Economic Determinants, Consequences and Policy...

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Voluntary sterilization has achieved wide acceptance in countries around the world from men and women seeking to limit family size. It has been adopted by governments in many countries as a means of achieving national population goals. Economic factors are important as determinants and as consequences of voluntary sterilization. Moreover, voluntary sterilization has important policy implications, many of which are primarily economic in nature.

The economics of voluntary sterilization differs in degree and not in kind from the economics of other forms of contraceptive use. The determinants, the consequences and the policy implications of voluntary sterilization are similar to their analogs for other methods of contraception. What this implies is that the economic determinants of the use of voluntary sterilization is basically the economics of fertility control and that the economic consequences which flow from voluntary sterilization are best described as a particular instance of the economic consequences which flow from any form of birth restriction. The use of voluntary sterilization represents a choice, first a choice to limit family size and second a choice to use a particular method of contraception.

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Economic factors are clearly central in the decisions of couples in the reproductive years as to the number and spacing of the children that they want. Children are the source of major financial demands upon the family. There are costs associated with the delivery of the child, costs associated with feeding, maintaining and educating the child through its development, costs associated with related changes in behavior such as withdrawal of the wife from the labor force, etc. The constraints on family resources also play an important role in determining fertility behavior. Economics models of fertility do not explain variations in fertility behavior to the same extent as empirical studies of other aspects of consumer behavior, but in general to the extent that one can judge across the very different methodologies, they do about as well as models developed by other disciplines.

The choice of sterilization over other methods of contraception is often dictated in part by economic considerations. The central economic hypothesis is that couples who want no more children would adopt that method of contraception which would accomplish this goal at the least cost. Basically, there are a number of different costs, some strictly economic, some more social or psychological in nature which affect the decision. The great advantage of sterilization is in its once and for all application, its long life and its relatively low annual cost when the costs are spread out over a large number of years. The factors which weigh against it are its relatively high cost in the initial period, and the psychological costs which some persons may experience in undertaking such an operation.

Voluntary sterilization has important consequences both for the adopting couple and for the wider society. The exact consequences
depend upon the circumstances of the couples who offer themselves for sterilization and the general circumstances prevailing in the society at the time. The principle immediate effect of sterilization is to reduce fertility. The reduced fertility induces a series of changes in work habits, consumption, investment, government welfare expenditures and other economic areas of choice. As in the case of the determinants, it is important to note that the primary consequences of sterilization represent a class of behavioral changes which may result from almost any form of contraceptive behavior which results in effectively lower fertility. It is important to distinguish the consequences of these fertility decisions as they take place in industrialized countries from those taking place in the less developed countries.

The economic framework for the examination of policy alternatives can play a useful role in the search for answers to questions about the role of sterilization in family planning programs. What are the costs of government sponsored voluntary sterilization programs? What are the potential benefits? To whom would the benefits accrue? The economic evaluation of policy alternatives involves a specification of the general objectives of policy and of the way that activities promoting sterilization would affect those objectives. Central to the process is the need to define the "response function," i.e. the quantitative effect of varying amounts of inputs into a particular program.
ECONOMIC DETERMINANTS, CONSEQUENCES
AND
POLICY IMPLICATIONS OF VOLUNTARY STERILIZATION

Voluntary sterilization has achieved wide acceptance in countries around the world from men and women seeking to limit family size. It has been adopted by governments in many countries as a means of achieving national population goals. Economic factors are important as determinants and as consequences of voluntary sterilization. Moreover, voluntary sterilization has important policy implications, many of which are primarily economic in nature. In the following pages we will discuss some of the economic determinants, consequences and policy implications of voluntary sterilization. Under each heading the general theoretical background, suggested hypotheses, and past research will be indicated. It is important to preface the following remarks with the observation that the economics of voluntary sterilization differs in degree and not in kind from the economics of other forms of contraceptive use. The determinants, the consequences and the policy implications of voluntary sterilization are similar to their analogs for other methods of contraception. What this implies is that the economic determinants of the use of voluntary sterilization is basically the economics of fertility control and that the economic consequences which flow from voluntary sterilization are best described as a particular instance of the economic consequences which flow from any form of birth restriction. Thus the discussion
takes as a point of departure very broad literature and attempts to focus this literature on the particular problem of voluntary sterilization.

I. The Economic Determinants of Voluntary Sterilization

Microeconomic theory provides a framework for the study of choice. It is postulated that the individual (and by extension, the family unit) possesses a set of tastes (the origin of which is not part of the study) which permit the ranking of all alternative states of the world. Those states which are highly preferred are said to provide high "utility;" low utility is attached to those states which are given low preference. The individual is constrained from achieving any state he prefers by scarcity. Thus the best he can do is to seek the highest level of utility consistent with a given set of prices and the income and time which are available to the family. Thus, economic theory predicts that the individual will choose the highest level of utility consistent with his budget constraint. The use of voluntary sterilization represents a choice, first a choice to limit family size and second a choice to use a particular method of contraception as opposed to other methods. Let us examine each of these choices in turn.

Economic factors are clearly central in the decisions of couples in reproductive years as to the number and spacing of the children that they want. When questioned as to the reasons for limiting family size, a consistent answer from parents in many countries is that it is economic factors which compel them to restrict the number of children which they have. Children are the source of major financial demands upon the family. There are costs associated with the delivery of the child, costs associated with feeding, maintaining and educating the child through its development, costs associated with related changes in behavior such as withdrawal.
of the wife from the labor force, etc. There have been a number of studies of the costs of raising children,\(^1\) and the conclusions are generally that it costs a great deal. To take an extreme example, the Commission on Population and the American Future estimated that it costs on the order of $60,000 to raise the first child to maturity.\(^2\) The cost of raising later children is, of course, less, but it is still high. The constraints on family resources also play an important role in determining fertility behavior. There is extensive literature on the economics of fertility. Gary Becker, in his original article on the subject (Becker, 1960), hypothesized that, contrary to popular opinion, with proper controls there should be a positive relationship between income and the number of children chosen by a family. Later writers and critics have suggested alternative formulations and extensions. Much of the literature is concerned with the appropriate definition of the costs and the income constraints relevant to family size decisions. The April 1973 supplement to the Journal of Political Economy contains an extensive bibliography and a description of the current state of the art. (Schultz, 1973). Most of the articles in this volume, and most notably the introductory article by Willis (Willis, 1973), take as their point of departure an economic model of the consumption of consumer durables. Children are considered to have many of the properties of durables in

\(^1\)The methodologies involved in these estimations are reviewed in T. J. Espenshade.

\(^2\)This estimate takes into account the loss of wages from the wife; it is not an estimate out of pocket expenses. (U.S. Commission on Population Growth and the American Future, 1972)
that they cost money but yield utility over long periods of time. Families are assumed to maximize their total utility from children and all other sources subject to economic and biological constraints. This literature has a considerable fascination in that it introduces to the area of study of demographic behavior a level of rigor which was hitherto lacking. Unfortunately, empirical studies based on the economic modeling has not been particularly successful. These models do not explain variations in fertility behavior to the same extent as empirical studies of other aspects of consumer behavior, but in general, to the extent that one can judge across the very different methodologies, they do about as well as models developed by other disciplines.

There are many problems associated with the literature on the economics of fertility. One problem, clearly defined in the literature, relates to the quality-quantity choice facing parents. Parents can spend the same total amount of money on children by having lots of children with relatively small expenditures per child or by having few children with relatively large expenditures per child. This additional dimension of choice makes it difficult to predict either the quantity or the quality of children that will be chosen by a particular family. A more fundamental problem arises from the fact that the economic models assume consumer tastes to be fixed and do not allow for learning as an integral process of family formation. For normal consumer choices, this formulation may be appropriate, but for choices involving as long a time period as the years between marriage and menopause, this specification of the problem is highly restrictive. A second part of the problem, at least in empirical applications of the models, is the fact that the point of observation when a survey is done often is associated with a quite
different set of constraints than might have been experienced by the parents during the actual years when most of their children were born. Thus, it may be inappropriate to combine retrospective fertility information from an interview with a forty year old woman with current information concerning income or the general economic situation of the family, since the woman may have experienced a quite different set of economic circumstances when she was 25 or 30. What these problems suggest is that the economics of fertility will be considerably strengthened if it can resort to longitudinal studies. The research may also be strengthened through more use of data concerning expectations and perceptions rather than resort to the hard economic data of the more traditional variety. In fact, the general use of inter-disciplinary data may be the greatest area of debate among economic scholars who work in the area. On the one hand there is a group who are concerned with a straightforward application of economic models of fertility (T. W. Schultz, 1973). On the other hand, there is a second group, much more diffused and less well organized, that is more concerned with the integration of different social science approaches to the study of fertility (E. Mueller, 1972; R. Easterlin, 1969; N. K. Namboodiri, 1972; Turchi, 1973; Fred S. Arnold and James T. Fawcett, 1973; R. Anker, 1973). The differences in approach will only be resolved through more theoretical and empirical work. The implications for the study of voluntary sterilization are clear. People who want no more children are likely to consider voluntary sterilization as a method. Economic factors play a major role in determining at what parity and what life stage people are likely to make such a choice. Thus, economic factors may be central to determining the time and age at which people elect voluntary sterilization.
One policy implication of the economic models of fertility is important for the developing countries. If economic factors are indeed important for fertility decisions, then it may be possible to encourage the use of contraception through changes made in the economic environment or through the use of incentives for couples who volunteer for the use of sterilization or other methods of contraception. Such incentives have been associated with government programs of voluntary sterilization in India and Pakistan. There is no agreement on their impact, but certainly the use of incentives is a subject that presents interesting opportunities for research.

The choice of sterilization over other methods of contraception is often dictated in part by economic considerations. The basic economic theory in this area is the idea that rational decision makers will attempt to minimize the cost of achieving any particular end. In this case the end is the prevention of further pregnancies, and the economic hypothesis is that couples who want no more children would adopt that method of contraception which would accomplish this goal at the least cost. The central issue is that definition of cost. There are, of course, other considerations which are at least as important, if not more important. Any couple willing to use voluntary sterilization for

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3 For one description of the way incentives may affect individual decisions see Simmons, 1971, Chapter VI.

4 The incentives literature is vast. For a review of the literature by non-economists see Pohlman 1971 or Rogers 1973.
contraceptive purposes must be content with the number of children which it has. Sterilization cannot be used for spacing. For that subset of couples which are eligible to use sterilization as a method of contraception, the economics of the choice may be an important consideration.

Basically, there are a number of different costs some strictly economic, some more social or psychological in nature which affect the decision (George B. Simmons, 1973). The great advantage of sterilization is in its once and for all application, its long life and its relatively low annual cost when the costs are spread out over a large number of years. The factors which weigh against it are its relatively high cost in the initial period, and the psychological costs which some persons may experience in undertaking such an operation. It is difficult to know on balance how these costs come out against one another. The following table gives some estimates of what the costs may be in the United States and India for Sterilization. The costs presented in the table do not take account of the costs of recruiting cases in an active program of family planning.

The numbers contained in the table are highly tentative. One of the areas with great research potential would be the investigation of the costs of different types of contraception and a further investigation of the role played by choice in determining the choices of contraceptors.
<table>
<thead>
<tr>
<th>Contraceptive Method</th>
<th>Pregnancy</th>
<th>Convenience</th>
<th>Direct Costs India</th>
<th>Direct Costs U.S.</th>
<th>Direct Costs for Five Years Protection U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vasectomy</td>
<td>Very Low</td>
<td>Fear but once &amp; for all</td>
<td>Rs. 20–30</td>
<td>$75–$150</td>
<td>$75–$150</td>
</tr>
<tr>
<td>Tubal Ligation</td>
<td>Very Low</td>
<td>Fear but once &amp; for all</td>
<td>Rs. 60–80</td>
<td>$150–$500</td>
<td>$150–$500</td>
</tr>
<tr>
<td>Oral Contraceptives</td>
<td>Low</td>
<td>Side Effects, Continuing Use</td>
<td>Rs. 35/yr.</td>
<td>$25–$40/yr.</td>
<td>$125–$200</td>
</tr>
<tr>
<td>I.U.D.</td>
<td>Low</td>
<td>Side Effects, Infrequent Application</td>
<td>Rs. 10</td>
<td>$20 per insertion</td>
<td>$70*</td>
</tr>
<tr>
<td>Conventionals</td>
<td>Moderate</td>
<td>Inconvenient</td>
<td>Rs. 10–20 year</td>
<td>$25–$35</td>
<td>$125–$175</td>
</tr>
</tbody>
</table>

*Two insertions plus three check-ups.

**Source:** Most of the estimates given are derived from discussions with colleagues at the Department of Population Planning at The University of Michigan. Professors J. Eliot, J. Y. Peng and Peter King were particularly helpful.
II. The Economic Consequences of Voluntary Sterilization

Voluntary Sterilization has important consequences both for the adopting couple and for the wider society. The exact consequences depend upon the circumstances of the couples who offer themselves for sterilization and the general circumstances prevailing in the society at the time. The principle immediate effect of sterilization is to reduce fertility. The amount of fertility reduction depends upon the age of the parents, the alternative fertility they would have experienced and a number of other factors. The reduced fertility induces a series of changes in work habits, consumption, investment, government welfare expenditures and other economic areas of choice. As in the case of the determinants, it is important to note that the primary consequences of sterilization represent a class of behavioral changes which may result from almost any form of contraceptive behavior which results in effectively lower fertility. There is an extensive literature on the economic consequences of fertility decisions. It is important to distinguish the consequences of these fertility decisions as they take place in industrialized countries from those taking place in the less developed countries. The latter has received considerably more attention in the recent literature.

\[5\] It would be impossible to list all relevant sources in this area. For LDC's a list of basic references can be found in Gavin W. Jones, 1971. See also the papers contained in National Academy of Sciences, 1971.
The economic consequences of reduced fertility in developed countries, such as the United States, has been described in Population and the American Future (U.S. Commission on Population and the American Future, Report, 1972 and Research Reports, 1972; Spengler, 1971) and in more detail some of the background papers for that report. Traditionally there has been some concern that a reduced rate of population growth would lead to a lower level of aggregate demand and therefore to adverse consequences for the country as a whole. This effect has been considered unlikely by most modern scholars. Recent developments have lead to improved methods of controlling economic fluctuations, methods which should permit the avoidance of such untoward consequences of changing rates of population growth. The other important impact of population growth in the developed countries is on the size of the labor force. The initial impact of lower fertility is to engage more women in the labor force who would otherwise have remained at home engaging in child care. Over the longer run, the impact of higher population growth is a more rapid rate of growth of the labor force itself. Thus in labor scarce economies the positive aspect of population growth may be to induce a larger labor supply for economic development. Whether such development is considered desirable or not depends upon the specification of policy objectives and is more properly treated under the label of policy.

In the less developed countries, the impact of population growth is more complicated and perhaps less understood because our knowledge of economic relations in the developing world is still relatively incomplete. In most LDC's, the labor supply is already sufficiently large that more labor is not an immediate need. There are some indications,
moreover, that the impact of population growth on savings may be adverse and that rapid population growth may be to a redirection of funds away from productive uses by government towards less productive welfare and social services expenditures. Thus the ultimate effect may be to reduce the capacity of the economy to grow. The immediate implication is that the high rate of population growth will lead to a somewhat lower level of per capita income than would have been attained otherwise. This short summary of the economic consequences of reduced fertility does little justice to the rich literature which exists in the area. There are many issues which are still unresolved, but as most of them relate to wider questions than sterilization per se, they will not be pursued in this paper. It need only be said that reduced rates of population growth have major beneficial implications for the developing countries, and that their impact on developed countries is not as harmful as has often been suggested.

In both the developed and less developed countries there is a set of more subtle and indirect effects that should be mentioned. As indicated in Population and the American Future, in the United States and presumably in other developed countries population growth has serious effects on political institutions, social structure, education, the environment, and other conditions which affect the lives of the entire population. Inevitably it must be true that these effects will have indirect implications for demographic and economic behavior. The implications for economic growth and for alternative patterns of economic activity are not entirely clear, but it would be unwise to suggest that we have a full understanding of all the economic implications of different rates of population growth. The influence
of population growth is subtle, pervasive, and long term. Economists are not well adapted to examining relationships of this nature. These remarks might also be applied to the effects of population growth in the developing countries. It is known with certainty that rapid population growth affects the form and development of social and economic institutions in those countries. The size of a family living together at any given time and the rapidity with which land gets subdivided are demographically determined conditions with important economic implications. Moreover, there are important ecological effects associated with population growth in many of the less developed regions. The recent famines in central Africa are illustrative of this kind of effect. Little is thus far known about the exact dynamics of these relationships. Thus, while the earlier paragraphs on the general literature in this area may give an impression of a fairly complete state of knowledge, there remain many questions which need further investigation. Voluntary sterilization, to the extent that it has demographic effects, is a potentially important influence on all of these economic consequences of fertility patterns.

III. The Policy Implications of Voluntary Sterilization

The central question of policy is whether voluntary sterilization has a role to play in a publically sponsored population program. If the answer to this question is in the affirmative, the next issue is the role that sterilization can play. The economic framework for the examination of policy alternatives is an important tool in the search for answers to these questions. What are the costs of government sponsored voluntary sterilization programs? What are the potential benefits? To whom would the benefits accrue?
The economic implications of government provision of facilities for voluntary sterilization can be evaluated in the same manner that we evaluate other government programs. While voluntary sterilization is not solely or primarily part of economic policy, to the extent that policies involving voluntary sterilization set in train a series of events with important economic implications, the initial policies concerning voluntary sterilization may be, and indeed should be, evaluated in terms of their economic implications. The evaluation of economic policies is a complex process. There are three major steps involved. The first involves specification of the objectives which a given set of activities (i.e. projects or programs) are intended to promote. The second involves a specification of the relationship between the suggested activities and those policy objectives. The third involves the choice of the optimum set of activities from among all the potential policy measures which might be undertaken. These various steps have been treated in great detail in a wide-ranging literature. In sum, the use of voluntary sterilization as a means of furthering economic policy can be broken into an analysis of the benefits and of the costs of this policy. On the benefit side voluntary sterilization leads to a reduction in the level of fertility which in

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6 The literature on the economics of population policy was recently reviewed in Simmons, Public Expenditure Analysis, 1973. See also Simmons, 1971; Ohlin, 1961; Zaidan, 1971; Enke, 1960; Leibenstein, 1969; Robinson and Horlacher, 1971.)
turn has favorable implications for a number of widely accepted economic objectives, such as the increase in the standard of living and maximization of employment opportunities for the population. On the cost side, programs of voluntary sterilization involve the use of scarce medical manpower and other resources which have important alternative uses. Almost all estimates in this area indicate that the costs of such programs are considerably less than the benefits, particularly in the less developed countries. To some extent one's judgement on this matter hinges on the definition of external effects, that is the extent to which the consequences of fertility are felt beyond the family.

The policy maker is also faced with the difficult choice concerning the scale of his activities. He must distinguish between the average benefit and the average cost and the marginal benefit and the marginal cost in assessing the value of expenditures on programs for voluntary sterilization. The marginal benefit depends to a very large extent on the nature of what may be called the "response function" of the population which/intended primary beneficiary of an active program of voluntary sterilization. Even if there is great justification for providing a given level of services, it is possible that there would not be sufficient additional demand to justify additional expenditures. This situation may be approximated by the level of family planning activities in support of voluntary sterilization under the present organization in India. The evidence of the last few years would seem to indicate that there is little marginal benefit to be gained from additional expenditures in the conventional family planning structure. Of course there might be large benefits to be gained by structural changes such as the recent resort to large scale vasectomy camps.
The "response function" is clearly related to the topics discussed in the first section of this paper. It attempts to isolate changes in the use of sterilization that result when the level of inputs to a public program increases, holding other factors constant. It is hard to overemphasize the importance of the response function for policy. The responsiveness of the population determines the cost of running a program of voluntary sterilization. If a large number of people are volunteering for this form of contraception, the program can be run relatively cheaply, but if people are reluctant to volunteer, voluntary sterilization and especially an active program of recruitment for voluntary sterilization may be one of the more expensive elements in a family planning program. The response function itself is partly determined by the way in which sterilization is offered. In many parts of the world people are afraid of sterilization. They confuse it with castration or they are afraid of medical complications. The problem may have important research implications.

It should also be noted in examining the costs and the benefits of programs of voluntary sterilization that the contraceptive alternatives to sterilization must be considered as a part of the analysis. It may be cheaper and easier to achieve the same demographic effect using a different emphasis than it is through the use of voluntary sterilization. Ideally the objective of an active population policy is to maximize the total social gain as measured by the difference between the total benefits generated and the total costs. In practical terms what this probably means is to maximize the impact of the population policy on the birth rate. That main impact may be achieved through the use of any one of a number of contraceptive strategies or through the use of
some mixture of different kinds of contraceptives. Each of these choices, of course, involves costs and may involve, in fact, some contradiction. When a couple uses an IUD, it is unlikely to simultaneously resort to sterilization. Thus an overall analysis of the policy implications of a program which encourages voluntary sterilization would involve an examination of some of the alternatives.

IV. Research Needs in the Area of Voluntary Sterilization

1. There is scope for increased theoretical and empirical investigation concerning the effects of economic variables on family

2. Further work should be done on the costs of sterilization in systems where it is used as part of a publically sponsored program of fertility control.

3. It would be important to begin to define the determinants of what we have labeled the response function in the earlier discussion. The further definition of this behavioral function would of necessity involve field studies concerning both the administrative and social contexts in which voluntary sterilization is offered and the other patterns of behavior which determine the individual's decision to use the method. The issues involved are not exclusively economic; in fact, medical, administrative and psychological research will be necessary before we can fully respond to the economic questions.
4. We need to know more about the general consequences of demographic behavior. How does economic growth or other forms of economic change result from changes in demographic behavior. This question is, of course, not specific to sterilization, nonetheless, it is important that efforts be made to extend such work in order to understand better the role that can be played by voluntary sterilization.

5. There should be more research on incentives.

We have not in this review been able to make reference to a wide range of economic research directly relating to the use of surgical sterilization. The bibliography presented by H. Presser (H. Presser, 1970) contains almost no references to materials prepared by economists. This result is in large measure a reflection of the fact that most of the economic issues relevant to sterilization apply in varying degrees to the use of all methods of contraception. On the wider set of issues the economic literature is more complete, in fact the literature is so extensive that we have only made reference to some of the key bibliographic studies available. Perhaps this is a measure of the relatively recent entry of economics into the area of demographic research, but thus far surgical sterilization has been treated by economists as a particular example of the wider classes of human behavior designated as
BIBLIOGRAPHY


