analysis: one at the macro level, the other at the micro level (Namboodiri 1986).

Other normative models advanced by Blake (1968, 1979), Hawthorne (1970), Ryder (1980), and others have also postulated a means-end process (Robinson and Harbison 1980:211). They more or less follow a functionalist approach, focusing on the rationality of the individual. They share the notion that children are social investments, not economic investments as the new home economics postulates. Children are means to social ends for their parents (e.g. companionship in old age, and marital cement). The empirical evidence Blake (1979) found in the United States supports their argument.

The normative approach faces a few challenges. Firstly, because of the abstract nature of some key concepts such as "group" and "consensus", social theoreticians have not reached an agreement on the boundaries of a "relevant group" (Mason 1983). Freedman (1963), for example, refers to the society, the community, or the family as the groups in which norms are defined and maintained; whereas Ryder (1973, 1978) stresses population aggregates such as level of schooling, race and religion. Secondly, consensus is "needed to conclude that an effective norm exists" (Mason 1983:395). Regardless of their reality, it is difficult to demonstrate either the existence or the effects of widely held norms. Finally, in a heterogeneous society, or in a society with a high rate of migration, for example, in the U.S., it is not easy to identify the norms which affect fertility behavior. The individual in such a society may still be under the influence of his or her original system of socialization and social control (Namboodiri, 1986).

Human fertility behavior is a complex phenomenon. The above literature review shows that there is little consensus on a single theory of any one discipline which dominates all others. There is a need to employ the essentials from various disciplines to achieve a better understanding of fertility behavior. R.A. Easterlin has made such an attempt.

1.7 The Easterlin Model

The Easterlin model, sometimes also described as the Easterlin hypothesis, was initiated by Richard Easterlin's 1966 paper entitled "On the Relation of Economic Factors to Recent and Projected Fertility Changes." Since then, Easterlin (1969, 1975, 1978, 1980, 1983, 1985) has developed and elaborated a microeconomic theory of fertility.

To follow the mainstream of the microeconomic theory of fertility (see, for example, Inkeles 1969, Inkeles and Smith 1974), the Easterlin model focuses on the causes of the shift from high to low fertility in the course of economic and social modernization. It sees that the fertility change is correlated with modernization, because modernization broadens parents' openness to new experience, increases parents' independence from their own parental authority, strengthens parents' belief in the efficacy of science, and stimulates parents' ambition for themselves and their children (Easterlin and Crimmins 1985:4; Inkeles and Smith 1974).

The Easterlin model begins with the assumption that a simple economic approach cannot provide a full understanding of fertility change, because other influences such as biological factors and differences in cultural norms, usually emphasized by sociologists, are also involved in fertility decisions. According to Easterlin, all the determinants of fertility are divided into the following three categories:

1. The demand for children, the number of surviving children parents would want if fertility regulation were costless. This depends on household tastes (including tastes relating to child 'quality'), income, and child cost consideration, including both the economic and noneconomic returns from children as well as their costs. It is roughly approximated by survey responses on desired family size.

2. The supply of children, the number of surviving children a couple would have if they made no deliberate attempt to limit family size. This reflects both a couple's natural fertility and the chances of child survival. As has been noted, natural fertility and hence the supply of children may be well below the biological maximum because of cultural conditions such as prolonged breastfeeding that inadvertently reduce fertility.

3. The costs of fertility regulation. This lumps together a couple's attitudes toward and access to fertility control methods and supplies. It includes both subjective disadvantages of regulation such as distaste for the general notion of family planning and the drawbacks of specific techniques like abortion, and the economic costs of control such as the time and money required to procure family planning services (Easterlin and Crimmins, 1985:14-15).

This model sees various modernization variables (i.e. industrialization, urbanization, compulsory public schooling, public health measures) and cultural variables (i.e. norms and religion) as directly affecting a couple's supply of children, demand for children, and costs of fertility control. At the same time, the supply and demand are seen as jointly determining their motivation for fertility control.

The rationale is this: when the potential supply of children is less than demand for children, parents will not limit their fertility; conversely, when supply exceeds demand, parents will confront the prospect of having unwanted children and, therefore, will be motivated to control their fertility (Easterlin and Crimmins 1985:17). Thus, the larger the excess supply, the greater is parents' motivation to deliberately limit their family sizes.

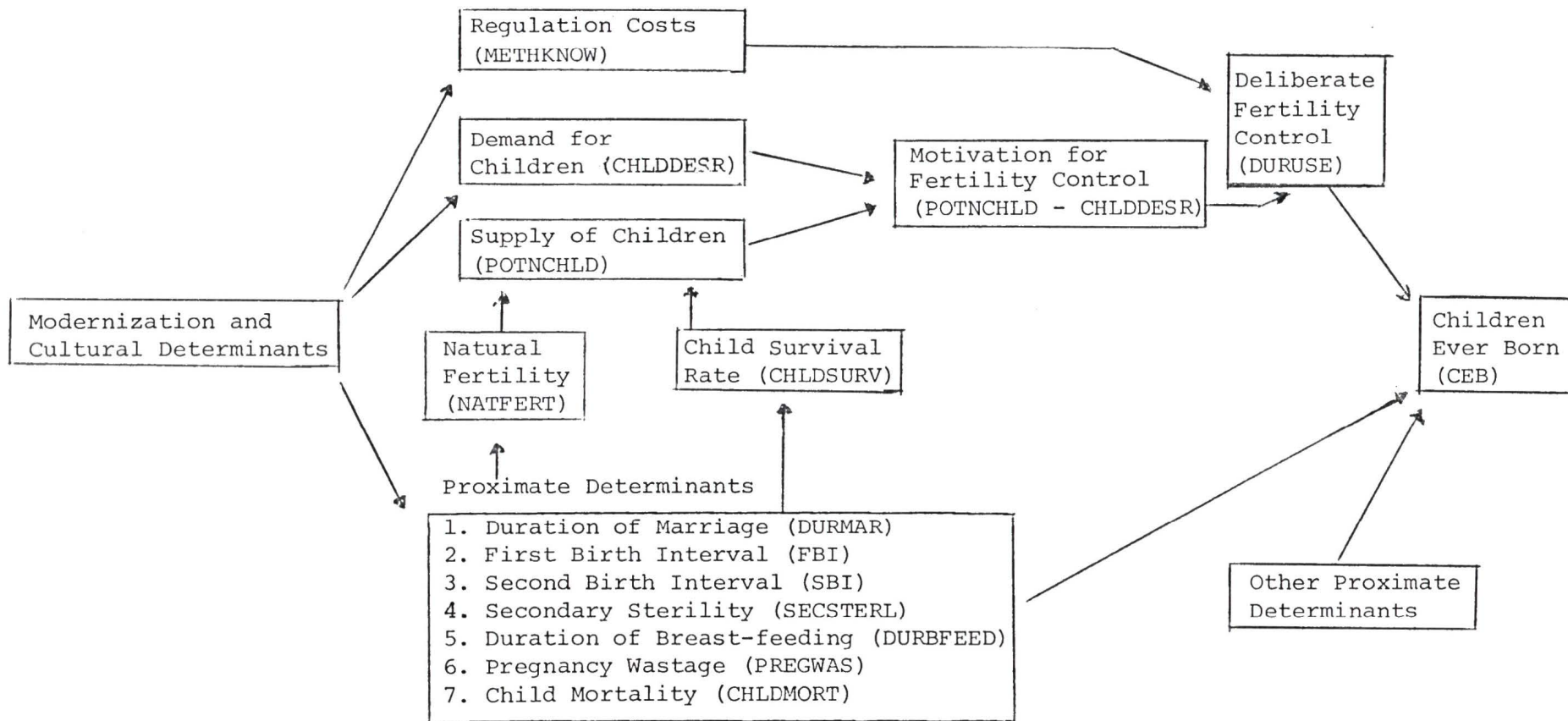
Besides motivation, costs of regulation also affect deliberate fertility control. Costs (e.g. psychic and market) imposed by limiting fertility sometimes may be very high compared with the motivation to control fertility; and they may sometimes exceed the costs of having unwanted children. In this situation, parents would not be motivated to control their fertility. The number of their surviving children will equal their potential supply of children. Hence Easterlin (1983) posited that the higher the costs of fertility control, the lower is a couple's motivation for deliberate control fertility.

In summary, the Easterlin model unifies standard micro-economic theories of fertility, which assume that a close link exists between social-economic development and fertility changes, and a model of "proximate determinants" as advanced by Bongaarts (1978). Easterlin adds to this an additional set of variables, demand, supply, and regulation costs, between modernization and the deliberate fertility control and fertility, as outlined below.

(FIGURE 1 HERE)

The diagram shows that modernization and cultural norms exert their impact on deliberate fertility control and then on observed fertility via supply, demand,

Figure 1 A Causal Diagram of the Easterlin Model



Note : Modernization determinants include educational levels, urbanization, etc.; cultural factors are religious affiliation and regional residence; and other proximate determinants are genetic factors.

and costs of regulation. Easterlin and Crimmins (1985) use World Fertility Survey (WFS) data for Sri Lanka and Colombia to show the application of the framework to the study of fertility behavior in the developing countries. The empirical results are consistent and support their model.

Accordingly, the Easterlin model leads to eighteen research hypotheses. The following is the presentation of these hypotheses.

1.8 Hypotheses

Stage 1

In stage one, Easterlin employs micro-economic theories of fertility and the normative approach to detect the effects of the various aspects of modernization and cultures on the demand for children, the supply of children and the costs of fertility control. Nine hypotheses are posited. For the first two hypotheses, the directions of the relationships are hypothesized; while, for the remaining seven hypotheses, the directions are not given. This is because, according to Easterlin (Easterlin and Crimmins 1985), the analysis in this stage is exploratory. Thus, the basic concern is whether there is a significant relationship of the various aspects of modernization and cultures with demand for children and with costs of fertility control rather than how they are associated. The following are the nine hypotheses derived from stage 1 of the Easterlin model:

H1. Growth in formal education is negatively associated with the demand for children and the costs of fertility control.

H2. Urbanization is negatively associated with both the demand for children and with the costs of fertility control.

H3. There is a significant relationship between wife's working status before marriage and the demand for children.

H4. There is a significant relationship between husband's working status and the costs of fertility control.

H5. There is a significant relationship between religious affiliation and the demand for children.

H6. There is a significant relationship between religious affiliation and the costs of fertility control.

H7. There is a significant relationship between regional residence and the demand for children.

H8. There is a significant relationship between regional residence and costs of fertility control.

H9. Modernization and cultural variables will be correlated with each of the determinants of the potential supply of children.

Stage 2

The crucial test of Easterlin's theory is stage 2. Easterlin sees a couple's motivation for fertility control and the costs (e.g. market and psychic) of fertility control as the causes of their adoption of techniques that limit their fertility. Accordingly, two hypotheses are proposed:

H10. Fertility control is positively associated with the excess of the supply of children over the demand for children. That is, fertility control is positively associated with a respondent's motivation for fertility control.

H11. Fertility control is negatively correlated with the costs of fertility control.

Stage 3

In stage three, Easterlin borrows from Bongaarts' (1978) "proximate determinants" approach to analyze observed fertility. These determinants, as identified by Bongaarts (1978), include length of exposure to intercourse, fecundity, contraceptive usage, breast-feeding, pregnancy wastage, and child mortality. Correspondingly, eight hypotheses are posited:

H12. Observed fertility is negatively associated with fertility control.

H13. Observed fertility is positively related to the duration of the respondent's exposure to intercourse.

H14. Observed fertility is positively related to a couple's fecundity and, by inference, is negatively associated with the length of the first birth interval between the time of marriage and time of the first birth.

H15. Observed fertility is negatively associated with the respondent's post-partum infecundity.

H16. Observed fertility is positively related with the respondent's absence of secondary sterility.

H17. Observed fertility is negatively correlated with the pregnancy wastage (which equals the the proportion of the total number of the pregnancies that did not result in a live birth over the total number of pregnancies).

H18. Observed fertility is negatively correlated with the duration of breast-feeding.

H19. Observed fertility is positively related with the child mortality rate.

The next chapter will explain the data and research methodology used to test these propositions. The data base will be delineated and variables operationalized. A brief discription of the statistical model will be also be provided. Chapter Three reports the findings of the data analysis. The last chapter will present a brief discussion and conclusion.

Chapter 2

DATA AND METHODOLOGY

2.1 The Data

The World Fertility Survey data set will be used to test the Easterlin model. The World Fertility Survey (WFS) is an international research program sponsored mainly by the United Nations Fund for Population Activities and the United States Agency for International Development. It aims to assess the present state of human fertility throughout the world. It has been undertaken by the International Statistical Institute (ISI) with the collaboration of the UN and the International Union for the Scientific Study of Population. The main characteristics of the WFS include: 1) well-designed sampling frames; 2) national representative samples; 3) face-to-face interviews using the WFS core questionnaire; and 4) comparability of data across countries (International Statistical Institute 1987). To date 42 developing countries and 20 developed countries have carried out surveys in the WFS program.

The World Fertility Survey data for South Korea (1974) will be used in the present study. South Korea is an ideal case in which to study the association of fertility with socio-economic development for the following reasons. Between

1960 and 1975 (a period in which most of the South Korean respondents underwent their child-bearing experiences), the population of South Korea increased from 25 million to 35 million. However, surprisingly, this period saw a rapid decline in the total fertility rate⁹ from 6.0 to 3.5 and a decline in the natural increase from 3.0 percent to 1.7 percent. Moreover, this period also encompassed rapid economic development. The General Domestic Product (in purchaser's value), for example, increased over 34 times in this 15 year period (UN Statistical Yearbook 1977).

The Easterlin model postulates that social-economic development and cultural norms affect a couple's supply of children, demand for children and costs of their fertility control, which, in turn, influence their adoption of contraceptive methods and their fertility. The above facts show that between 1960 and 1975 South Korea experienced both a rapid increase in economic development and a rapid decrease in fertility levels. Thus, South Korea has quickly undergone the macro changes in socio-economic development that Easterlin posits to be causally related to fertility decline at the micro level, and for which Easterlin and Crimmins found support in Sri Lanka and Colombia. This research will explore whether these findings will be repeated at the micro level in a rapidly modernizing country that has undergone a sharp aggregate decline in fertility.

2.2 The Sample

In the South Korean National Fertility Survey , a self-weighting probability sample¹⁰ of 21,248 households was selected (National Statistical Institute 1978:1). The individual questionnaire (the WFS core questionnaire) was administered to all ever-married women in the sample who were under 50 years of age. Five thousand, four hundred and seventeen women were interviewed. The response rate to the survey was 94.6 percent (National Statistical Institute 1978:2).

To replicate the study of Easterlin and Crimmins (1985), this study used the same criteria for inclusion as did Easterlin and Crimmins. The respondents had to: 1) be 35-44 years of age; 2) have been married only once; 3) have husbands still alive; and 4) have had at least two live births, and no illegitimate births.¹¹ After application of these criteria, 1,572 respondents remained for subsequent analyses.

2.3 Operationalization¹²

Modernization Variables

Wife's EDucation (WED)

This variable measures one major aspect of modernization: increases in formal schooling. It is believed to affect all three principle determinants: demand, supply and regulation costs. This variable is measured as the number of years of formal education reported by the respondent.

URBan and RURAL residence (URBRURAL)

This is a dichotomous variable, measuring urbanization, which characterizes the process of modernization, (1 = rural; 0 = urban).

Husband's WORK status (HWORK) (HWORKINS, HWORKOUT, HWORKNO)

This is a set of three dichotomous dummy variables: 1) whether the husband worked inside the family (HWORKINS), 2) whether the husband worked outside the family (HWORKOUT), and 3) whether the husband never worked (HWORKNO).

Wife's WORK status Before Marriage (WWORKBM) (WWORKINS, WWORKOUT, WWORKNO)

This is also a set of three dichotomous dummy variables: 1) whether the respondent worked inside the family before their marriage (WWORKINS), 2) whether the respondent worked outside the family before marriage (WWORKOUT), and 3) whether the respondent never worked before marriage (WWORKNO).

Cultural Variables

RELIGIOUS affiliation (RELIGION) (TRADITON, BUDDHIST, PROTESTN, CATHOLIC, RELOOTHER)

Religious affiliation is a set of five dichotomous dummy variables: 1) none or traditional (TRADITON),¹³ 2) Buddhist (BUDDHIST), 3) Protestant (PROTESTN), 4) Catholic (CATHOLIC); and 5) others (RELOOTHER).

REGIONAL residence (REGION) (NORTH, SOUTH, CENTRAL, CHEJU)

This is a set of four dichotomous dummy variables based on whether the respondents resided in 1) northern areas including Seoul, Kyunggi Do and Kangwon Do, (NORTH), 2) central areas comprising Chungcheong Pukdo, Chungcheong

Namdo and Kyungsang Pukdo, (CENTRAL), 3) southern areas consisting of Pusan, Kyungsang Namdo, Cholla Pukdo, and Cholla Namdo, (SOUTH), and 4) Cheju Do island, (CHEJU).

Motivation Variables

NATural FERTility (NATFERT)

Natural fertility is estimated from the regression equation in stage three (see next section) as "a + b1X1....b7X7," (where a is a constant, and b2X2 through b7X7 are the set of the seven proximate variables operationalized later in this section), because all seven proximate determinant variables contribute to the respondent's assessment of her potential fertility which, in turn, affects her decision in fertility regulation (Easterlin and Crimmins 1985:50).

CHiLD SURVival rate (CHLDSURV)

This variable measures the child survival rate and is constructed to estimate the respondent's potential supply of children. It equals 1 subtracted from the child mortality rate (which will be defined later in this section): $CHLDSURV = 1 - CHLDMORT$.

POTeNtial supply of CHiLDren (POTNCHLD)

The potential supply of children refers to the potential number of children a couple may have when there is an absence of contraceptive usage. Since the supply of children is not directly observable, it is estimated as the product of natural fertility (NATFERT), and the child survival rate (CHLDSURV), that is, $POTNCHLD = NATFERT \times CHLDSURV$. NATFERT is estimated by summing up

the regression coefficients of the seven proximate variables and the constant term in the multiple regression with observed fertility as the dependent variable, and the child survival rate is one minus the child mortality rate, ($CHLDSURV = 1 - CHLDMORT$).

CHiLDren DESiRed (CHLDDESR)

The number of children desired measures the demand for children. The variable is obtained from a question about the number of surviving children a respondent would like to have in her whole life. It equals the number of surviving children desired by the respondent in the absence of costs of fertility regulation.

Actual FAMiLy SIZE (FAMSIZE)

This variable is the number of living children the respondents reported.

WANT no MORE (WANTMORE)

This is a dichotomous variable, which intends to measure the respondents' current fertility motivation. The respondents who were fecund and wanted no more children were coded 1, ($WANTMORE = 1$); and others were coded 0, ($WANTMORE = 0$).

Regulation Cost Variables

METHods of contraception KNOWn (METHKNOW)

This variable is the number of contraceptive methods known to the respondent. It purports to measure both the monetary and psychological costs of contraception. It is assumed that the more methods a respondent knew before using any contraceptive, the lower the costs were, and the more likely she would use contraception.

Efficiency of Methods Known (EFFUSE, INEFFUSE, KNOWNOMD)

According to the WFS' definitions, efficient methods are the pill, IUD, diaphragm, condom, and injection; while inefficient methods include douche, abstinence, withdrawal, and rhythm. A set of three dichotomous dummy variable were created based on 1) whether the respondents knew no contraceptive method (KNOWNOMD), 2) whether the respondents knew only inefficient methods (INEFFUSE), and 3) whether the respondents knew one or more efficient methods (EFFUSE).

KNOWledge of ABORtion (KNOWABOR)

This is also a dichotomous variable, 1 = yes (know where to get abortion); 0 = no, (do not know where to get abortion).

TRAVel TIME to nearest abortion clinic (TRAVTIME)

This variable measures the time (in minutes) the respondents took to travel to the nearest abortion clinic. It is assumed that the longer time it takes to the abortion clinic the higher the regulation costs are.

Proximate Determinants variables

Children Ever Born (CEB)

As a measure of differential fertility, number of children ever born will be used.

Regulators, nonregulators (CONUSER)

This is a dummy variable. The respondents who reported ever using any method of contraception or induced abortion were coded as CONUSER = 1 (regulators); and the rest (non-regulators) were assigned a value of 0.

DURation of contraceptive USagE (DURUSE)

Fertility control is measured as the duration of use of contraception in years. As defined by the World Fertility Survey, contraception includes efficient methods (pill, IUD, diaphragm, condom, and injection) and inefficient methods (douche, abstinence, withdrawal, and rhythm). This variable is produced by subtracting the estimate of age at first use of contraception from the age of the respondent at the time of the interview, assuming contraception is continuously used over the measured period.

DURation of first MARriage (DURMAR)

This variable is obtained by subtracting the age at first marriage from the age of the respondent at the time of the interview (respondents with disrupted first marriages will be excluded). It serves as a proxy for exposure to the risk of intercourse.

Length of First Birth Interval in months (FBI)

This variable is constructed by subtracting the age of the respondent at first marriage from age of the respondent at first birth. Because it is assumed that the respondent wanted the first birth, this variable is an indicator of the respondent's fecundity.¹⁴

Length of Second Birth Interval in months (SBI)

This variable is the interval between the date of the respondent's first birth and the date of her second birth. As was the case with FBI, this variable is also an indicator of the respondent's fecundity. More specifically, it purports to measure three things: 1) the effects of post-partum infecundity; 2) the waiting time to contraception; and 3) the time between contraception and live birth.

Not SECondarily STERiLe (SECSTERL)

This is a dummy variable. The respondents are classified as secondarily sterile if 1) they thought that they had a fecundity impairment, or 2) they were not currently using contraception, and had had no child in the last five years, and were never pregnant. These women were coded as SECSTERL = 0; all the rest were assigned a value of 1. This variable measures the respondent's self-reported fecundity, which means whether or not the respondent could bear another child.

DURration of Breast-FEEDing (DURBFEEED)

This variable is the length of breast-feeding in months during last closed birth interval, which covers the period of raising the last child. It is assumed that this variable is highly correlated with breast-feeding in previous birth intervals. The variable intends to measure the respondent's post-partum infecundity.

PREGnancy WASTage proxy (PREGWAS)

The pregnancy wastage reflects the length of waiting time to live births. It equals the proportion of the total number of the pregnancies which did not result in a live birth over the total wasted pregnancies plus the number of live births.

CHILD MORTality (CHLDMORT)

This variable equals the number of children who died by the time of the interview divided by the total number of live births.

2.4 The Model

In order to test the Easterlin model on the World Fertility Survey data for South Korea, the causal model they constructed will be used again (see Figure 1 on page 26). Multiple regression will be the basic statistical technique used in the data analysis. Accordingly, the test of the model passes through the three connected stages of the statistical model.

In stage one, the model looks into the causal relationship of various modernization and cultural variables with demand, supply and regulation costs. As mentioned earlier, the supply of children (POTNCHLD) is a product of child survival rate (CHLDSURV) and an estimate of natural fertility (NATFERT) from the set of the seven proximate variables. That is: $POTNCHLD = NATFERT \times CHLDSURV$. Thus, a total of nine dependent variables are derived from the stage 1 analysis. These nine dependent variables are: 1) the demand for children (CHLDDESR); 2) the costs of fertility control (METHKNOW); 3) duration of marriage (DURMAR); 4) breast-feeding (DURBFEEED); 5) first birth interval (FBI); 6) second birth interval (SBI); 7) not secondary sterility (SECSTERL); 8) pregnancy wastage (PREGWAS); and 9) child mortality (CHLDMORT). For each of these nine dependent variables, the following regression equation is computed:

$$Y(1-9) = a + b1WED + b2URBRURAL + b3HWORK + b4WORKBM \\ + b5RELIGION + b6REGION$$

where: Y(1-9) refers to the set of the above mentioned nine dependent variables; WED is wife's education level; URBRURAL is urban and rural residence; HWORK is husband's work status; WORKBM is wife's work status before marriage; RELIGION is religious affiliation; and REGION is regional residence.

In stage two, the model attempts to explain fertility control, as measured by duration of contraceptive usage (DURUSE), by employing a multiple regression equation with three explanatory variables: the demand for children (CHLDDES), the supply of children (POTNCHLD) and regulation costs (METHKNOW). According to Easterlin, this stage is the key one in testing the theory, because demand and supply jointly result in a respondent's motivation to limit her family size (POTNCHLD - CHLDDES);¹⁵ and POTNCHLD - CHLDDES and METHKNOW determine the respondent's duration of contraceptive usage. Accordingly, the second stage equation is:

$$DURUSE = a + b1(POTNCHLD - CHLDDES) + b2METHKNOW$$

where: DURUSE is duration of contraceptive usage; POTNCHLD is potential supply of surviving children, which is the product of natural fertility (NATFERT) and

the child survival rate ($POTNCHLD = <1 - CHLDMORT> \times NATFERT$); $CHLDDESR$ is the demand for children; and $METHKNOW$ is regulation costs.

In stage three, attention is focused on the reproductive process, investigating the association of observed fertility (CEB) with the seven proximate determinants and with fertility control. As mentioned earlier, stage 3 of the Easterlin model corresponds to the proximate determinants analysis (see footnote 5). The third stage equation is:

$$CEB = a + b_1DURMAR + b_2FBI + b_3SBI + b_4SECSTERL + b_5DURBFEEED \\ + b_6PREGWAS + b_7CHLDMORT + b_8DURUSE$$

where: CEB is children ever born; $DURMAR$ is duration marriage in years; FBI is length of first birth interval in months; SBI is length of second birth interval in months; $SECSTERL$ is not secondarily sterile; $DURBFEEED$ is length of breast-feeding in months; $PREGWAS$ is proportion of pregnancy wastage; $CHLDMORT$ is proportion of child mortality; and $DURUSE$ is duration of use of contraception in years.

The findings will be reported in the next chapter as tables. They will be followed by a brief discussion.

Chapter 3

RESULTS

3.1 Stage 1: Linkage between Modernization and Supply, Demand and Costs of Regulation

Introduction

In stage 1, an effort is made to identify the impact of the various aspects of modernization and culture upon the three central determinants of fertility: the demand for children, the supply of children and the costs of fertility regulation. Hence a total of nine dependent variables are included in the regression analyses. (Recall that the supply of children is a product of natural fertility, which is estimated from the set of the seven proximate determinants, and child survival rate.) These nine dependent variables are: 1) duration of marriage (DURMAR); 2) breastfeeding (DURBFEEED); 3) first birth intervals (FBI); 4) second birth interval; 5) secondary sterility (SECSTERL); 6) pregnancy wastage (PREGWAS); and 7) child mortality (CHLDMORT); 8) the demand for children (CHLDDESR); and 9) the costs of fertility control (METHKNOW). Each of the nine dependent variables is regressed on the specified modernization and cultural variables. Modernization variables are: 1) wife's education (WED); 2) rural and urban-residence (URBRURAL); 3) husband's work status (HWORKINS, HWORKOUT, HWORKNO);

and 4) wife's work status before marriage (WWORKINS, WWORKOUT, WFNOWORK). The cultural variables include religious affiliation (TRADITON, BUDDHIST, CATHOLIC, PROTESTN, RELOOTHER) and regional residence (NORTH, SOUTH, CENTRAL, CHEJU). All of the variables used in this study are fully operationalized in Chapter 2; and descriptive phrases for each variable mnemonic are provided in Appendix 1.

Despite the goal set out for the stage 1 analysis, for both the Sri Lankan and Colombian data, Easterlin and Crimmins (1985) found weak or imprecise linkages between modernization and cultural variables, on the one hand, and demand, supply and regulation costs on the other. In their study, the socio-economic and cultural variables explain negligible variance ($R^2 = .02$ or less) in four of determinants of supply (first and second birth intervals, FBI and SBI, secondary sterility, SECSTERL, and pregnancy wastage, PREGWAS). The remaining five dependent variables (the demand for children, CHLDDESR, regulation costs, METHKNOW, duration of marriage, DURMAR, breast-feeding, DURBFEEED, and child mortality, CHLDMORT) had relatively more variance explained (R^2 ranged from .04 to .31). Because South Korea had both more rapid economic development and more rapid fertility decline than did either Sri Lanka or Colombia in the 1960s and 70s (Demographic Yearbooks 1967-1977, International Financial Statistics 1965, 1977), it is expected that, for the South Korean respondents, clearer linkages between modernization and the three central determinants (demand, supply and and regulation costs) would be found. The second section is a presentation of the findings in the stage 1 analysis of the Easterlin model.

Findings

Table 1 presents descriptive data for all the variables used in stage 1. It shows that the respondents had, on the average, 4.58 years of schooling (WED = 4.58), while the comparable figures are 4.36 in Sri Lanka and 3.7 in Colombia. Over 53 per cent of the respondents were living in urban areas (URBRURAL = .47), compared with 17 per cent of the Sri Lankan and 67 per cent of the Colombian respondents. Forty-three per cent of South Korean women worked before they married (WWORKINS + WWORKOUT = .43). Only 12.3 per cent of the South Korean respondents worked outside the family (WWORKOUT = .123). In contrast, more than 51 per cent of the respondents' husbands worked outside the family (HWORKOUT = .51). The data in table 1 also indicate that 60.8 per cent of South Korean respondents reported that they held traditional or no religious beliefs (TRADITON = .608). Finally, the means of regional residence (NORTH, SOUTH, CENTRAL) show that the respondents have a roughly equal regional distribution. The constrained category, Cheju Do island (CHEJU), comprises less than two per cent of the respondents.

As with the data of Easterlin and Crimmins, the equations for the nine dependent variables are found to fall into two groups according to the values of adjusted R squares and the number of the independent variables which are significant. One of these groups merits only passing comment; the other will be discussed in more detail. The first group consists of five determinants of the potential supply of children (POTNCHLD): breast-feeding (DURBFEEED), first and second birth intervals (FBI, SBI), "not secondary sterile" (SECSTERL), and child mortality (CHLDMORT)¹⁶. For this group of dependent variables, the adjusted R squares

Table 1 Means and Standard Deviations for Variables of Stage 1

NUMBER OF VALID OBSERVATIONS (LISTWISE) = 1529.00					
VARIABLE	MEAN	STD DEV	MINIMUM	MAXIMUM	VALID N
WED	4.575	3.817	.00	18.00	1572
URBRURAL	.468	.499	.00	1.00	1572
WWORKINS	.308	.462	.00	1.00	1572
WWORKOUT	.123	.328	.00	1.00	1572
HWORKINS	.484	.500	.00	1.00	1572
HWORKOUT	.511	.500	.00	1.00	1572
TRADITON	.608	.488	.00	1.00	1572
PROTESTN	.086	.280	.00	1.00	1572
CATHOLIC	.036	.185	.00	1.00	1572
BUDDHIST	.256	.436	.00	1.00	1572
NORTH	.371	.483	.00	1.00	1572
CENTRAL	.277	.448	.00	1.00	1572
SOUTH	.340	.474	.00	1.00	1572
CHLDDESR	3.517	1.163	.00	10.00	1546
METHKNOW	5.669	2.297	.00	11.00	1572
DURMAR	19.109	4.607	5.00	30.00	1572
DURBFEEED	24.552	19.405	.00	99.00	1572
FBI	27.082	21.815	.00	192.00	1555
SBI	32.923	16.919	.00	205.00	1572
SECSTERL	.799	.401	.00	1.00	1572
PREGWAS	.163	.195	.00	.83	1572
CHLDMORT	.091	.140	.00	.75	1572

are low (the highest = .035), and there are only one or two significant independent variables in each of these equations. These equations will not be discussed further, but are reported in Appendix 2 for the interested reader.

The second group of dependent variables comprise demand for children (CHLDDESR), regulation costs (METHKNOW), duration of marriage (DURMAR), and pregnancy wastage (PREGWAS). These variables are partially explained by the socioeconomic and cultural variables used. For these dependent variables, the adjusted R squares are higher, ranging from .11 to .20, and there are two or more independent variables which are significant. The regression equations for each of these will be examined separately.

Zero-order correlations among stage 1 variables are given in table 2. Tables 3 through 6 present the regression results of the stage 1 analyses. A quick look at the correlation matrix suggests that multicollinearity exists because the inter-correlations among some independent variables are moderately high. However, despite this defect of the South Korean data, neither the collinear nor nonsignificant¹⁷ variables were dropped, because this is a replication of the Easterlin model, and Easterlin and Crimmins included these multicollinear variables. Moreover, the primary concern of stage 1 is to determine whether the significant variables in Easterlin and Crimmins' study remain significant in the present study, and whether more significant variables can be found. Thus, the non-significant independent variables in the equations are also included in the subsequent analyses.

Table 2 Correlation Matrix for Variables of Stage 1

	WED	URBRURAL	WWORKINS	WWORKOUT	HWORKINS	HWORKOUT	TRADITON	PROTESTN	CATHOLIC	NORTH
URBRURAL	-.4242 (1572) P= .000									
WWORKINS	-.2453 (1572) P= .000	.1897 (1572) P= .000								
WWORKOUT	.3012 (1572) P= .000	-.1757 (1572) P= .000	-.2495 (1572) P= .000							
HWORKINS	-.3498 (1572) P= .000	.4469 (1572) P= .000	.1756 (1572) P= .000	-.1801 (1572) P= .000						
HWORKOUT	.3559 (1572) P= .000	-.4475 (1572) P= .000	-.1798 (1572) P= .000	.1800 (1572) P= .000	-.9899 (1572) P= .000					
TRADITON	-.2069 (1572) P= .000	.1814 (1572) P= .000	.0902 (1572) P= .000	-.0764 (1572) P= .001	.1426 (1572) P= .000	-.1429 (1572) P= .000				
PROTESTN	.1448 (1572) P= .000	-.0779 (1572) P= .001	-.0470 (1572) P= .031	.0860 (1572) P= .000	-.0334 (1572) P= .093	.0365 (1572) P= .074	-.3813 (1572) P= .000			
CATHOLIC	.0898 (1572) P= .000	-.0632 (1572) P= .006	-.0390 (1572) P= .061	.0641 (1572) P= .006	-.0420 (1572) P= .048	.0439 (1572) P= .041	-.2391 (1572) P= .000	-.0589 (1572) P= .010		
NORTH	.2764 (1572) P= .000	-.2813 (1572) P= .000	-.2325 (1572) P= .000	.0980 (1572) P= .000	-.1561 (1572) P= .000	.1560 (1572) P= .000	-.0652 (1572) P= .005	.0984 (1572) P= .000	.0230 (1572) P= .181	
CENTRAL	-.1444 (1572) P= .000	.2396 (1572) P= .000	-.0130 (1572) P= .303	-.0499 (1572) P= .024	.1647 (1572) P= .000	-.1641 (1572) P= .000	-.0258 (1572) P= .153	-.0732 (1572) P= .002	.0189 (1572) P= .227	-.4757 (1572) P= .000

(COEFFICIENT / (CASES) / 1-TAILED SIG)

Table 2 Continued

	WED	URBRURAL	WWORKINS	WWORKOUT	HWORKINS	HWORKOUT	TRADITON	PROTESTN	CATHOLIC	NORTH	CENTRAL
SOUTH	-.1522 (1572) P= .000	.0561 (1572) P= .013	.2364 (1572) P= .000	-.0601 (1572) P= .009	.0081 (1572) P= .374	-.0061 (1572) P= .404	.0879 (1572) P= .000	-.0237 (1572) P= .174	-.0366 (1572) P= .073	-.5515 (1572) P= .000	-.4450 (1572) P= .000
CHLDDESR	-.2282 (1546) P= .000	.2810 (1546) P= .000	.1500 (1546) P= .000	-.1170 (1546) P= .000	.1892 (1546) P= .000	-.1935 (1546) P= .000	.0969 (1546) P= .000	-.0294 (1546) P= .124	-.0164 (1546) P= .260	-.1865 (1546) P= .000	.0374 (1546) P= .071
METHKNOW	.4208 (1572) P= .000	-.2537 (1572) P= .000	-.0864 (1572) P= .000	.1636 (1572) P= .000	-.2330 (1572) P= .000	.2431 (1572) P= .000	-.1873 (1572) P= .000	.1045 (1572) P= .000	.0441 (1572) P= .040	.1645 (1572) P= .000	-.1409 (1572) P= .000
DURMAR	-.3436 (1572) P= .000	.2001 (1572) P= .000	.0124 (1572) P= .312	-.1751 (1572) P= .000	.1523 (1572) P= .000	-.1587 (1572) P= .000	.0484 (1572) P= .028	-.0856 (1572) P= .000	-.0299 (1572) P= .118	-.1722 (1572) P= .000	.1097 (1572) P= .000
DURBFEEED	-.0391 (1572) P= .061	.0934 (1572) P= .000	.0100 (1572) P= .346	.0490 (1572) P= .026	.0233 (1572) P= .178	-.0192 (1572) P= .223	-.0252 (1572) P= .159	.0296 (1572) P= .121	.0140 (1572) P= .290	-.0216 (1572) P= .197	.0111 (1572) P= .330
FBI	-.1680 (1555) P= .000	.0670 (1555) P= .004	.1029 (1555) P= .000	-.0886 (1555) P= .000	.0160 (1555) P= .264	-.0224 (1555) P= .189	.0350 (1555) P= .084	-.0446 (1555) P= .039	-.0023 (1555) P= .463	-.0872 (1555) P= .000	.0285 (1555) P= .131
SBI	-.0190 (1572) P= .226	-.0093 (1572) P= .356	.0400 (1572) P= .056	-.0351 (1572) P= .082	-.0129 (1572) P= .304	-.0028 (1572) P= .457	.0105 (1572) P= .339	-.0006 (1572) P= .491	.0004 (1572) P= .493	-.0363 (1572) P= .075	.0057 (1572) P= .411
SECSTERL	-.0405 (1572) P= .054	.0915 (1572) P= .000	.0457 (1572) P= .035	-.0494 (1572) P= .025	.0317 (1572) P= .105	-.0273 (1572) P= .140	.0324 (1572) P= .099	-.0445 (1572) P= .039	.0279 (1572) P= .135	-.0125 (1572) P= .310	.0767 (1572) P= .001
PREGWAS	.3531 (1572) P= .000	-.3314 (1572) P= .000	-.1641 (1572) P= .000	.1435 (1572) P= .000	-.2511 (1572) P= .000	.2575 (1572) P= .000	-.1845 (1572) P= .000	.0739 (1572) P= .002	.0940 (1572) P= .000	.2169 (1572) P= .000	-.1274 (1572) P= .000
CHLDMORT	-.1796 (1572) P= .000	.1214 (1572) P= .000	.0150 (1572) P= .276	-.0495 (1572) P= .025	.0846 (1572) P= .000	-.0843 (1572) P= .000	.0417 (1572) P= .049	-.0381 (1572) P= .065	-.0614 (1572) P= .007	-.0176 (1572) P= .243	.0611 (1572) P= .008
BUDDHIST	.1150 (1572) P= .000	-.1314 (1572) P= .000	-.0593 (1572) P= .009	-.0016 (1572) P= .475	-.1214 (1572) P= .000	.1215 (1572) P= .000	-.7293 (1572) P= .000	-.1797 (1572) P= .000	-.1127 (1572) P= .000	.0028 (1572) P= .457	.0700 (1572) P= .003

(COEFFICIENT / (CASES) / 1-TAILED SIG)

Table 2 Continued

	SOUTH	CHLDDESR	METHKNOW	DURMAR	DURBFEEED	FBI	SBI	SECSTERL	PREGWAS	CHLDMORT
CHLDDESR	.1531 (1546) P= .000									
METHKNOW	-.0275 (1572) P= .138	-.1981 (1546) P= .000								
DURMAR	.0661 (1572) P= .004	.1701 (1546) P= .000	-.1952 (1572) P= .000							
DURBFEEED	.0087 (1572) P= .365	.0095 (1546) P= .354	-.0365 (1572) P= .074	.0495 (1572) P= .025						
FBI	.0541 (1555) P= .016	.0072 (1529) P= .389	-.0995 (1555) P= .000	.2917 (1555) P= .000	.0157 (1555) P= .268					
SBI	.0300 (1572) P= .117	-.0463 (1546) P= .034	-.0739 (1572) P= .002	.1751 (1572) P= .000	.0404 (1572) P= .055	.0882 (1555) P= .000				
SECSTERL	-.0518 (1572) P= .020	-.0014 (1546) P= .478	.0736 (1572) P= .002	-.2156 (1572) P= .000	-.0036 (1572) P= .444	.0004 (1555) P= .494	.0125 (1572) P= .310			
PREGWAS	-.0974 (1572) P= .000	-.2122 (1546) P= .000	.3129 (1572) P= .000	-.1645 (1572) P= .000	-.0420 (1572) P= .048	-.0874 (1555) P= .000	.0093 (1572) P= .356	-.0039 (1572) P= .438		
CHLDMORT	-.0404 (1572) P= .055	.0562 (1546) P= .014	-.1655 (1572) P= .000	.2273 (1572) P= .000	.1460 (1572) P= .000	.0346 (1555) P= .086	-.0267 (1572) P= .145	-.0669 (1572) P= .004	-.1522 (1572) P= .000	
BUDDHIST	-.0733 (1572) P= .002	-.0814 (1546) P= .001	.1327 (1572) P= .000	-.0018 (1572) P= .471	-.0074 (1572) P= .384	-.0225 (1555) P= .188	-.0088 (1572) P= .363	-.0225 (1572) P= .186	.1225 (1572) P= .000	-.0049 (1572) P= .423

(COEFFICIENT / (CASES) / 1-TAILED SIG) * THIS TABLE INTENDS TO SHOW

Note: The purpose of presenting this table is to show the collinearity among the variables and is not a test of the stage 1 hypotheses.

Table 3 Regression of Duration of Marriage on Specified Measures of Culture and Modernization

Multiple R	.38669	Analysis of Variance			
R Square	.14953		DF	Sum of Squares	Mean Square
Adjusted R Square	.14244	Regression	13	4986.97529	383.61348
Standard Error	4.26673	Residual	1558	28363.42357	18.20502
		F =	21.07185	Signif F =	.0000

----- Variables in the Equation -----

Variable	B	SE B	95% Confdnce Intrvl B	Beta	SE Beta	Correl Part Cor	Partial	T	Sig T
BUDDHIST	-1.219943	.902567	-2.990316 .550431	-.115550	.085489	-.001814	-.031579	-1.352	.1767
WWORKOUT	-1.355485	.352615	-2.047136 -.663835	-.096578	.025124	-.175066	-.089813	-3.844	.0001
CENTRAL	-1.465723	1.035992	-3.497807 .566361	-.142465	.100696	.109691	-.033055	-1.415	.1573
CATHOLIC	-1.363213	1.048089	-3.419026 .692600	-.054857	.042176	-.029873	-.030389	-1.301	.1936
PROTESTN	-1.866857	.952582	-3.735334 .001620	-.113561	.057946	-.085614	-.045788	-1.960	.0502
WWORKINS	-1.183528	.253610	-1.680981 -.686074	-.118615	.025417	.012372	-.109033	-4.667	.0000
HWORKINS	-1.829718	1.526644	-4.824210 1.164775	-.198523	.165639	.152334	-.028002	-1.199	.2309
WED	-.349350	.033903	-.415850 -.282850	-.289424	.028087	-.343593	-.240752	-10.304	.0000
SOUTH	-1.502757	1.030222	-3.523525 .518011	-.154589	.105979	.066109	-.034080	-1.459	.1449
URBRURAL	.416833	.261731	-.066548 .960215	.048403	.028352	.200141	.039887	1.707	.0880
TRADITON	-1.578558	.884723	-3.313931 .156815	-.167351	.093794	.048398	-.041687	-1.784	.0746
NORTH	-2.326423	1.032459	-4.351578 -.301267	-.243974	.108275	-.172243	-.052645	-2.253	.0244
HWORKOUT	-2.064585	1.528798	-5.063302 .934132	-.224066	.165918	-.158683	-.031552	-1.350	.1771
(Constant)	26.229933	1.943585	22.417615 30.042250					13.496	.0000

Table 4 Regression of Pregnancy Wastage on Specified Measures of Culture and Modernization

Multiple R	.43708	Analysis of Variance		
R Square	.19104		DF	Sum of Squares
Adjusted R Square	.18429	Regression	13	11.42229
Standard Error	.17619	Residual	1558	48.36717
		F =	28.30263	Signif F = .0000

----- Variables in the Equation -----

Variable	B	SE B	95% Confidence Interval B	Beta	SE Beta	Correl Part Cor	Partial	T	Sig T
BUDDHIST	.015463	.037271	-.057645 .088570	.034590	.083376	.122460 .009453	.010510	.415	.6783
WWORKOUT	.009887	.014561	-.018674 .038449	.016638	.024503	.143533 .015473	.017200	.679	.4972
CENTRAL	.007858	.042781	-.076057 .091773	.018038	.098208	-.127432 .004185	.004653	.184	.8543
CATHOLIC	.051768	.043281	-.033126 .136663	.049200	.041134	.094049 .027255	.030289	1.196	.2318
PROTESTN	.003440	.039337	-.073718 .080599	.004942	.056514	.073945 .001993	.002216	.087	.9303
WWORKINS	-.016138	.010473	-.036680 .004405	-.038198	.024789	-.164066 -.035112	-.039009	-1.541	.1235
HWORKINS	.077757	.063043	-.045900 .201414	.199252	.161547	-.251051 .028105	.031233	1.233	.2176
WED	.010147	.001400	.007401 .012893	.198535	.027393	.353122 .165148	.180597	7.248	.0000
SOUTH	.013904	.042543	-.069543 .097351	.033781	.103361	-.097404 .007447	.008280	.327	.7438
URBRURAL	-.062070	.110808	-.083270 -.040870	-.158800	.027652	-.331366 -.130861	-.143979	-5.743	.0000
TRADITON	-.022022	.036535	-.093684 .049640	-.055140	.091476	-.184453 -.013735	-.015269	-.603	.5467
NORTH	.047311	.042635	-.036317 .130940	.117182	.105600	.216902 .025286	.028102	1.110	.2673
HWORKOUT	.106747	.063131	-.017084 .230579	.273614	.161819	.257495 .038529	.042799	1.691	.0911
(Constant)	.040444	.080260	-.116985 .197873					.504	.6144

Table 5 Regression of Child Demand on Specified Measures of Culture and Modernization

Multiple R	.33950	Analysis of Variance			
R Square	.11526		DF	Sum of Squares	Mean Square
Adjusted R Square	.10787	Regression	13	240.89083	18.53006
Standard Error	1.08943	Residual	1558	1849.13763	1.18687
		F =	15.61260	Signif F =	.0000

----- Variables in the Equation -----

Variable	B	SE B	95% Confdnce Intrvl B	Beta	SE Beta	Correl	Part Cor	Partial	T	Sig T
BUDDHIST	.090282	.230454	-.361751 .542315	.034159	.087194	-.080871	.009336	.009925	.392	.6953
WWORKOUT	-.107535	.090034	-.284136 .069065	-.030606	.025625	-.116588	-.028462	-.030246	-1.194	.2325
CENTRAL	-.112951	.264522	-.631807 .405905	-.043855	.102705	.037022	-.010175	-.010817	-.427	.6694
CATHOLIC	.233365	.267611	-.291550 .758280	.037513	.043017	-.016253	.020781	.022087	.872	.3833
PROTESTN	.189493	.243225	-.287589 .666575	.046045	.059102	-.029187	.018566	.019734	.779	.4360
WWORKINS	.105375	.064755	-.021641 .232591	.042186	.025924	.148481	.038778	.041192	1.627	.1039
HWORKINS	-.363449	.389801	-1.128039 .401140	-.157523	.168944	.187601	-.022219	-.023615	-.932	.3513
WED	-.024431	.008656	-.041411 -.007432	-.080852	.028648	-.225165	-.067255	-.071320	-2.822	.0048
SOUTH	.124110	.263049	-.391857 .640077	.051000	.108094	.151751	.011243	.011952	.472	.6371
URBRURAL	.434354	.066828	.303272 .565437	.187953	.028918	.278578	.154885	.162477	6.500	.0000
TRADITON	.169292	.225898	-.273804 .612388	.071693	.095665	.096187	.017859	.018983	.749	.4537
NORTH	-.195646	.263620	-.712733 .321441	-.081960	.110435	-.185094	-.017685	-.018799	-.742	.4581
HWORKOUT	-.491626	.390351	-1.257294 .274043	-.213134	.169229	-.191849	-.030013	-.031891	-1.259	.2081
(Constant)	3.745113	.496260	2.771706 4.718519						7.547	.0000

Table 6 Regression of Regulation Costs on Specified Measures of Culture and Modernization

Multiple R	.45916	Analysis of Variance			
R Square	.21083		DF	Sum of Squares	Mean Square
Adjusted R Square	.20424	Regression	13	1747.74158	134.44166
Standard Error	2.04918	Residual	1558	6542.24825	4.19913
		F =	32.01653	Signif F =	.0000

----- Variables in the Equation -----

Variable	B	SE B	95% Confdnce Intrvl B	Beta	SE Beta	Correl	Part Cor	Partial	T	Sig T
BUDDHIST	.567839	.433475	-.282416 1.418094	.107877	.082351	.132691	.029483	.033169	1.310	.1904
WWORKOUT	.299552	.169350	-.032626 .631730	.042808	.024202	.163620	.039810	.044768	1.769	.0771
CENTRAL	.626011	.497554	-.349935 1.601957	.122042	.097000	-.140937	.028317	.031859	1.258	.2085
CATHOLIC	.299360	.503364	-.687982 1.286703	.024162	.040628	.044125	.013385	.015065	.595	.5521
PROTESTN	.516878	.457495	-.380492 1.414249	.063064	.055819	.104460	.025428	.028611	1.130	.2587
WWORKINS	.216601	.121801	-.022310 .455513	.043541	.024484	-.086351	.040023	.045008	1.778	.0755
HWORKINS	1.529121	.733199	.090960 2.967282	.332768	.159559	-.232956	.046938	.052763	2.086	.0372
WED	.205114	.016282	.173176 .237052	.340834	.027056	.420755	.283517	.304040	12.597	.0000
SOUTH	.980862	.494783	.010350 1.951373	.202381	.102089	-.027494	.044616	.050160	1.982	.0476
URBRURAL	-.168965	.125701	-.415526 .077596	-.036711	.027311	-.253651	-.030252	-.034035	-1.344	.1791
TRADITON	.037651	.424905	-.795794 .871096	.008006	.090351	-.187260	.001994	.002245	.089	.9294
NORTH	1.034131	.495858	.061512 2.006749	.217523	.104300	.164502	.046938	.052763	2.086	.0372
HWORKOUT	1.869109	.734234	.428919 3.309298	.406867	.159828	.243064	.057293	.064360	2.546	.0110
(Constant)	1.897222	.933443	.066286 3.728158						2.032	.0423

Duration of Marriage

As operationalized earlier, duration of respondent's first marriage (DURMAR) measures the length of the respondent's exposure to likelihood of intercourse. Also, recall that the respondents with multiple or broken marriages are excluded from the study population.

The regression equation for duration of marriage (DURMAR) as the dependent variable is found in table 3. The data show that 14.2 per cent of variance of DURMAR is explained by the thirteen predictors ($P = .0001$), compared with 31.4 per cent of variance explained for the Sri Lankan data and 8 per cent for the Colombian data. The best predictors are WED, wife's educational level ($\beta = -.29$), followed by North, a regional dummy vector ($\beta = -.24$), WWORKINS (wife worked inside family), a dummy vector, ($\beta = -.12$), and WWORKOUT (wife worked outside the family), another dummy vector, ($\beta = -.10$). Collectively, 14 per cent of the variance in duration of marriage is explained by WED and the three dummy vectors.¹⁸ Not surprisingly, WED is significant for both the Sri Lankan and Colombian data. The other significant variables for the Sri Lankan data include five dummy vectors (HWORKINS, WWORKINS, WWORKOUT), and two regional dummy vectors. For the Colombian data, only one other predictor (WWORKOUT) is significant. The findings in the present equation suggest that for the South Korean respondents, the more formal education obtained by the women, the later they marry; and the less likely the women to work, the more likely they are to marry early. Finally, the South Korean data also show that the respondents from the northern areas tend to marry later than their central and southern counterparts.

Pregnancy Wastage

Recall that pregnancy wastage (PREGWAS) measures the respondent's waiting time to live birth and equals the number of wasted pregnancies divided by total pregnancies. The regression results with PREGWAS as the dependent variable are presented in table 4. Although only two predictors are significant, the data show that PREGWAS is better explained than DURMAR (the adjusted R square = .18, $p = .001$). Nevertheless, this was not true for the data on Sri Lanka or Colombia. Easterlin and Crimmins (1985) found one dummy vector (WWORKINS) to be significant with an R square of .003 for the Sri Lankan data. For the Colombian data, only one significant dummy vector (a regional vector) with an R square of .019 for the Colombian data. For the South Korean data, WED, referring to wife's educational level, turns out to be the best predictor (beta = .20) of PREGWAS, showing a positive relationship. The other significant predictor is URBRURAL, urban-rural residence, (beta = -.16). These findings are not surprising because here wasted pregnancies include induced abortions. It is reasonable to assume that urban women with more education are more likely to have stronger feelings than their counterparts about limiting their fertility. Thus, they may have a higher number of induced abortions than less educated women¹⁹. The findings in this table suggest that urban women with more education tend to have a high proportion of pregnancy wastage. Together, these two variables alone account for 16 per cent of the variance in pregnancy wastage (see footnote 18).

Demand for Children

The demand for children (CHLDDESR) refers to the total number of children desired by the respondent. The regression findings with child demand (CHLDDESR) as the dependent variable is presented in table 5. It is clear that less variance is explained for demand than was true for the two preceding variables (adjusted R square = .11, $p = .0001$). Two predictors are significant. Although Easterlin and Crimmins (1985) found similar values of R square for Sri Lanka (.13) and Colombia (.10), the Sri Lankan data reveal that seven predictors (WED, URBRURAL, HWORKINS, WWORKOUT, and three religious dummy vectors) are significant; while the Colombian data show that five are (WED, WWORKINS, WWORKOUT, and two regional dummy vectors). Not surprisingly, WED, significant in the Easterlin and Crimmins' study, is one of the significant predictor (beta = -.08). Another significant factor is URBRURAL, urban and rural residence, which performs better than WED (beta = .19). These two variables alone explain 9 per cent of the variance in child demand (see footnote 18). These findings suggest that the rural and less educated women tend to have higher child demand than their urban counterparts. Easterlin and Crimmins (1985) also found such a positive significant relationship for URBRURAL in Sri Lanka but a nonsignificant effect in Colombia. This may result from limitations of the Colombian data. It appears more difficult to distinguish the boundary between rural and urban regions in Colombia than in Sri Lanka and South Korea.

Regulation Costs

Recall that the costs of regulation is measured as the methods of contraception known to the respondent (METHKNOW). It is assumed that the more methods of contraception the respondent knew, the less were the costs of fertility regulation. Table 6 gives the regression analysis with METHKNOW as the dependent variable. Collectively, the available set of socioeconomic and cultural variables explains over 20 per cent of the variance in regulation costs, compared with 20.8 per cent for Sri Lanka and 15.6 for Colombia. Five independent variables, which include both socio-economic and cultural factors, show significant effects on the costs of fertility regulation. In comparison, Easterlin and Crimmins found six significant factors (WED, URBRUAL, HWORKINS, HWORKOUT, WWORKOUT and one religious dummy vector) for the Sri Lankan data, and three significant predictors (WED, URBRURAL, and a regional dummy vector) for the Colombian data. For the South Korean data, HWORKOUT, (husband worked outside the family), is the best predictor (beta = .41); the other vector of husband work status, HWORKINS, (husband worked inside family), was also significant (beta = .33). Since regulation costs are measured by the number of methods known, and higher number of methods known implies lower regulation costs, a positive relationship here indicates that the wives who have working husbands know more methods of contraception. Easterlin and Crimmins reported a similar finding. Also consistent with Easterlin and Crimmins' data, wife's education (WED) has a significant positive effect on methods known (beta = .34). This finding suggests that the higher the women' education levels, the lower are the regulation costs. However, URBRURAL is not a significant predictor as was true for both the Sri Lankan and

Colombian data. This may be primarily due to the fact that South Korea experienced a more rapid process of industrialization in the rural areas than Sri Lanka and Colombia. Modernization increases a couple's belief in the efficacy of science (Easterlin and Crimmins 1985:4), which, undoubtedly, include new techniques of contraception. Finally, the data in this equation also show that two regional vectors, South (beta = .20) and North (beta = .22) turn out to be significant, suggesting that the northern and southern women tend to know more methods of fertility than the women from the central areas. Collectively, these five significant predictors account for 19 per cent of the variance in the costs of regulation, (see footnote 18).

Summary

In stage 1, an attempt was made to examine the impact of the modernization and cultural variables upon the three central determinants of fertility (demand, supply and regulation costs). A total of nine dependent variables are examined. Recall that the supply of children is estimated from natural fertility (which was estimated from the seven proximate determinants) and the child survival rate. On the average, the modernization and cultural variables account for 7.9 per cent of the variance in the nine dependent variables, compared with 8.9 per cent for the Sri Lankan data and 6.7 per cent for the Colombian data. For South Korea, five dependent variables (breast-feeding, first and second birth intervals, secondary sterility, and child mortality) out of nine have negligible variance explained by the specified modernization and cultural variables (adjusted R squares = .03 or less), and are not examined in detail. However, the results of these regression

equations are reported in Appendix 2. The remaining four dependent variables (duration of marriage, pregnancy wastage, demand for children, and regulation costs) have low or moderate adjusted R squares, ranging from .11 to .20. The significant independent variables include wife's education (WED), urban and rural residence (URBRURAL), husband working status (HWORKINS, HWORKOUT), wife's working status (WWORKINS, WWORKOUT), and two regional vectors (NORTH, SOUTH). The most variance is explained for regulation costs (METHKNOW). Easterlin and Crimmins also found this to be the case in Colombia, while in Sri Lanka the variance explained in METHKNOW was the second highest of the dependent variables.

In summary, the South Korean data support five hypotheses posited in Chapter 2 (see page 27; and note that Hypothesis 1 contains two hypothesis, as does Hypothesis 2): 1) growth in formal education is negatively associated with the demand for children (see table 5); 2) growth in formal education is negatively associated with the costs of fertility control (see table 6); 3) urbanization is negatively associated with the demand for children (see table 5); 4) there is a significant relationship between husband's working status and the costs of fertility control (see table 6); and 5) there is a significant relationship between regional residence and costs of fertility control (see table 6). However, the South Korean data do not lend support to five hypotheses of stage 1 of the Easterlin model. These five hypotheses are: 1) urbanization is negatively associated with the costs of fertility control (see table 6); 2) there is a significant relationship between wife's working status before marriage and the demand for children (see table 5); 3) there is a significant relationship between religious affiliation and the demand for

children (see table 5); 4) there is a significant relationship between religious affiliation and the costs of fertility control (see table 6); and 5) there is a significant relationship between regional residence and the demand for children. Finally, the South Korean data show weak support for Easterlin's last hypothesis of stage 1 that modernization and cultural variables are correlated with each determinant of supply of children. Only two determinants out of seven had a significant proportion of the variance explained (see tables 3 and 4). These two determinants are duration of marriage (adjusted R square = .14) and pregnancy wastage (adjusted R square = .18).

To conclude, South Korean data do not show a better fit of the Easterlin model than do the Sri Lankan data, but do produce a better fit than do the Colombian data (judging from the means of R squares). It will be explained in Chapter 4 why the South Korean data lend weak support to the stage 1 of the Easterlin model.

3.2 Stage 2: Use of Fertility Control

Introduction

Easterlin's Hypothesis

As mentioned earlier, stage 2 is the key to the test of the Easterlin model. In this stage, an attempt is made to identify the determinants of deliberate fertility control (DURUSE), as measured by duration of contraceptive usage. A key hypothesized determinant of deliberate fertility control is Easterlin's concept of

motivation for fertility control, as measured by the excess of the potential supply of children over demand for children (POTNCHLD - CHLDDESR). It is assumed that the the greater the excess of potential supply over the number of the children desired, the greater is a couple's motivation for fertility control. Accordingly, contraceptive usage (DURUSE) is taken as the dependent variable. Motivation for fertility control (POTNCHLD - CHLDDESR) and regulation costs (METHKNOW), are the independent variables. As hypothesized earlier, contraceptive usage, DURUSE, is expected to be positively correlated with motivation for fertility control (POTNCHLD - CHLDDESR) and negatively with regulation costs as measured by contraceptive methods known (METHKNOW). Following Easterlin and Crimmins, the present measure of motivation (POTNCHLD - CHLDDESR) is also compared with other measures of motivation often cited in the literature; and the present measure of regulation costs (METHKNOW) is compared with other measures of costs which are available in the World Fertility Survey data set. Easterlin and Crimmins do not include these in their model but test them in an attempt to demonstrate the superiority of their own measures.

Other Measures (Not in the Easterlin Model)

In addition to Easterlin's measure of motivation, five other variables of motivation are included in the analysis: 1) WANTMORE, an attitudinal variable which measures the desire for no more children among fecund, married women, 2) FAMSIZE - CHLDDESR, a measure of "unwanted children," 3) FAMSIZE, the actual number of living children, 4) CHLDDESR, the number of children desired, and 5) POTNCHLD, the potential supply of children, as estimated from the set of the seven proximate determinants used to estimate natural fertility in stage 1 of the Easterlin model.

Supplementing Easterlin's measure of regulation costs (METHKNOW), other variables which measure regulation costs but which are not part of the Easterlin model include: 1) KNOWABOR, a measure of the respondents' knowledge of abortion, 2) TRAVTIME, a measure of distance from the nearest abortion clinic, and 3) EFFUSE and INEFFUSE, two dummy vectors measuring the respondent's knowledge of efficient or inefficient methods of contraception. These variables are operationalized in Chapter 2. The descriptive phrases for these variable mnemonics are given in Appendix 1.

Concerning the relationships of the above mentioned motivation variables with contraceptive usage (DURUSE), Easterlin and Crimmins (1985) examined relationships hypothesized in the literature of selected variables with deliberate fertility control. Specifically, they expected fertility control to be: 1) more likely among fecund and married women who want no more children (WANTMORE) than among their counterparts; 2) higher as the number of "unwanted children" (CHLDDESR - CHLDDESR) increases; 3) lower as the demand for children (CHLDDESR) increases; 4) higher as the potential supply of children (POTNCHLD) increases; and 5) higher as the actual family size (FAMSIZE) increases.

Regarding the relationships of contraceptive usage (DURUSE) with the above mentioned costs variables, Easterlin and Crimmins (1985) also examined other relationships with fertility control as hypothesized in the literature. Specifically, they expected fertility control to be: 1) higher when the respondent knows the location of the nearest abortion clinic (KNOWABOR); 2) higher when the respondent has easier access to the abortion clinic (TRAVTIME); and 3) higher when the

respondent knows either both efficient and inefficient contraceptive methods (EFFUSE) or inefficient methods only (INEFFUSE).

Other Tests

Following Easterlin and Crimmins, in the next segment of this stage of the analysis an effort is made to decompose the respective effects of demand (CHLDDESR) and supply (POTNCHLD) contributing to Easterlin's measure of motivation (POTNCHLD - CHLDDESR) and, similarly, the respective effects of natural fertility (NATFERT) and the child survival rate (CHLDSURV), contributing to POTNCHLD (for CHLDSURV = 1 - CHLDMORT, and POTNCHLD = NATFERT x CHLDSURV).

Finally, stage 2 examines the impact of contraceptive usage (DURUSE) upon births averted, measured as the excess of the potential supply over actual family size (POTNCHLD - FAMSIZE). It also examines the effects of not using contraception upon unwanted children, measured as excess of actual family size over the number of children desired (FAMSIZE - CHLDDESR). The separate results for the total population and the regulating population (those who reported ever using contraception and induced abortion) are provided. However, data for the nonregulating population (nonusers of contraception) are also given for reference.

Findings

Motivation

Table 7 presents the descriptive data for contraceptive usage (DURUSE) and six motivation variables not only for the total population, but also for the subpopulations of the regulators (users of contraception) and the nonregulators (nonuser of contraception). The mean value of Easterlin's measure of motivation (POTNCHLD - CHLDDESR) for the total population is 4.9 children. Because supply of children (POTNCHLD) and the demand for children (CHLDDESR) for both the total and regulating populations have approximately the same values, POTNCHLD - CHLDDESR for the regulating population averages only .14 children greater than the total population. The same pattern is found for the other pairs of the variables.

Zero-order correlations of duration of contraceptive usage, DURUSE, and various specified measures of motivation are given in tables 8 through 10. As expected, the correlation between DURUSE and Easterlin's measure of motivation, POTNCHLD - CHLDDESR, is positive and significant. However, the correlation between DURUSE and FAMSIZE - CHLDDESR ("unwanted children"), is not in the direction hypothesized by Easterlin, although it is not statistically significant. The correlation of DURUSE and WANTMORE (fecund and married women who want no children = 1) is not in the hypothesized direction either. This does not support the hypothesis that the parents who want no more children are motivated to control their fertility. As in Sri Lanka and Colombia, a negative association between DURUSE and FAMSIZE is found. This does not lend support to the general belief that the larger the number of surviving children, the longer will

Table 7 Means and Standard Deviations for Years Since Fertility
Control and Specified Measures of Motivation Variables:
Total, Regulating and Nonregulating Populations

A. Total Population

VARIABLE	CASES	MEAN	STD DEV
DURUSE	1125	7.6507	3.9605
MOTIV	1529	4.9452	2.0019
WANTMORE	1572	.8270	.3784
UNWANTCD	1546	.9521	1.5422
POTNCHLD	1555	8.4763	1.6306
CHLDDESR	1546	3.5175	1.1631
FAMSIZE	1572	4.4828	1.4816

B. Regulating Population

VARIABLE	CASES	MEAN	STD DEV
DURUSE	1125	7.6507	3.9605
MOTIV	1217	5.0847	1.9231
WANTMORE	1244	.8931	.3091
UNWANTCD	1229	1.0358	1.4281
POTNCHLD	1232	8.5117	1.5560
CHLDDESR	1229	3.4231	1.1089
FAMSIZE	1244	4.4670	1.4038

C. Nonregulating Population

VARIABLE	CASES	MEAN	STD DEV
DURUSE	0	.	.
MOTIV	312	4.4009	2.2036
WANTMORE	328	.5762	.4949
UNWANTCD	317	.6278	1.8894
POTNCHLD	323	8.3411	1.8851
CHLDDESR	317	3.8833	1.2910
FAMSIZE	328	4.5427	1.7465

Note: MOTIV = POTNCHLD - CHLDDESR; UNWANTCD = FAMSIZE - CHLDDESR.

Table 8 Correlation Matrix for Years Since Starting Fertility Control and Specified Measures of Motivation, Total Population

	DURUSE	MOTIV	WANTMORE	UNWANTCD	POTNCHLD	CHLDDESR
MOTIV	.2413 (1103) P= .000					
WANTMORE	-.1187 (1125) P= .000	.1363 (1529) P= .000				
UNWANTCD	-.0444 (1112) P= .069	.4342 (1529) P= .000	.1368 (1546) P= .000			
POTNCHLD	.1740 (1116) P= .000	.8140 (1529) P= .000	.1128 (1555) P= .000	.2240 (1529) P= .000		
CHLDDESR	-.1677 (1112) P= .000	-.5782 (1529) P= .000	-.0630 (1546) P= .007	-.4311 (1546) P= .000	.0032 (1529) P= .450	
FAMSIZE	-.1777 (1125) P= .000	-.0040 (1529) P= .438	.0901 (1572) P= .000	.7042 (1546) P= .000	.2419 (1555) P= .000	.3371 (1546) P= .000

(COEFFICIENT / (CASES) / 1-TAILED SIG)

Note: MOTIV = POTNCHLD - CHLDDESR; UNWANTCD = FAMSIZE - CHLDDESR.

Table 9 Correlation Matrix for Years Since Starting Fertility Control and Specified Measures of Motivation, Regulating Population

	DURUSE	MOTIV	WANTMORE	UNWANTCD	POTNCHLD	CHLDDESR
MOTIV	.2413 (1103) P= .000					
WANTMORE	-.1187 (1125) P= .000	.0231 (1217) P= .210				
UNWANTCD	-.0444 (1112) P= .069	.4128 (1217) P= .000	.0087 (1229) P= .380			
POTNCHLD	.1740 (1116) P= .000	.8179 (1217) P= .000	.0233 (1232) P= .206	.2194 (1217) P= .000		
CHLDDESR	-.1677 (1112) P= .000	-.5858 (1217) P= .000	-.0027 (1229) P= .462	-.4138 (1229) P= .000	-.0129 (1217) P= .327	
FAMSIZE	-.1777 (1125) P= .000	-.0433 (1217) P= .065	.0076 (1244) P= .394	.6926 (1229) P= .000	.2169 (1232) P= .000	.3701 (1229) P= .000

(COEFFICIENT / (CASES) / 1-TAILED SIG)

Note: MOTIV = POTNCHLD - CHLDDESR; UNWANTCD = FAMSIZE - CHLDDESR.

Table 10 Correlation Matrix for Years Since Starting Fertility Control and Specified Measures of Motivation, Nonregulating Population

	DURUSE	MOTIV	WANTMORE	UNWANTCD	POTNCHLD	CHLDDESR
MOTIV	(. 0) P= .					
WANTMORE	(. 0) P= .	.2588 (312) P= .000				
UNWANTCD	(. 0) P= .	.4658 (312) P= .000	.2900 (317) P= .000			
POTNCHLD	(. 0) P= .	.8111 (312) P= .000	.2687 (323) P= .000	.2233 (312) P= .000		
CHLDDESR	(. 0) P= .	-.5183 (312) P= .000	-.0235 (317) P= .338	-.4447 (317) P= .000	.0798 (312) P= .080	
FAMSIZE	(. 0) P= .	.1202 (312) P= .017	.2881 (328) P= .000	.7510 (317) P= .000	.3131 (323) P= .000	.2574 (317) P= .000

(COEFFICIENT / (CASES) / 1-TAILED SIG)

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Note: MOTIV = POTNCHLD - CHLDDESR; UNWANTCD = FAMSIZE - CHLDDESR.

be the contraceptive usage. Other results in this table show that use is inversely associated with demand (CHLDDESR) and directly associated with supply (POTNCHLD). Both are significant and in the hypothesized direction. Consistent with Easterlin and Crimmins, the correlation of DURUSE with Easterlin's measure of motivation (POTNCHLD - CHLDDESR) performs better than other measures implied in the literature, though the strength of the association is weak ($r = .24$).

Costs of Regulation

The means and standard deviations of contraceptive usage (DURUSE) and various specified cost variables for the total population and two subpopulations are given in table 11. Recall that the measurement of regulation costs, METHKNOW, is based on the knowledge of contraceptive methods known to the respondent. On the average, the regulating population (users of contraception) knows 2.16 more methods than the nonregulating population (nonusers). Over 99 per cent of the regulators know at least one efficient method (EFFUSE), compared with 91 per cent of the nonregulators. Ninety per cent of the regulators know of induced abortion (KNOWABOR); whereas 68 per cent of the nonregulators have the same knowledge. The data also indicate that, compared with the regulators, the nonregulators are twice as distant from the nearest abortion clinic (TRAVTIME).

Tables 12 through 14 present the zero-order correlations among the variables in the previous table. As hypothesized earlier, it is expected that duration of use of contraception is inversely associated with the costs of regulation. More specifically, those who know about induced abortion (KNOWABOR = 1) are more likely to know more methods of contraception and have a longer duration of using contraception (DURUSE). In addition, the shorter the distance to the nearest

Table 11 Means and Standard Deviations for Years Since Starting Fertility Control and Specified Measures of Costs of Regulation: Total, Regulating and Nonregulating Populations

A. Total Population

VARIABLE	CASES	MEAN	STD DEV
DURUSE	1125	7.6507	3.9605
METHKNOW	1572	5.6692	2.2971
KNOWABOR	1572	.8518	.3554
TRAVTIME	1537	20.9863	28.6790
EFFUSE	1572	.9790	.1434
INEFFUSE	1572	.0006	.0252

B. Regulating Population

VARIABLE	CASES	MEAN	STD DEV
DURUSE	1125	7.6507	3.9605
METHKNOW	1244	6.1190	2.0599
KNOWABOR	1244	.8979	.3029
TRAVTIME	1223	17.0237	24.5903
EFFUSE	1244	.9960	.0633
INEFFUSE	1244	.0008	.0284

C. Nonregulating Population

VARIABLE	CASES	MEAN	STD DEV
DURUSE	0	.	.
METHKNOW	328	3.9634	2.3524
KNOWABOR	328	.6768	.4684
TRAVTIME	314	36.4204	37.0827
EFFUSE	328	.9146	.2799
INEFFUSE	328	.0000	.0000

Table 12 Correlation Matrix for Years Since Starting Fertility Control and Specified Measures of Costs of Regulation, Total Population

	DURUSE	METHKNOW	KNOWABOR	TRAVTIME	EFFUSE
METHKNOW	.1807 (1125) P= .000				
KNOWABOR	.0744 (1125) P= .006	.3344 (1572) P= .000			
TRAVTIME	-.1000 (1107) P= .000	-.3652 (1537) P= .000	-.9881 (1537) P= .000		
EFFUSE	. (1125) P= .	.3596 (1572) P= .000	.1512 (1572) P= .000	-.1518 (1537) P= .000	
INEFFUSE	. (1125) P= .	-.0513 (1572) P= .021	-.0605 (1572) P= .008	.0596 (1537) P= .010	-.1723 (1572) P= .000

(COEFFICIENT / (CASES) / 1-TAILED SIG) " . " IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

Table 13 Correlation Matrix for Years Since Starting Fertility Control and Specified Measures of Costs of Regulation, Regulating Population

	DURUSE	METHKNOW	KNOWABOR	TRAVTIME	EFFUSE
METHKNOW	.1807 (1125) P= .000				
KNOWABOR	.0744 (1125) P= .006	.2142 (1244) P= .000			
TRAVTIME	-.1000 (1107) P= .000	-.2526 (1223) P= .000	-.9829 (1223) P= .000		
EFFUSE	. (1125) P= .	.1826 (1244) P= .000	.0205 (1244) P= .235	-.0281 (1223) P= .163	
INEFFUSE	. (1125) P= .	-.0705 (1244) P= .006	-.0841 (1244) P= .001	.0826 (1223) P= .002	-.4465 (1244) P= .000

(COEFFICIENT / (CASES) / 1-TAILED SIG)

" . " IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

Table 14 Correlation Matrix for Years Since Starting Fertility Control and Specified Measures of Costs of Regulation, Nonregulating Population

	DURUSE	METHKNOW	KNOWABOR	TRAVTIME	EFFUSE
DURUSE					
METHKNOW	(. 0) P= .				
KNOWABOR	(. 0) P= .	.3861 (. 328) P= .000			
TRAVTIME	(. 0) P= .	-.3924 (. 314) P= .000	-.9945 (. 314) P= .000		
EFFUSE	(. 0) P= .	.5155 (. 328) P= .000	.1622 (. 328) P= .002	-.1519 (. 314) P= .004	
INEFFUSE	(. 0) P= .	(. 328) P= .	(. 328) P= .	(. 314) P= .	(. 328) P= .

(COEFFICIENT / (CASES) / 1-TAILED SIG)

" . " IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

abortion clinic (TRAVTIME), the longer the respondents have used contraception. Like Sri Lankan and Colombian data, the South Korean data (in table 12) support these hypotheses, though the strength of the associations is weak (highest $r = .18$, compared with $.35$ for Sri Lanka and Colombia). Finally, knowledge of efficient methods (EFFUSE, INEFFUSE) do not have the expected results.

Multivariate Analysis of Stage 2 Variables

Recall that the zero order correlations in table 8 showed that Easterlin's motivation variable (POTNCHLD - CHLDDESR) performed better in explaining fertility control (DURUSE) than did most other measures of motivation which are cited in the literature. This result is also found in tables 15 through 18 when motivation and regulation cost measures compete with each other in the multiple regression analyses. Again the association of DURUSE and WANTMORE (fecund and married women who want no more children, WANTMORE = 1), is not in the hypothesized direction (see tables 16); and the strength of the associations are generally weak, (the highest beta = $.18$ in table 15). Regulation costs (METHKNOW) and motivation for control (POTNCHLD - CHLDDESR), combined, generate the highest adjusted R square ($.05$) in explaining fertility control (see table 15). Regulation costs (METHKNOW) and the demand for children (CHLDDESR) have approximately the same beta weights (see table 17), as do METHKNOW and POTNCHLD, the potential supply of children, (see table 18). Moreover, as can be seen in tables 19 through 22, exclusion of the nonregulating population in the sample does not change the results. Except for WANTMORE, the variables remain significant and in the hypothesized directions.

Table 15 Regression of Years Since Starting Fertility Control on Motivation for Fertility Control and Regulation Costs, Total Population

Multiple R	.21876	Analysis of Variance			
R Square	.04786		DF	Sum of Squares	Mean Square
Adjusted R Square	.04664	Regression	2	843.74197	421.87098
Standard Error	3.27090	Residual	1569	16786.43797	10.69881
		F =	39.43157	Signif F =	.0000

----- Variables in the Equation -----

Variable	B	SE B	95% Confdnce Intrvl B	Beta	SE Beta	Correl Part Cor	Partial	T	Sig T
METHKNOW	.156772	.036331	.085510 .228033	.107502	.024913	.133619 .106300	.108298	4.315	.0000
MOTIV	.297237	.042272	.214321 .380152	.175174	.024913	.191202 .173216	.174784	7.032	.0000
(Constant)	5.292071	.282999	4.736974 5.847167					18.700	.0000

End Block Number 1 All requested variables entered.

Note: MOTIV = POTNCHLD - CHLDDES.

Table 16 Regression of Years Since Starting Fertility Control on Want No More and Regulation Costs, Total Population

Multiple R	.16174	Analysis of Variance			
R Square	.02616		DF	Sum of Squares	Mean Square
Adjusted R Square	.02492	Regression	2	461.19879	230.59939
Standard Error	3.30796	Residual	1569	17168.98115	10.94263
		F =	21.07350	Signif F =	.0000

----- Variables in the Equation -----

Variable	B	SE B	95% Confdnce Intrvl B	Beta	SE Beta	Correl Part Cor	Partial	T	Sig T
METHKNOW	.223432	.037162	.150540 .296324	.153212	.025483	.133619 .149790	.150069	6.012	.0000
WANTMORE	-.825273	.225602	-1.267786 -.382760	-.093218	.025483	-.061014 -.091135	-.091960	-3.658	.0003
(Constant)	7.066537	.263875	6.548953 7.584121					26.780	.0000

End Block Number 1 All requested variables entered.

Table 17 Regression of Years Since Starting Fertility Control on Child Demand and Regulation Costs, Total Population

		Analysis of Variance		
		DF	Sum of Squares	Mean Square
Multiple R	.17276			
R Square	.02985			
Adjusted R Square	.02861			
Standard Error	3.30170			
		Regression	2	526.19691
		Residual	1569	17103.98303
		F =	24.13482	Signif F = .0000

----- Variables in the Equation -----

Variable	B	SE B	95% Confdnce Intrvl B	Beta	SE Beta	Correl Part Cor	Partial	T	Sig T
METHKNOW	.162918	.036981	.090381 .235455	.111716	.025359	.133619	.109547	.110538	4.405 .0000
CHLDDESR	-.324356	.073651	-.468821 -.179892	-.111679	.025359	-.133588	-.109510	-.110501	-4.404 .0000
(Constant)	7.868038	.373238	7.135940 8.600137						21.080 .0000

End Block Number 1 All requested variables entered.

Table 18 Regression of Years Since Starting Fertility Control on Supply of Children and Regulation Costs, Total Population

		Analysis of Variance		
		DF	Sum of Squares	Mean Square
Multiple R	.18767			
R Square	.03522			
Adjusted R Square	.03399			
Standard Error	3.29254			
		Regression	2	620.92957
		Residual	1569	17009.25036
				310.46479
				10.84082
		F =	28.63849	Signif F = .0000

----- Variables in the Equation -----

Variable	B	SE B	95% Confidence Interval B	Beta	SE Beta	Correl Part	Cor	Partial	T	Sig T
METHKNOW	.188080	.036185	.117105 .259055	.128971	.024813	.133619	.128891	.130107	5.198	.0000
POTNCHLD	.272373	.051253	.171842 .372905	.131861	.024813	.136407	.131779	.132972	5.314	.0000
(Constant)	4.275768	.481071	3.332159 5.219377						8.888	.0000

End Block Number 1 All requested variables entered.

Table 19 Regression of Years Since Starting Fertility Control on Motivation for Fertility Control and Regulation Costs, Regulating Population

Multiple R	.26291	Analysis of Variance			
R Square	.06912		DF	Sum of Squares	Mean Square
Adjusted R Square	.06762	Regression	2	1218.67228	609.33614
Standard Error	3.63654	Residual	1241	16411.50766	13.22442
		F =	46.07658	Signif F =	.0000

----- Variables in the Equation -----

Variable	B	SE B	95% Confdnce Intrvl B	Beta	SE Beta	Correl Part Cor	Partial	T	Sig T
METHKNOW	.256413	.050524	.157291 .355535	.140248	.027635	.167517 .138996	.142592	5.075	.0000
MOTIV	.404839	.054717	.297491 .512186	.204465	.027635	.223169 .202639	.205543	7.399	.0000
(Constant)	4.023256	.400840	3.236858 4.809653					10.037	.0000

End Block Number 1 All requested variables entered.

Note: MOTIV = POTNCHLD - CHLDDESR.

Table 20 Regression of Years Since Starting Fertility Control on Want No More and Regulation Costs, Regulating Population

Multiple R	.19675	Analysis of Variance			
R Square	.03871		DF	Sum of Squares	Mean Square
Adjusted R Square	.03716	Regression	2	682.45332	341.22666
Standard Error	3.69547	Residual	1241	16947.72662	13.65651
		F =	24.98638	Signif F =	.0000

----- Variables in the Equation -----

Variable	B	SE B	95% Confdnce Intrvl B	Beta	SE Beta	Correl Part Cor	Partial	T	Sig T
METHKNOW	.327329	.051200	.226880 .427778	.179037	.028005	.167517 .177932	.178562	6.393	.0000
WANTMORE	-1.264941	.341183	-1.934300 -.595583	-.103828	.028005	-.083963 -.103187	-.104666	-3.708	.0002
(Constant)	6.777524	.425197	5.943341 7.611708					15.940	.0000

End Block Number 1 All requested variables entered.

Table 21 Regression of Years Since Starting Fertility Control on Child Demand and Regulation Costs, Regulating Population

		Analysis of Variance		
		DF	Sum of Squares	Mean Square
Multiple R	.21209			
R Square	.04498			
Adjusted R Square	.04344			
Standard Error	3.68340			
		Regression	2	793.03606
		Residual	1241	16837.14388
		F =	29.22579	Signif F = .0000

----- Variables in the Equation -----

Variable	B	SE B	95% Confdnce Intrvl B	Beta	SE Beta	Correl Part Cor	Partial	T	Sig T
METHKNOW	.264154	.051507	.163104 .365205	.144483	.028172	.167517 .142269	.144063	5.129	.0000
CHLDDESR	-.451384	.096265	-.640243 -.262524	-.132100	.028172	-.157293 -.130077	-.131941	-4.689	.0000
(Constant)	7.579522	.505018	6.588739 8.570304					15.008	.0000

End Block Number 1 All requested variables entered.

Table 22 Regression of Years Since Starting Fertility Control on Supply of Children and Regulation Costs, Regulating Population

Multiple R	.22769	Analysis of Variance			
R Square	.05184		DF	Sum of Squares	Mean Square
Adjusted R Square	.05031	Regression	2	913.97813	456.98906
Standard Error	3.67014	Residual	1241	16716.20181	13.46995
		F =	33.92657	Signif F =	.0000

----- Variables in the Equation -----

Variable	B	SE B	95% Confdnce Intrvl B	Beta	SE Beta	Correl Part Cor	Partial	T	Sig T
METHKNOW	.295307	.050574	.196087 .394526	.161522	.027662	.167517 .161400	.163522	5.839	.0000
POTNCHLD	.375342	.067279	.243350 .507335	.154324	.027662	.160598 .154207	.156417	5.579	.0000
(Constant)	2.648968	.648660	1.376379 3.921558					4.084	.0000

End Block Number 1 All requested variables entered.

Proximate Determinants of Motivation and Supply

Table 23 gives zero-order correlations of Easterlin's measure of motivation (POTNCHLD - CHLDDESR) with the demand for children (CHLDDESR) and the supply of children (POTNCHLD). It shows the respective effects of demand and supply contributing to the variation of a couple's motivation for fertility control. As expected, both variables, CHLDDESR and POTNCHLD, have high correlations with motivation across the whole population. The results are roughly the same when controlling for the use of contraception.

Following the same logic, table 24 assesses the respective roles of natural fertility, NATFERT, and the child survival rate, CHLDSURV ($CHLDSURV = 1 - CHLDMORT$) in explaining the household differences in potential supply of children ($POTNCHLD = NATFERT \times CHLDSURV$; and recall that NATFERT is estimated from the regression equation with children ever born as the dependent variable and the seven proximate determinants as the independent variables.) It is clear that POTNCHLD has moderately high correlations with NATFERT and CHLDSURV across the population. POTNCHLD has roughly the same correlation with NATFERT and CHLDSURV for the regulating population, and has higher correlation with CHLDSURV than NATFERT for the nonregulating population.²⁰

Births Averted and Unwanted Fertility

According to the Easterlin model, the primary concerns of the present approach are to find the effects of the use of contraception upon births averted and the effects of not using contraception upon unwanted fertility (Easterlin and

Table 23 Correlation Matrix for Motivation, Child Demand and Supply of Children: Total, Regulating and Nonregulating Populations

A. Total Population

	MOTIV	CHLDDESR	POTNCHLD
CHLDDESR	-.5782 (1529) P= .000		
POTNCHLD	.8140 (1529) P= .000	.0032 (1529) P= .450	

(COEFFICIENT / (CASES) / 1-TAILED SIG)

B. Regulating Population

	MOTIV	CHLDDESR	POTNCHLD
CHLDDESR	-.5858 (1217) P= .000		
POTNCHLD	.8179 (1217) P= .000	-.0129 (1217) P= .327	

(COEFFICIENT / (CASES) / 1-TAILED SIG)

C. Nonregulating Population

	MOTIV	CHLDDESR	POTNCHLD
CHLDDESR	-.5183 (312) P= .000		
POTNCHLD	.8111 (312) P= .000	.0798 (312) P= .080	

(COEFFICIENT / (CASES) / 1-TAILED SIG)

Note: MOTIV = POTNCHLD - CHLDDESR.

Table 24 Correlation Matrix for Supply of Children, Natural Fertility and Child Survival Rate: Total, Regulating and Nonregulating Populations

A. Total Population

	POTNCHLD	NATFERT	CHLDSURV
NATFERT	.5720 (1555) P= .000		
CHLDSURV	.6226 (1555) P= .000	-.2748 (1555) P= .000	

(COEFFICIENT / (CASES) / 1-TAILED SIG)

B. Regulating Population

	POTNCHLD	NATFERT	CHLDSURV
NATFERT	.5970 (1232) P= .000		
CHLDSURV	.5925 (1232) P= .000	-.2818 (1232) P= .000	

(COEFFICIENT / (CASES) / 1-TAILED SIG)

C. Nonregulation Population

	POTNCHLD	NATFERT	CHLDSURV
NATFERT	.5351 (323) P= .000		
CHLDSURV	.7050 (323) P= .000	-.2098 (323) P= .000	

(COEFFICIENT / (CASES) / 1-TAILED SIG)

Crimmins 1985:79). Easterlin and Crimmins operationalize the excess number of living children over the number of children desired as the implied number of unwanted children (FAMSIZE - CHLDDESR). Similarly, for the regulators (users of contraception), the excess of the potential supply over the number of children desired (POTNCHLD - CHLDDESR) is operationalized as the potential unwanted children if contraception had been used. The excess of the potential supply over the actual number of living children (POTNCHLD - FAMSIZE), is termed as the number of "averted children," and seen as the effect of fertility control. Table 25 shows that both subpopulations, (regulating and nonregulating) on the average, had more children than they desired, given the fact that the regulators deliberately controlled their fertility. For the regulators, the number of "averted children" (POTNCHLD - FAMSIZE) is much greater than the actual number of unwanted children (FAMSIZE - CHLDDESR). Fertility control reduced the potential number of unwanted children by 79 per cent ($\frac{\text{POTNCHLD} - \text{FAMSIZE}}{\text{POTNCHLD} - \text{CHLDDESR}} \times 100$), compared with 72 per cent and 65 per cent Easterlin and Crimmins found in Sri Lanka and Colombia respectively.

Summary

In the stage 2 analysis, as expected, the South Korean data show a positive association of contraceptive usage (DURUSE) with the present measure of motivation for fertility control, the excess of the potential supply of children over the demand for children (POTNCHLD - CHLDDESR). Also as expected, the South Korean data show a negative association of POTNCHLD - CHLDDESR with the costs of fertility control, as measured by the number of contraceptive methods

Table 25 Means and Standard Deviations of Actual Unwanted Children of Nonregulating Population, and of Actual Unwanted Children, and Children Averted of Regulating Population

A. Nonregulating Population

NUMBER OF VALID OBSERVATIONS (LISTWISE) =					317.00
VARIABLE	MEAN	STD DEV	MINIMUM	MAXIMUM	VALID N
UNWANTCD	.628	1.889	-5.00	8.00	317

B. Regulating Population

NUMBER OF VALID OBSERVATIONS (LISTWISE) =					1217.00
VARIABLE	MEAN	STD DEV	MINIMUM	MAXIMUM	VALID N
UNWANTCD	1.036	1.428	-6.00	6.00	1229
MOTIV	5.085	1.923	-3.67	12.09	1217
AVERTCD	4.040	1.857	-.60	12.73	1232

Note: UNWANTCD = FAMSIZE - CHLDDES; MOTIV = POTNCHLD - CHLDDES;
 AVERTCD = POTNCHLD - FAMSIZE.

known to the respondent (METHKNOW). Similar results were found for the Sri Lankan and Colombian data. Also consistent with Easterlin and Crimmins, the variable measuring motivation for fertility control (POTNCHLD - CHLDDSR) is found to perform better than the other measures of motivation which are often cited in the literature. These measures include WANTMORE (measuring the desire for no more children among fecund and married women), FAMSIZE - CHLDDESR ("unwanted children"), POTNCHLD (the supply of children), CHLDDESR (the demand for children), and FAMSIZE (actual family size).

As generally noted in the literature, the South Korean data also show that DURUSE is positively associated with POTNCHLD, and negatively associated with CHLDDESR. Also as generally expected, the data show that there is a positive relationship of DURUSE with KNOWABOR (the knowledge of where to get abortion), and a negative relationship with TRAVTIME (the distance from the nearest abortion clinic). Once again, like the Sri Lankan and Colombian data, the South Korean data show high correlations of POTNCHLD - CHLDDESR with POTNCHLD and CHLDDESR; and of POTNCHLD with NATFERT (natural fertility) and CHLDSURV (child survival rate). Moreover, the South Korean data show that there is a strong effect of the use of contraception upon averted births (POTNCHLD - FAMSIZE) and unwanted births (FAMSIZE - CHLDDESR), consistent with the Easterlin model.

However, unexpectedly, the South Korean data fail to provide support for three hypotheses derived from the general literature. These are the longer the contraceptive usage (DURUSE): 1) the larger is the number of "unwanted children" (FAMSIZE - CHLDDESR); 2) the more likely a married and fecund woman

will want no children (WANTMORE); and 3) the larger the actual family size (FAMSIZE). Except for this last hypothesis, the Sri Lankan and Colombian data provide support for these hypotheses. Chapter 4 will include an interpretation of why these hypotheses were not supported by the South Korean data.

3.3 Stage 3: Proximate Determinant Analysis

Introduction

The stage 1 analysis of the Easterlin model attempted to clarify the associations of modernization and cultural variables with the demand for children (CHLDDESR), the supply of children (POTNCHLD) and regulation costs (METHKNOW). The stage 2 analysis looked at the effects of motivation for fertility control (POTNCHLD - CHLDDESR) and regulation costs upon use of contraception (DURUSE). The stage 3 analysis will examine the impact of the seven proximate determinants and use of contraception on observed fertility (CEB). As hypothesized earlier, the observed fertility is expected to be positively associated with duration of marriage (DURMAR) and child mortality (CHLDMORT), and to be negatively associated with the duration of contraceptive usage (DURUSE), breastfeeding (DURBFEEED), first and second birth intervals (FBI, SBI), and incidence of secondary sterility (SECSTERL). Easterlin and Crimmins reported that both Sri Lankan and Colombian data supported these hypotheses; the explained variance (R squares) in observed fertility (CEB) is relatively high for both countries. Because Easterlin borrows from the "proximate determinants" approach, which has

received strong support in the recent literature (cf. Bulatao and Lee 1983), as the third stage of his model, it was expected that the South Korean data also would support these hypotheses. Finally, observed fertility (CEB) and estimated potential fertility (POTNCHLD) are compared for the regulators (users of contraception) and the nonregulators. Again the descriptive phrases for each variable mnemonic are found in Appendix 1.

Findings

Table 26 presents descriptive data on the stage 3 variables. Except for children ever born (CEB) and duration of contraceptive usage (DURUSE), all other variables are the dependent variables in the stage 1 regression analyses. These other variables include duration of marriage (DURMAR), first and second birth intervals (FBI, SBI), secondary sterility (SECSTERL), breast-feeding (DURBFEEED), pregnancy wastage (PREGWAS), and child mortality (CHLDMORT). The South Korean respondents reported a mean number of 5.0 children ever born to them (CEB = 5.0). This is lower than that reported by Easterlin and Crimmins (1985) for both Sri Lankan (5.7) and Colombian respondents (6.7). The South Korean respondents reported a longer duration of use of contraception (DURUSE = 7.6) and longer first and second birth intervals (FBI = 27.1, SBI = 32.9) than Sri Lankan and Colombian respondents (for Sri Lanka: DURUSE = 4.3, FBI = 21.6, SBI = 29.2; for Colombia: DURUSE = 7.3, FBI = 16.8, SBI = 23.7).

Table 27 gives the zero-order correlations among these variables. The data show that the intercorrelations among the independent variables are generally low (the highest is .29). Like the Sri Lankan and Colombian data, the South Korean

Table 26 Means and Standard Deviations for Variables of Stage 3

VARIABLE	CASES	MEAN	STD DEV
CEB	1572	5.0197	1.7400
DURMAR	1572	19.1088	4.6075
DURUSE	1125	7.6507	3.9605
FBI	1555	27.0817	21.8153
SBI	1572	32.9225	16.9194
SECSTERL	1572	.7990	.4009
DURBFEEED	1572	24.5515	19.4051
PREGWAS	1572	.1634	.1951
CHLDMORT	1572	.0914	.1400

Table 27 Correlation Matrix for Variables in Stage 3

	CEB	DURMAR	DURUSE	FBI	SBI	SECSTERL	DURBFEEED	PREGWAS
DURMAR	.4867 (1572) P= .000							
DURUSE	-.2053 (1125) P= .000	.2112 (1125) P= .000						
FBI	-.0263 (1555) P= .150	.2917 (1555) P= .000	-.0044 (1116) P= .441					
SBI	-.1557 (1572) P= .000	.1751 (1572) P= .000	-.1035 (1125) P= .000	.0882 (1555) P= .000				
SECSTERL	.0687 (1572) P= .003	-.2156 (1572) P= .000	-.2011 (1125) P= .000	.0004 (1555) P= .494	.0125 (1572) P= .310			
DURBFEEED	.0435 (1572) P= .042	.0495 (1572) P= .025	-.0908 (1125) P= .001	.0157 (1555) P= .268	.0404 (1572) P= .055	-.0036 (1572) P= .444		
PREGWAS	-.3602 (1572) P= .000	-.1645 (1572) P= .000	.1553 (1125) P= .000	-.0874 (1555) P= .000	.0093 (1572) P= .356	-.0039 (1572) P= .438	-.0420 (1572) P= .048	
CHLDMORT	.3202 (1572) P= .000	.2273 (1572) P= .000	-.1059 (1125) P= .000	.0346 (1555) P= .086	-.0267 (1572) P= .145	-.0669 (1572) P= .004	.1460 (1572) P= .000	-.1522 (1572) P= .000

(COEFFICIENT / (CASES) / 1-TAILED SIG)

data show that, except for breast-feeding, all the independent variables in stage 3 have the hypothesized signs. Easterlin and Crimmins found breast-feeding not to be significant for either Sri Lankan or Colombian data in zero order correlations of the stage 3 variables. The data in table 27 also show that, except for duration of marriage (DURMAR), child mortality (CHLDMORT), and pregnancy wastage (PREGWAS), the correlation coefficients are generally low in magnitude. The correlation of CEB and FBI is not only the lowest but also not significant. The rest of the coefficients are all statistically significant.

Table 28 presents the results of a regression analysis with children ever born (CEB) as the dependent variable. Independent variables are duration of contraceptive usage (DURUSE), duration of marriage (DURMAR), first and second birth intervals (FBI, SBI), secondary sterility (SECSTERL), breast-feeding (DURBFEEED), pregnancy wastage (PREGWAS), and child mortality, (CHLDMORT). As can be seen, each beta weight has the hypothesized sign. Except for one, all coefficients are statistically significant. Collectively, the eight independent variables explain over 51 per cent of the variation in the dependent variable (CEB), compared with 31 per cent for Sri Lanka and 51 per cent for Colombia. Easterlin and Crimmins reported that, except for the nonsignificance of PREGWAS for the Colombian data, all the other independent variables are in the hypothesized directions and statistically significant.

Table 28 also shows that the single best predictor for children ever born (CEB) is duration of marriage, DURMAR, (beta = .60), followed by SBI, PREGWAS, DURUSE, FBI, SECSTERL, and CHLDMORT. DURMAR alone accounts for 36 per cent of the variance in CEB controlling for other independent variables. Breast-feeding has the lowest beta weight and is not significant.

Table 28 Third Stage Regression of Child Ever Born on Specified Variables

Multiple R	.71588	Analysis of Variance		
R Square	.51249		DF	Sum of Squares
Adjusted R Square	.50999	Regression	8	2437.59242
Standard Error	1.21801	Residual	1563	2318.79625
				Mean Square
				304.69905
				1.48355
		F =	205.38442	Signif F = .0000

----- Variables in the Equation -----

Variable	B	SE B	95% Confdnce Intrvl B	Beta	SE Beta	Correl Part Cor	Partial	T	Sig T
CHLDMORT	1.823347	.231423	1.369415 2.277278	.146671	.018616	.320167 .139148	.195446	7.879	.0000
SBI	-.026213	.001868	-.029876 -.022549	-.254887	.018161	-.155704 -.247866	-.334542	-14.035	.0000
SECSTERL	.767608	.079279	.612104 .923113	.176853	.018266	.068651 .170999	.237877	9.682	.0000
FBI	-.016263	.001488	-.019182 -.013345	-.202792	.018553	-.026183 -.193041	-.266478	-10.930	.0000
DURBFEEED	-.001809	.001606	-.004960 .001341	-.020178	.017912	.043490 -.019896	-.028484	-1.127	.2601
PREGWAS	-2.002031	.163256	-2.322254 -1.681807	-.224463	.018304	-.360239 -.216578	-.296261	-12.263	.0000
DURUSE	-.116156	.009665	-.135114 -.097198	-.223630	.018608	-.167539 -.212247	-.290842	-12.018	.0000
DURMAR	.225761	.007690	.210677 .240845	.597806	.020363	.486682 .518481	.596178	29.358	.0000
(Constant)	2.489408	.183066	2.130327 2.848489					13.598	.0000

End Block Number 1 All requested variables entered.

Recall that one major use of the proximate determinants equation, according to Easterlin, is to estimate natural fertility (NATFERT) by summing up the unstandardized coefficients of the seven proximate variables and the constant term in the equation. Also recall that the estimated potential supply of children is a product of NATFERT, natural fertility, and CHLDSURV, child survival rate, (and $CHLDSURV = 1 - CHLDMORT$). Table 29 gives descriptive data about estimated potential fertility (POTNCHLD) compared with observed fertility (CEB) for the regulators (users of contraception) and the nonregulators (nonusers of contraception) separately. As expected, the regulators have a lower mean level of fertility than the nonregulators, and the difference between estimated potential fertility (POTNCHLD) and actual fertility (CEB) is higher for the regulators than for the nonregulators. Furthermore, the estimated mean potential fertility (POTNCHLD) for the regulators is higher than that of the nonregulators (see footnote 20).

To explain why the estimated mean potential fertility (POTNCHLD) is higher for the regulators than for the nonregulators, table 30 gives the mean values and standard deviations of the proximate variables and of contraceptive usage for the two subpopulations. It shows that the nonregulators have longer birth intervals (FBI, SBI), longer duration of marriage (DURMAR), and higher values of child mortality (CHLDMORT), but a much lower value of pregnancy wastage (PREGWAS). This implies that higher values of potential fertility for the regulators may be due to their shorter birth intervals and lower incidence of secondary sterility (see footnote 20).

Table 29 Means and Standard Deviations of Estimated Natural Fertility
and Children Ever Born: Nonregulating and Regulating Populations

A. Regulating Population

NUMBER OF VALID OBSERVATIONS (LISTWISE) =					1232.00
VARIABLE	MEAN	STD DEV	MINIMUM	MAXIMUM	VALID N
CEB	4.949	1.690	2.00	12.00	1244
POTNCHLD	8.512	1.556	3.23	14.73	1232

B. Nonregulating Population

NUMBER OF VALID OBSERVATIONS (LISTWISE) =					323.00
VARIABLE	MEAN	STD DEV	MINIMUM	MAXIMUM	VALID N
CEB	5.287	1.896	2.00	11.00	328
POTNCHLD	8.341	1.885	2.75	15.05	323

Table 30 Means and Standard Deviations of Variables in Stage 1:
Regulating and Nonregulating Populations

A. Regulating Population

NUMBER OF VALID OBSERVATIONS (LISTWISE) =		1116.00			
VARIABLE	MEAN	STD DEV	MINIMUM	MAXIMUM	VALID N
CEB	4.949	1.690	2.00	12.00	1244
DURUSE	7.651	3.960	.00	30.00	1125
DURMAR	18.804	4.525	6.00	30.00	1244
FBI	25.403	19.834	.00	124.00	1232
SBI	31.414	14.908	.00	205.00	1244
SECSTERL	.822	.383	.00	1.00	1244
DURBFEEED	24.227	19.427	.00	99.00	1244
PREGWAS	.196	.201	.00	.83	1244
CHLDMORT	.079	.130	.00	.67	1244

B. Nonregulating Population

NUMBER OF VALID OBSERVATIONS (LISTWISE) =		.00			
VARIABLE	MEAN	STD DEV	MINIMUM	MAXIMUM	VALID N
CEB	5.287	1.896	2.00	11.00	328
DURUSE	.00	.00	.00	.00	0
DURMAR	20.265	4.740	5.00	30.00	328
FBI	33.483	27.221	1.00	192.00	323
SBI	38.643	22.114	9.00	194.00	328
SECSTERL	.713	.453	.00	1.00	328
DURBFEEED	25.780	19.303	.00	99.00	328
PREGWAS	.042	.102	.00	.50	328
CHLDMORT	.138	.165	.00	.75	328

Summary

In the stage 3 analysis, the South Korean data show that seven out of eight independent variables (duration of marriage, use of contraception, first and second birth intervals, secondary sterility, pregnancy wastage, and child mortality) have significant effects on children ever born (CEB). The relationship of CEB and each of the eight independent variables is in the hypothesized direction. Breast-feeding (DURBFEEED) is not statistically significant in the regression equation. Collectively, 51 per cent of the variance in CEB is explained.

In the next chapter, the pattern of findings in the analysis will be discussed, which will be followed by a conclusion.

Chapter 4

SUMMARY AND CONCLUSION

4.1 Stage 1

The data for stage 1, linking modernization and cultural variables to the supply of children (POTNCHLD), the demand for children (CHLDDESR) and the costs of fertility regulation (METHKNOW), provide weak support for Easterlin's hypothesized approach. There is an absence of a clear linkage of the modernization and cultural variables on the one hand, and demand, supply and regulation costs on the other. The Sri Lankan and Colombian data provide a similar lack of support. A plausible explanation is that modernization is improperly measured. This is possibly because, theoretically, the Easterlin model misses or inappropriately delineates the salience of socioeconomic modernization ²¹ and, methodologically, the available World Fertility Survey data variables do not validly measure the equivalent aspects of modernization specified by the model.

However, despite these theoretical and methodological weaknesses, the stage 1 analysis does produce some support for the Easterlin model.

Firstly, as Easterlin and Crimmins found, in South Korea the modernization variables have a greater impact than do the cultural variables. This impression is

derived from the fact that modernization variables, more than cultural variables, show a significant and substantial impact (judged by their beta values) upon demand, supply and costs of regulation.

Secondly, as in Sri Lanka and Colombia, the South Korean data show that the wife's education (WED) is the most important predictor. Wife's education produces a significant effect in six regression equations out of nine related to stage 1, (see tables 3 through 6 and appendixes 2 through 6). This result is consistent with many recent findings in the literature (see, for example, Oppong 1983). For the South Korean respondents, however, urban-rural residence (URBRURAL) is the next in importance among the modernization variables, whereas Easterlin and Crimmins found wife's work status to be the second in importance. This partially confirms the effect of urbanization on the decision-making process affecting human reproduction. Furthermore, other modernization variables, such as the husband's work status is found to be related to regulation costs; the wife's work status before marriage is found to be associated with pregnancy wastage. These findings support the mainstream of microeconomic theories, which emphasize the effects of socioeconomic status upon fertility levels.

Thirdly, among the cultural variables, there is an effect for regional residence; the South Korean respondents from the northern and southern areas, in some way, distinguish themselves from the respondents from the central areas. Possibly this regional disparity may be due to differences both in cultural background and in levels of socioeconomic development and modernization.

4.2 Stage 2

Easterlin emphasizes (1985:36) that the stage 2 analysis is the crucial test of his theory. In this stage Easterlin's concept of parents' motivation for fertility control is examined. Motivation, as Easterlin sees it, is "a matter of a couple's reproductive supply and demand condition" (Easterlin and Crimmins 1985:180); and empirically, it is the excess of the supply of children over the demand for children (POTNCHLD - CHLDDESR). Hence the theory predicts that the higher a couple's motivation for regulating fertility, the longer will be their use of contraception. This hypothesis is supported by the South Korean data.

Easterlin's measure of motivation to control fertility (POTNCHLD - CHLDDESR) was compared with other frequently used measures of motivation found in the literature. Easterlin's measure of motivation (POTNCHLD - CHLDDESR) was superior to these other measures of motivation in explaining the variance in the length of contraceptive usage (DURUSE), as was seen in tables 15 through 18. This was also the case for Sri Lanka and Colombia. In sum, the South Korean findings support Easterlin's notion (1985) that parents are motivated to use contraception because they envisage that the number of surviving offspring they would produce would exceed the number they desire if they do not limit their fertility.

Because high costs of regulation may hinder parents from regulating their fertility, the Easterlin model also predicts that lower costs of regulation will lead to longer use of contraception. More specifically, Easterlin (1985) hypothesized that the period of the women's contraceptive usage (DURUSE) will be longer: 1)

the more the number of contraceptive methods known to the woman (METHKNOW); 2) the more likely the woman has knowledge of induced abortion (KNOWABOR); 3) the shorter the time required to travel to the nearest abortion clinic (TRAVTIME); and 4) the more likely the woman knows both inefficient and efficient methods of contraception or only inefficient methods (EFFUSE, INEFFUSE). Like the Sri Lankan and Colombian data, the South Korean data support these hypotheses except for the last one, for which the South Korean data do not generate the expected results (see table 12 and 13).²² Nevertheless, the correlations between use of contraception and each measure of costs is low. A plausible interpretation is that other factors, such as socioeconomic variables, directly or indirectly, influence use of contraception.

Finally, the South Korean data show that respondents who are married, fecund and want no more children are less likely to use contraception longer than are their counterparts (see table 8 and 16). Also, as surprisingly found, those South Korean respondents who have smaller number of "unwanted children" or of surviving children are more likely to have longer duration of contraceptive usage (see table 8). However, this result may be partially due to the invalid measurement of fertility control by assuming that a longer duration of using contraceptive methods is equivalent to higher fertility control. It is reasonable to assume that couples, in all types of societies and all levels of socioeconomic development, are likely to use contraception for child spacing purposes. If this was true for a significantly large proportion of the South Korean sample population, then length of use of contraception would be an inappropriate or invalid measurement of fertility control. Furthermore, people may be more likely to contracept after desired family size is reached.

4.3 Stage 3

In stage 3, Easterlin hypothesizes observed fertility (CEB) to be higher: 1) the shorter the durations of contraceptive usage (DURUSE) and of breast-feeding (DURBFEEED), 2) the longer the duration of marriage (DURMAR), 3) the shorter the first and second birth intervals (FBI, SBI), 4) the lower incidence of secondary sterility (SECSTERL), 5) the lower the rates pregnancy wastage (PREGWAS), and 6) the higher is the child mortality rate (CHLDMORT). Easterlin and Crimmins (1985) reported supporting data from their studies in Sri Lanka and Colombia. In the current research, these propositions were examined by testing the impact of the seven proximate variables and the fertility control variable on observed fertility in South Korea. All of the relationships are in the hypothesized direction; and only the relationship of children ever born (CEB) with breast-feeding (DURBFEEED) is not statistically significant (see table 28). The eight independent variables, duration of contraceptive usage (DURUSE), duration of marriage (DURMAR), first birth interval (FBI), second birth interval (SBI), not secondary sterility (SECSTERL), breast-feeding (DURBFEEED), pregnancy wastage (PREGWAS), and child mortality (CHLDMORT), account for 51 per cent of the variance in observed fertility (CEB), compared with the 31 per cent in Sri Lanka and 51 per cent in Colombia reported by Easterlin and Crimmins. Like Easterlin and Crimmins, the South Korean data show that duration of marriage is the most important predictor and, other things being equal, it accounts for 36 per cent of the variation in

observed fertility. As expected, a positive relationship is found between them, which suggests that the longer a woman has been married (which implies higher risk of exposure to intercourse), the higher is her fertility level. However, contradictory to the common view in the literature (see, for example, Bongaarts 1983), the South Korean data do not suggest that breast-feeding (DURBFEEED) has a significant effect on fertility, as Easterlin and Crimmins also found in Sri Lanka and Colombia. This finding might be caused by an extremely skewed distribution in the length of breast-feeding. In sum, the framework of the third stage provides a simple and straightforward way of seeing the effect of the various proximate determinants on human reproductive behavior; and the data support the applicability of such a framework.

To conclude, the Easterlin model does appear to be an impressive approach to studying fertility differentials. The quantitative analyses of this study offer some tentative explanations of demand, supply and costs of regulation, which are the three major determinants of fertility change in stage 1. Moreover, they support Easterlin's measure of motivation for fertility control as superior to alternative conceptualizations in the literature in stage 2. Finally, the analyses based upon the Easterlin model reported herein explain 51 per cent of the variance in observed fertility in stage 3.

However, as the UN report (United Nations 1985:93) suggests, more work needs to be done to extend the Easterlin model to less restricted samples (e.g. other age groups of women and women with broken marital history) and, more importantly, to improve the linkages between modernization and proximate deter-

minants of fertility. World Fertility Survey data sets for other developing countries which have been undergoing a fertility decline may be able to support future improvement in the Easterlin model.

FOOTNOTES

1. See the Associated Press, "Population Boom Called Disaster--But Not By All," Time-Colonist, Monday, April 18, 1988, p. A9. The rate of growth is estimated from T.W. Merrick's "World Population in Transition," Population Bulletin, Vol. 41. No.2, April 1986, p.2.

2. Generally, the decline in fertility occurred in Western Europe in the late 19th century though some countries, such as Sweden and France, showed earlier indication of fertility decline (cf. Coale and Watkins 1986, Handwerker 1986a).

3. See, for example Ronald Freedman (1986), Henri Leridon (1980), "Overview", in Determinants of Fertility Trends: Theories Re-examined, IUSSP, Leige Belguim, p.304; Carman A. Miro and Joseph E. Potter (1980), Population Policy: Research Priorities in the Developing World London: Frances Pinter, p.94.

4. Easterlin's general theory is commonly referred to as the Easterlin model.

5. Easterlin borrows from Bongaarts' analysis of proximate determinants. Bongaarts (1982) identified seven variables as the "complete set of intermediate fertility variables: 1) proportions married among females, 2) contraceptive use and effectiveness, 3) prevalence of induced abortion, 4) duration of post-partum infecundity, 5) fecundity (or frequency of intercourse), 6) spontaneous intrauterine mortality, 7) prevalence of permanent sterility. Each of these seven intermediate variables directly influences fertility, and together they determine the level of fertility" (Bongaarts 1982:179).

6. A similar research was conducted by the Population Division of the Department of International Economic and Social Affairs of the United Nations

Secretariat in 1985. Besides Sri Lanka and Colombia, the World Fertility Survey data for Costa Rica and Tunisia were also included in their analyses. The empirical results generally replicate Easterlin and Crimmins' findings. The UN study forms a valuable guide to the present paper (see United Nations 1985).

7. Thomas Robert Malthus was an English clergyman and professor. His theory, originating from his 1789 book entitled Essay on Population, states that population tends to increase at a geometric ratio, while the means of subsistence increases at an arithmetic ratio, resulting in an inadequate supply of the goods supporting life, unless a catastrophe occurs to reduce the population or the increase of population is checked by sexual restraint (Weeks 1981).

8. See Van de Walle and Knodel (1967) and Coale and Watkins (1986) for a general description of the study.

9. Total fertility rate is an estimate of the average number of children that would be born to each woman if the current age-specific birth rates remained constant.

10. A self-weighting probability sample is one in which each population element has a known nonzero probability of being chosen and, thus, each sample element has been given equal chance of being selection, (cf. Earl Babbie, The Practice of Social Research, 3rd <ed.>, California: Wadsworth, 1983, p.173).

11. Easterlin explains the rationale of these restrictions:

The choice of those aged 35-44 is partly to control for age and partly to maximize the likelihood that variables such as first and second birth intervals would be observable. The restriction to continuous marriages minimizes conceptual and measurement problems associated with marital disruption. The theory does not encompass the causes of marital disruption, and accurate measurement of variables such as duration of exposure and use of fertility control become much more problematic for women with multiple marriages. Women with premarital births are omitted because of lack of appro-

priate data on duration of exposure and first birth interval. For women with one child, there are, of course, no observations on second birth interval and breast-feeding in the last closed interval; for childless women there are, additionally, no observations on first birth interval (1985:43).

12. To replicate Easterlin and Crimmins' study, the variables they used will be used again. Similar operationalization procedures will be followed.

13. It is realized that "none or traditional" could be categorizing very unlike cases. But the World Fertility Survey core questionnaire did not differentiate between "none" and "traditional."

14. For those who claim that they used contraception before the first birth, a value is assigned which equals the mean first birth interval if the respondents did not regulate until after the first birth (cf. Easterlin and Crimmins 1985:47). This also applies to the length of the second birth interval.

15. According to Easterlin, POTNCHLD - CHLDDESR exercises as a function of the motivation for fertility control (the excess of supply over demand). "They should have the same coefficient. The difference in behavior of two couples differing on POTNCHLD - CHLDDESR by some given magnitude, and in other respects identical, should be unaffected by whether the source of the difference in motivation is POTNCHLD, CHLDDESR, or both" (Easterlin and Crimmins 1985:39).

16. As mentioned earlier, similar results are found in Easterlin and Crimmins' study. The first group in Easterlin and Crimmins' study comprises first and second birth intervals, not secondary sterile, and pregnancy wastage. However, in the present study, breast-feeding is not significant itself in the third stage regression analysis; and the regression with child mortality as the dependent variable

generates an adjusted R square of .035 which could have been included in the second group in Easterlin and Crimmins' findings because the minimum value of R square among their second group dependent variables is .04.

17. The conventional .05 significance level will be used in this analysis. This is because the .05 significance level is generally used in sociological studies and also because Easterlin and Crimmins (1985) used it throughout their study. In the following section of this thesis, wherever the term "significant" is used, it means statistically significant.

18. Separate regression equations, which were not reported in the analysis, were computed to examine the effects of the significant independent variables upon the dependent variables. These equations excluded nonsignificant variables. This also applies to the subsequent regression analyses of stage 1 of the Easterlin model.

19. The result of the bivariate correlation between number of years of wife's schooling and number of induced abortions support this line of reasoning ($r = .24$, $p = .001$).

20. In an unreported analysis, except for duration of marriage and duration of breast-feeding, the differences between the means of the two subgroup populations (regulating and nonregulating) were significant when two-tail t-tests were used.

21. Easterlin selected five aspects of modernization which, he says, influence fertility through demand, supply and costs of regulation: 1) innovations in public health and medical care, 2) innovations in formal schooling, 3) urbanization, 4) the introduction of new goods, and 5) the establishment of a family planning program (Easterlin 1983).

22. This is because over 99 per cent of the regulators and 91 per cent of the nonregulators in South Korea knew at least one method of contraception (see table 11). The skewed distribution of efficient methods known failed to produce significant results.

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Appendix 1 Labels for Variables Used in the Thesis*

AVERTCD (35,36)	POTNCHLD - FAMSIZE, averted Children
BUDDHIST (34)	Buddhist (see RELIGION)
CATHOLIC (34)	Catholic (see RELIGION)
CEB (37)	Children ever born
CENTRAL (34)	Central areas (see REGION)
CHLDDESR (35)	Demand for children
CHEJU (34)	Cheju Do island (see REGION)
CHLDMORT (40)	Child mortality rate
CHLDSURV (35)	1 - CHLDMORT, child survival rate
CONUSER (38)	Ever use of contraception
DURBFEEED (39)	Length of breast-feeding in months
DURUSE (38)	Years since first use of fertility control
DURMAR (38)	Duration of marriage in years
EFFUSE (37)	Efficient methods known
FAMSIZE (36)	Actual family size
FBI (38)	First birth interval in months
HWORK (34)	Husband's work status
HWORKINS (34)	Husband worked inside family (see HWORK)
HWORKNO (34)	Husband never worked (see HWORK)
HWORKOUT (34)	Husband worked outside family (see HWORK)
INEFFUSE (37)	Inefficient methods known only
KNOWABOR (37)	Know where to get abortion
KNOWNOMD (37)	Know no contraceptive methods
METHKNOW (36)	Methods of contraception known
MOTIV (35,35)	POTNCHLD - CHLDDESR, motivation to control
NATFERT (35)	Natural fertility
NORTH (34)	Northern areas (see REGION)
POTNCHLD (35)	Supply of children
PREGWAS (39)	Pregnancy wastage
PROTESTN (34)	Protestant (see RELIGION)
REGION (34)	Regional residence
RELIGION (34)	Religious affiliation
RELOTHER (34)	Other religious beliefs (see RELIGION)
SBI (39)	Second Birth interval in months
SECSTERL (39)	Not secondarily sterile
SOUTH (34)	Southern areas (see REGION)
TRADITON (34)	None or traditional (see RELIGION)
TRAVTIME (37)	Time it takes to the nearest abortion clinic
UNWANTCD (36,35)	FAMSIZE - CHLDDESR, unwanted children
URBRURAL (33)	Urban or rural residence
WANTMORE (36)	Married, fecund, want no more children
WED (33)	Wife's education in years
WWORKBM (34)	Wife's work status before marriage

WWORKINS (34)	Wife worked inside family before marriage
WWORKNO (34)	Wife never worked before marriage (see WWORKBM)
WWORKOUT (34)	Wife worked outside family before marriage (see WWORKBM)

* Parenthetical number refers to the page on which the variable has been operationalized.

Appendix 2 Supplementary Tables

Table 31 Regression of First Birth Interval on Specified Measures of Culture and Modernization

Multiple R	.20075	Analysis of Variance			
R Square	.04030	Regression	DF	Sum of Squares	Mean Square
Adjusted R Square	.03229	Residual	13	29805.45322	2292.72717
Standard Error	21.34372		1558	709754.01927	455.55457
		F =	5.03283	Signif F =	.0000

----- Variables in the Equation -----

Variable	B	SE B	95% Confdnce Intrvl B	Beta	SE Beta	Correl Part Cor	Partial	T	Sig T
BUDDHIST	-6.666832	4.514963	-15.522873 2.189209	-.134095	.090813	-.022322	-.036648	-1.477	.1400
WWORKOUT	-2.514857	1.763908	-5.974739 .945024	-.038051	.026688	-.088125	-.035385	-1.426	.1541
CENTRAL	-6.307706	5.182400	-16.472915 3.857504	-.130194	.106967	.028448	-.030208	-1.217	.2237
CATHOLIC	-4.627091	5.242915	-14.910999 5.656817	-.039540	.044803	-.002326	-.021904	-.883	.3776
PROTESTN	-7.296363	4.765154	-16.643150 2.050425	-.094252	.061554	-.044302	-.038003	-1.531	.1259
WWORKINS	2.565618	1.268650	.077178 5.054057	.054603	.027000	.101196	.050192	2.022	.0433
HWORKINS	-10.959206	7.636818	-25.938724 4.020311	-.252504	.175955	.015394	-.035616	-1.435	.1515
WED	-.843171	.169594	-1.175827 -.510515	-.148338	.029836	-.166446	-.123393	-4.97	.0000
SOUTH	-6.350963	5.153540	-16.459563 3.757637	-.138737	.112579	.053812	-.030586	-1.232	.2180
URBRURAL	-.024057	1.309271	-2.592175 2.544060	-5.534E-04	.000118	.066647	-.000456	-.018	.9853
TRADITON	-6.286521	4.425701	-14.967474 2.394433	-.141528	.093635	.034772	-.035254	-1.420	.1557
NORTH	-7.869165	5.164730	-17.999714 2.261384	-.175246	.115018	-.086645	-.037815	-1.524	.1278
HWORKOUT	-8.530981	7.647591	-23.531629 6.469668	-.196611	.176251	-.022246	-.027686	-1.116	.2648
(Constant)	53.277100	9.722506	34.206532 72.347668					5.480	.0000

(Contd.) Table 32 Regression of Second Birth Interval on Specified Measures of Culture and Modernization

Multiple R	.12799	Analysis of Variance			
R Square	.01638		DF	Sum of Squares	Mean Square
Adjusted R Square	.00817	Regression	13	7366.60385	566.66183
Standard Error	16.85008	Residual	1558	442355.33060	283.92512
		F =	1.99581	Signif F =	.0180

----- Variables in the Equation -----

Variable	B	SE B	95% Confdnce Intrvl B	Beta	SE Beta	Correl Part Cor	Partial	T	Sig T
BUDDHIST	1.951938	3.564396	-5.039577 8.943453	.050347	.091938	-.008828 .013760	.013872	.548	.5840
WWORKOUT	-1.581133	1.392540	-4.312581 1.150315	-.030678	.027019	-.035101 -.028529	-.028754	-1.135	.2564
CENTRAL	.555732	4.091312	-7.469323 8.580788	.014710	.108292	.005668 .003413	.003441	.136	.8920
CATHOLIC	2.624757	4.139086	-5.494006 10.743520	.028763	.045358	.000412 .015934	.016064	.634	.5261
PROTESTN	2.666470	3.761912	-4.712471 10.045412	.044171	.062317	-.000569 .017810	.017955	.709	.4786
WWORKINS	.962485	1.001552	-1.002046 2.927015	.026268	.027335	.040012 .024146	.024339	.961	.3367
HWORKINS	-26.585770	6.028984	-38.411542 -14.759997	-.785514	.178135	-.012948 -.110799	-.111027	-4.410	.0000
WED	-.019297	.133888	-.281917 .243322	-.004354	.030206	-.019009 -.003621	-.003651	-.144	.8854
SOUTH	.751077	4.068528	-7.229287 8.731442	.021040	.113974	.029996 .004638	.004677	.185	.8536
URBRURAL	-.928345	1.033621	-2.955778 1.099088	-.027385	.030491	-.009346 -.022567	-.022748	-.898	.3692
TRADITON	2.387695	3.493926	-4.465596 9.240985	.068933	.100869	.010455 .017171	.017311	.683	.4945
NORTH	-.612377	4.077362	-8.610069 7.385316	-.017489	.116443	-.036253 -.003774	-.003805	-.150	.8806
HWORKOUT	-26.210556	6.037489	-38.053011 -14.368102	-.774638	.178435	-.002751 -.109081	-.109326	-4.341	.0000
(Constant)	57.146636	7.675558	42.091131 72.202141					7.445	.0000

(Contd.) Table 33 Regression of Breast-feeding on Specified Measures of Culture and Modernization

Multiple R	.13565	Analysis of Variance		
R Square	.01840		DF	Sum of Squares
Adjusted R Square	.01021	Regression	13	10884.94199
Standard Error	19.30579	Residual	1558	580687.88434
				Mean Square
				837.30323
				372.71366
		F =	2.24651	Signif F = .0065

----- Variables in the Equation -----

Variable	B	SE B	95% Confdnce Intrvl B	Beta	SE Beta	Correl	Part Cor	Partial	T	Sig T
BUDDHIST	-5.256405	4.083868	-13.266858 2.754047	-.118213	.091843	-.007420	-.032307	-.032591	-1.287	.1982
WWORKOUT	4.067483	1.595487	.937956 7.197010	.068811	.026991	.049017	.063991	.064453	2.549	.0109
CENTRAL	-2.677827	4.687577	-11.872447 6.516793	-.061799	.108181	.011099	-.014339	-.014471	-.571	.5679
CATHOLIC	-3.670810	4.742313	-12.972795 5.631175	-.035073	.045311	.013997	-.019429	-.019607	-.774	.4390
PROTESTN	-3.332046	4.310170	-11.786388 5.122296	-.048126	.062253	.029557	-.019404	-.019582	-.773	.4396
WWORKINS	.264747	1.147517	-1.986092 2.515587	.006300	.027306	.010021	.005791	.005845	.231	.8176
HWORKINS	8.605894	6.907643	-4.943357 22.155144	.221701	.177952	.023313	.031272	.031548	1.246	.2130
WED	-.159886	.153401	-.460760 .141007	-.031451	.030175	-.039106	-.026162	-.026397	-1.042	.2974
SOUTH *	-2.236199	4.661472	-11.379614 6.907217	-.054619	.113857	.008716	-.012041	-.012153	-.480	.6315
URBRURAL	4.280898	1.184260	1.957988 6.603807	.110106	.030460	.093453	.090734	.091199	3.615	.0003
TRADITON	-6.246650	4.003128	-14.098733 1.605433	-.157239	.100766	-.025231	-.039168	-.039503	-1.560	.1189
NORTH	-2.181050	4.671594	-11.344319 6.982219	-.054308	.116323	-.021557	-.011719	-.011827	-.467	.6407
HWORKOUT	9.416241	6.917387	-4.152123 22.984605	.242643	.178251	-.019213	.034168	.034466	1.361	.1736
(Constant)	21.593144	8.794187	4.343463 38.842826						2.455	.0142

(Contd.) Table 34 Regression of Secondarily Sterile on Specified Measures of Culture and Modernization

Multiple R	.14507	Analysis of Variance		
R Square	.02105		DF	Sum of Squares
Adjusted R Square	.01288	Regression	13	5.31349
Standard Error	.39830	Residual	1558	247.16488
				Mean Square
				.40873
				.15864

F = 2.57642 Signif F = .0016

----- Variables in the Equation -----

Variable	B	SE B	95% Confidence Interval B	Beta	SE Beta	Correl Part	Cor	Partial	T	Sig T
BUDDHIST	-.052203	.084255	-.217468 .113061	-.056828	.091719	-.022525	-.015531	-.015695	-.620	.5356
WWORKOUT	-.036392	.032917	-.100958 .028173	-.029801	.026955	-.049352	-.027713	-.027999	-1.106	.2691
CENTRAL	.176582	.096710	-.013113 .366277	.197261	.108035	.076739	.045769	.046209	1.826	.0681
CATHOLIC	.025370	.097839	-.166540 .217280	.011734	.045250	.027893	.006500	.006569	.259	.7954
PROTESTN	-.087168	.088923	-.261590 .087254	-.060942	.062169	-.044544	-.024572	-.024827	-.980	.3271
WWORKINS	.038286	.023675	-.008151 .084723	.044100	.027270	.045708	.040538	.040937	1.617	.1060
HWORKINS	.164285	.142512	-.115251 .443821	.204862	.177712	.031681	.028896	.029193	1.153	.2492
WED	7.75713E-04	.003165	-.005432 .006983	.007386	.030134	-.040466	.006144	.006210	.245	.8064
SOUTH	.099577	.096171	-.089061 .288216	.117730	.113703	-.051776	.025955	.026223	1.035	.3006
URBRURAL	.069172	.024433	.021242 .117096	.086118	.030418	.091457	.070967	.071542	2.831	.0047
TRADITON	-.032217	.082589	-.194214 .129780	-.039255	.100630	.032415	.009778	-.009882	-.390	.6965
NORTH	.149855	.096380	-.039193 .338904	.180620	.116167	-.012509	.038975	.039361	1.555	.1202
HWORKOUT	.186524	.142713	-.093406 .466454	.232657	.178011	-.027253	.032762	.033094	1.307	.1914
(Constant)	.482026	.181434	.126146 .837905						2.657	.0080

(Contd.) Table 35 Regression of Child Mortality on Specified Measures of Culture and Modernization

Multiple R	.20728	Analysis of Variance			
R Square	.04296		DF	Sum of Squares	Mean Square
Adjusted R Square	.03498	Regression	13	1.32230	.10172
Standard Error	.13750	Residual	1558	29.45469	.01891
		F =	5.38023	Signif F =	.0000

----- Variables in the Equation -----

Variable	B	SE B	95% Confdnce Intrvl B	Beta	SE Beta	Correl Part Cor	Partial	T	Sig T
BUDDHIST	-.023066	.029086	-.080117 .033985	-.071917	.090687	-.004924	-.019655	-.020087	-.793 .4279
WWORKOUT	.002280	.011363	-.020009 .024569	.005347	.026651	-.049457	.004973	.005083	.201 .8410
CENTRAL	-.004969	.033385	-.070453 .060516	-.015897	.106819	.061100	-.003689	-.003770	-.149 .8817
CATHOLIC	-.060756	.033775	-.127005 .005494	-.080480	.044740	-.061428	-.044583	-.045526	-1.799 .0722
PROTESTN	-.033114	.030697	-.093327 .027098	-.066309	.061469	-.038117	-.026736	-.027319	-1.079 .2809
WWORKINS	-.006684	.008173	-.022715 .009346	-.022052	.026963	.014997	-.020271	-.020716	-.818 .4135
HWORKINS	.025250	.049197	-.071249 .121748	.090181	.175711	.084584	.012720	.013002	.513 .6079
WED	-.006130	.001093	-.008273 -.003987	-.167164	.029795	-.179566	-.139052	-.140725	-5.610 .0000
SOUTH	-.022608	.033199	-.087728 .042512	-.076557	.112423	-.040365	-.016878	-.017250	-.681 .4960
URBRURAL	.015703	.008434	-8.41262E-04 .032247	.055994	.030076	.121355	.046142	.047114	1.862 .0628
TRADITON	-.026534	.028511	-.082457 .029389	-.092600	.099497	.041732	-.023066	-.023572	-.931 .3522
NORTH	-.002208	.033271	-.067470 .063053	-.007624	.114859	-.017619	-.001645	-.001682	-.066 .9471
HWORKOUT	.023565	.049266	-.073070 .120200	.084188	.176007	-.084275	.011855	.012117	.478 .6325
(Constant)	.126570	.062633	.003717 .249423						2.021 .0435

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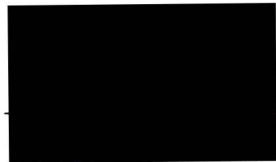
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