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ISSUES IN THE ECONOMICS OF A POPULATION POLICY
FOR THE UNITED STATES

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Economists approach the question of determining the optimum quantity of the production of a good by examining how the good's social benefits--the sum of all individual benefits--compare with its social costs.[1] Policies directed toward change in the amounts of production are of course examined in terms of the marginal changes in benefits and costs. So it should be with people, or, more specifically, with children. It is easy to state, but difficult to implement, the requirements for an optimal population policy. First, all restrictions on the use of existing family planning methods should be removed to permit the exercise of rationality and free choices by parents. Second, parents should be responsible for the total costs (external as well as private costs) of children they bear, although the costs could sometimes be reduced by means of child-related subsidies directed toward correcting for distributional inequities. The second point is beset by contradictions that arise when distributional transfers, which contain implicit price distortions, are overlaid on an undistorted price structure which marginally equates total costs and benefits (aside from distributional benefits).

The problem of achieving distributional equity is, moreover, only one of the conceptual and empirical problems which a benefit-cost approach to population policy encounters. As in every important application of this approach, the analyst must cope with faulty prices, measuring externalities, evaluating goods over time, assessing the probabilities of misestimation of the effects of the applied policies, and with weighting intruding value judgments. These problems may prove insuperable in applying economic analysis to the question of determining the optimum production of people. We will not know until we have tried, and it would be an unhappy commentary on

economics if the most important, the most time-consuming, and the most costly good produced by households was beyond our ability to analyze in terms of social welfare.

Several assumptions underlie my economic analysis of population policy. It is assumed that human choices are involved in the determination of population size and that economic variables--prices and incomes--affect the choices. I rely on the conventional assumption of rationality in household decision making. This does not assume that markets--economic or political--are organized in such a way as to transform household decisions to socially optimal results. The rationality assumption here simply means that responses are made to price changes for purposes of improving one's utility (or one's family's utility). Money per capita income--even corrected for pollution--should not, however, be the sole measure of utility. In the model of household decision making presented below, children are viewed as a good yielding utility or psychic income to the parents--a view expressed to economists most cogently by Becker [2] and to demographers and sociologists in lucid terms by Ryder [19]. (There may be a need to reach an audience of biologists.) The social optimum in population size should allow for this psychic income. It is important to point out, however, that this view of children is consistent with the assumption that the utility function of a parent includes as arguments the welfare of his children, both during the parent's life and whenever the children are acting as adult decision makers. In this regard children differ from other goods. I do not assume altruism regarding nonfamily members in the utility function of parents.

Let me now specify some of the demographic assumptions which provide the context for the analysis. These assumptions are not intended as

predictions, but they do delimit empirical boundaries within which I intend the analysis to be relevant.

Demographic Background

1. Population growth in advanced economies like the United States depends primarily on fertility. Mortality is of negligible consequence. Migration, which in recent years has contributed from about 10 to 20 percent of the annual growth in population in the United States, is relatively easy to control by governmental policy. The search for a population policy is, then, mainly a search for a fertility policy.[2]

2. The concept of optimality of population size must eventually provide for a rate of population growth that averages out to zero. Humanitarian considerations dictate that this be achieved by a lower birth rate. But the statement that zero population growth (ZPG) is an eventual logical necessity (in a closed economy), is less important to this paper than is the empirical judgment (backed up, I admit, by no evidence) that negative externalities of congestion are likely to be felt as the population grows and, in particular, if the population of the United States were to double or quadruple in size over the next 100 years (see point 5 below).

3. Population growth is, fortunately, a gradual phenomenon and is in fact subject to reversal. For this reason an assessment and evaluation can be made by each generation of the prospect for congestion and other costs associated with population growth. The metaphor of a bomb does not seem apt, and we should feel less constrained (although not unconstrained) in our customary uses of marginal analysis than we might if explosive discontinuities were present.

4. Although a zero rate of population growth is the only equilibrium rate that can be sustained, no cohort of American women ever had as few as 2.11 children per completed family, which is currently required for ZPG.[3] The lowest number in our history, 2.27, was experienced by the women who were born in the period of 1906-1910, and who reached the ages of peak childbearing in the Depression. The highest in this century is a projected 3.36 for women born in 1926-30 [21]. While it is true that the annual birth rates of the past few years are almost as low as they were during the 1930's, these rates obviously do not measure completed cohort fertility, and we will not know the latter for at least fifteen years.

The alarm sounded by Davis [9] and Blake [4] in papers containing empirical evidence is that Americans desire more than three children per family. In an important paper which moderates this alarm, Bumpass and Westoff argue, on the basis of improved techniques for determining wanted and unwanted children, that the desired number of children per family is about 2.5 [7]. A remarkable, even shocking, finding they report is that about 20 percent of all births and 40 percent of births among poor families were "unwanted." If all births were limited to just the "wanted" births and in this sense "perfect contraception" were realized, then the current desires of American women would lead to a birth rate close to that required for ZPG.

The attainment of birth control close to that represented by "perfect contraception" is not unrealistic considering the rapid pace of developments in contraceptive technology, although some type of abortion would have to be both legalized and accepted by women who were unsuccessful contraceptors. Nevertheless, it is risky to rely on this one study to conclude that the sum of individual choices matches the social requirements--even assuming that a move to

ZPG is now optimal.[4] Aside from the admitted fact that "perfect contraception" is yet only an ideal, some allowance should be made for corresponding medical advances which will reduce sterility or subfecundity. Also, since the reference period of the survey on which the Bumpass-Westoff paper is based was 1960-65, it is likely that the sluggish economy of that period may have led to a slight overstatement of unwanted fertility relative to more prosperous periods. Finally, I will argue below that the projected increase in per capita income in the United States will stimulate a larger number of desired children. These pro-natal qualifications are probably minor, however, and the implication of the Bumpass-Westoff study, combined with the direct evidence of lower birth rates in recent years, strengthens the point that the United States population is not exploding. This does not mean that a lower rate of growth would not be optimal.

5. Completed cohort fertility of 2.45 to 3.11 children implies that the United States population will reach 308 million to 408 million in 50 years and increase from 412 million to 839 million in 100 years, not allowing for increases due to immigration or reduced mortality.[5] These latter population figures imply that population density, which is now 110 persons per square kilometer of habitable land, will rise in 100 years to 223 and 455 respectively.[6]

Social Costs of Population Growth

Increases in density may entail a negative externality from population growth, but the severity of this is probably exaggerated because of the confusion between density generally and distributional congestion. The particular problem of congestion in the major urban areas is surely attributable to a sub-optimal distribution of people (rather than the numbers)

and inefficiencies in the various patterns of land utilization, transportation modes, and other institutional arrangements--all susceptible to specific remedies which should be taken care of even if population ceases to grow. Curtailing population growth in the near future is neither necessary nor sufficient to cope with urban congestion.

Congestion costs of additional people may be defined as the amount which all others in society would have to pay to be just as well off as they were before the newcomers arrived. Given a correction in the inefficiencies of the current distribution of people, would population growth in the near future involve congestion costs? The answer depends, obviously, on how costly it is to modify the existing residences or to settle in new residences. If density increases to the point when many new residential settlements in, say, North Dakota, become economically optimal, we may be sure that the external costs in established residences have become substantial. My own view is that current preferences of people combined with the income advantages available in large urban areas imply continued urban concentration. Under these conditions an increase of 100 to 200 million people in the United States in 50 years would appear to involve some negative externalities.

The congestion problem of population has been even more highly exaggerated with respect to the pollution problem. The technological sources of pollution--the fuels, phosphates, mercury, insecticides, and so on--are perfectly apparent and each has a number of specific remedies. Policies to reduce the number of people is a gross and ineffective method of combating pollution.

The implicit judgment being made is that a given dollar amount of population control--i.e., that amount which is equivalent to what is sacrificed

by having one less child--yields far smaller benefits in reduced pollution (or urban congestion) than will that same dollar amount if it is spent on specific pollution control. It is in this policy-oriented sense that I regard population size as a relatively unimportant source of the problems of urban density and pollution. The benefit-cost calculations admittedly cannot be defended adequately in the absence of an economic model of fertility and empirical evidence. These issues are discussed below.

6. Let me mention briefly (and quickly dismiss) one additional red herring in discussions of population growth. In his book, The Population Bomb, Ehrlich [13] argues that the most serious threat to the survival of civilization stems from the population growth of industrialized nations, notably the United States. His argument, which is made by many others, is that the voracious appetite for consumption of the world's well-off peoples, combined with their increasing numbers, will lead to the depletion of resources to an extent that will impoverish mankind. The production side of the ledger is simply ignored or misunderstood. For if production by a person (or a family) covers his consumption, where is the source of impoverishment? The answer may be that there is none, or it may be that the economic system is giving us false information about what constitutes consumption and production. In response to this issue Nordhaus and Tobin have recently calculated a welfare measure of national production, and they find that the conventional measure of GNP is more likely to be understating the trends in per capita welfare [17].

There is widespread criticism of the "ethic of consumption," but there appears also to be a pervasive lack of understanding of what production is: namely a means of transforming resources from one form to another and

enhancing the value of the resources in the process. How we measure value is what economics is all about. Admittedly, however, what we do with our increased production depends on our preferences or values, which fundamentally is what economics takes as given. Nevertheless, it seems premature to conclude that we cannot be trusted to use the proceeds of economic growth in production to buy such goods as cleaner air and an end to poverty; yet it is precisely this lack of faith in reason and judgment that underlies the call for a slowdown in growth.

Economic Analysis at the Micro-Level

In the older literature on optimum population size (see [15]) and in much of the contemporary discussion about population in underdeveloped economies, the target variable is per capita income and the framework of analysis is an aggregative macro-economic model. Population is a denominator, national income a numerator, and there is attention to the effect of population growth on income, to the ratio of the labor force to population, to aggregate savings, and other macro-economic variables.

Two objections may be raised to employing this approach to the question of optimum population size in a developed economy like that of the United States. A substantive objection is that insufficient recognition is given to the value of children as consumer goods--a label which is intended to imply simply that parents usually choose to have children and that they get pleasure from children. A second and methodological point is that a micro-economic model of the household is preferable to the macro-approach because decisions about fertility are made at the micro-level. The two points are related: better predictions about fertility behavior would result from a

focus on married couples as a household unit and this focus should allow for the fact that parents are willing to give up other goods to obtain children. From the standpoint of normative economics, the micro-approach is useful because we often want to measure social welfare by summing the welfare of individuals.

An economic model of fertility decisions by households is basically a model of demand for consumer durables. Married couples are assumed to make decisions which aim at maximizing their collective welfare. Children yield utility to parents in the form of psychic income over a span of many years. The household's demand for children is a function of the income of the household, its tastes, the price of children, prices of complementary and substitutable goods, and the prevailing institutional or cultural environment.[7]

Prices. The costs of children to the parents consist of the goods and time forgone when bearing and raising children. The "direct" price is mainly contained in the prices of goods and services that are complementary with children: obstetrical services, subsequent medical services, food, housing, education, and so on. The Institute of Life Insurance [25] has recently estimated the direct costs of a child up to age 18 in a four-person family earning $9,000 annually. By my calculations, the present value of these costs at time of birth is about $13,300, using an 8 percent rate of discount.[8]

The indirect costs consist of the time parents spend on children. Although a careful distinction should be made between leisure time devoted to children and work time given to them, even conservative estimates of the work component show that the indirect costs are higher than the direct costs, as I will indicate below. To simplify the presentation of the economic model of fertility, let us assume that the work time involved in bringing up children

is entirely borne by the mother. She sacrifices time which could otherwise be spent in market work or leisure. The marginal value of this time may be represented by the wage available to her in the market.

I have estimated the marginal decision to have a first child entails a loss of market earnings which amount to a present value at birth of about $11,500.[9] In addition there is time spent in homework which I have assumed to require 14 hours per week for a child up to age three, 10 hours between the ages of three and six, and 5 hours of homework thereafter up to age fourteen. By evaluating this time at three-fourths the going market wage (to allow for the possibility that discontinuities, corner solutions, imperfections, and the like might keep the imputed home wage below the prevailing market wage), about $6,100 is added to the present value of the indirect costs.

The total costs to the parents of a child, including the dominant component of time forgone, is around $31,000. Two points may be made. One is that the willingness to assume these costs by parents offers convincing evidence for the proposition that children provide them with a great deal of utility. The second point is that there are a number of prices included in the overall price of a child, and each component price is potentially changeable by means of a wide variety of policy actions.

Some knowledge about the magnitude of the effects on fertility of changing these prices is, of course, crucial to wise policy decisions, and I will return to this issue later. Suffice to say at this point that the single most important price associated with children appears to be the price of the mother's time. An increase in wage rates, fringe benefits, or some other form of the remuneration of work for women can raise the price of children substantially

and would be potentially an important anti-natalist policy. If, however, free day care were provided, the price effect of children on the mother's time falls to near zero. Not only would the effect of market work options be nullified by free day care, but also the costs of time in the homework component of child care would be drastically reduced. If the price of children has any significant effect on demand, free day care ought to be strongly pro-natalist.

Income. The demand for children, viewed as a consumer durable, would be presumed to be positively related to income, except for the unlikely case in which children were an inferior good. Several qualifications should be added, but none of them is likely to lead to a reversal of the proposition that the net effect of income is positive.

First, as Becker noted, income affects expenditures per child--the qualitative dimension of the commodity purchase--to a great extent than it affects the number of children. The interrelations between tastes, the price structure, and income would, however, have to be very peculiar if the quantitative dimension of the commodity purchase were to be unrelated or negatively related to income, properly defined.

Closely related is the question of whether the income and tastes of parents interact in such a way that preferences are geared to the relative income position of the parents. Perhaps a given amount of quality per child is perceived to diminish as income increases, so some of the rise in income is needed to maintain a relative standing of the child's quality.[10] A relative income hypothesis may apply (see [12] and [14]), in which case the aggregative, positive income effect on the quantity of children would be expected to be smaller (and the effect on the quality of children greater) than what would be observed, say, in a cross-section of individual households.

Third, the effect of income on the demand for children should be measured net of any embodied price effects. Income transfer payments that depend on family size, like family allowance payments, carry price effects in an obvious way. Also, as already noted, price effects are included in those income changes that result from changes in wage rates--especially of wives, and such price effects would be expected to be negatively related to time-intensive commodities like children. In the United States we may presume that wage rates of husbands and of children are negligible influences on the price of children the former because they contribute little to homework and the latter because earnings are an insubstantial part of the lifetime income of parents.

I conclude that the effect of income on the quantity of children demanded is positive but probably small. The implication is that any increase in population and depletion of resources which lowers per capita income in time period $\underline{t}$ will reduce fertility rates in time period $\underline{t} + 1$, assuming free choice by parents. On the other hand, if per capita income continues to increase, as most of us expect, then fertility will rise, ceteris paribus. (But note that the female wage rate will also be increasing.)

Institutional, Cultural, and Technological Constraints

Among the "givens" in an economic analysis of demand functions are: (a) the structure of tastes and preferences, which is related to (b) laws and governmental policies, and, finally, (c) the state of technology. All factors are, of course, to some degree mutable. Detecting and interpreting trends in people's preferences and fashions is difficult, especially identifying changes in tastes that are causally prior, and not merely responses, to price and income changes. It is interesting to ponder, for example, how much of women's liberation and

demands for improved birth control measures stem from the heightened value of women's time represented by higher wage rates. Whatever the source, there appears to be an irreversible trend toward more liberal laws and church policies toward birth control, including abortion. The ideal of "every child a wanted child" is closer to attainment, and this implies a dampening effect on fertility rates, as the Bumpass-Westoff paper makes clear. It also implies that economic theories, which rest on rational choice, should achieve greater explanatory power.

One type of governmental action which casts a shadow on the generally optimistic view sketched up to now is the continued emphasis on war as an instrument of national policy. To be sure, modern war technology has made population size less important, but still not irrelevant, to the capacity of a nation to wage war. A related motivation is the drive for ethnic or racial domination. These motives, which presumably reflect a summation of individual values, are likely to produce pro-natalist policies that would be uneconomic on grounds other than the alleged national survival. Indeed, the existence of such motives challenges (but does not, I hope, overturn) the assumptions of rationality on which the economic model is based.

The role of technology often tends to dominate the debate on the population bomb, but I will not add to my brief earlier comments. Others are better equipped to discuss the role of technology in augmenting resources and shaping the environment. Regarding the technology of birth control, parturition, and child care, one would guess that the net effects would be anti-natalist: improvements in contraception and the potential ability to choose the sex of children[11] ought to outweigh the pro-natalist effects of reductions in sub-fecundity, infant mortality, birth defects, maternal mortality and morbidity,

the discomforts in pregnancy and childbirth, and the onerousness of home-work tasks in child care.

Externalities and Distributional Issues

Children are now subsidized in many ways, but, except for families on welfare, the subsidies are indirect; and except for public support of education, the subsidies do not sum to a large fraction of the total costs assumed by parents. Although arguments are made for the external benefits of elementary and secondary education and the research component of higher education, I suggest that parents could assume a much greater share of these costs without violence to equity or efficiency criteria. Home ownership is subsidized through the tax system and loan subsidies, but there are also implicit taxes imposed on this industry by building codes and labor unions. Other items, like medical, recreational, and day-care services may be mentioned, but these are probably not areas in which private costs are pervasively and significantly supplemented by public subsidies, except for programs dealing with a fraction of the poverty population.

Existing and proposed systems of income maintenance are another matter. All plans are family-size as well as income conditioned, and this raises important questions for an optimal population policy: What effects do these children's allowances have on the birth rate, what costs are generated, and what amount of benefits from alleviating poverty offset the costs? We have little empirical knowledge about any of these issues, but it is consistent with the model employed in the paper to assume that the fertility effect is positive and large enough to be worth analyzing. These plans lower the direct price of children and, because they impose marginal taxes on earnings at rates of 50 to 100 percent, they lower the indirect price by reducing the effective wage rate facing the wife.

The pro-natal effects may be moderated in two general ways. One is in the design of the income maintenance program. Thus, to reduce a "birth bonus" the income support plan should include childless poor families and could provide graduated payments for a child according to his age. Both measures enhance equity, and the latter is consistent with matching benefits to costs, since older children are more expensive [25]. For the same reasons the payment schedule per child should be reduced as the number of children increase, to allow for the economies of scale. (Note that the Nixon administration's Family Assistance Plan has none of these features.)

Another design feature is to substitute cash grants for all income-in-kind subisides that are pro-natalist, like public housing. A symmetrical step is to design the program to minimize the disincentives to work and, in particular, to keep the implicit tax on earnings of the wife low.[12]

A second approach is to subsidize anti-natalist measures to counter the direct subsidies to children. Family planning and labor market services could be provided free, or by means of direct payments if the pro-natal effects of children's allowances were seriously large. But let us note that we are not now even providing unrestricted availability of all forms of birth control. Abortion, for example, is still highly restricted and, where available, appears to be priced too high--that is, priced above the "resource-use costs" of the method.

If income maintenance programs lead the poor to have more children than the nonpoor, someone will probably want to examine eugenic issues.[13] However, it is not clear that children's allowances will have this effect. If the wages available to wives and preferences are, on average, the same, then the presumed positive effect of income will encourage more children by the

nonpoor and may offset the positive effects on fertility of the allowances for poor families.

Externalities associated with a growing population appear to me to be all negative but, for the near future, all minor. A positive externality has been claimed because there will be more geniuses and ideas from a larger than from a smaller population, ceteris paribus [19]. There will also be more villains, but the crucial weakness in this argument is identical to that regarding density and pollution; namely, that there are specific sources of research, ideas, and knowledge, and it is most efficient to subsidize these directly. In the long run a serious external diseconomy will be the problem of congestion, broadly speaking. The assumption of diminishing returns to labor implies another negative externality, but in the face of secular rising per capita incomes, this appears to me less important. At some point, these problems probably justify subsidies to birth control technology and, possibly, smaller tax deductions allowed for children.

Conclusions and Agenda for Research

The widely discussed issue of the threat of a United States population bomb--is, in my opinion, a non-issue. The question of optimality of population size is, on the other hand, always an issue. Indeed we cannot escape from having a population policy and an implicit benefit-cost calculation associated with that policy. Is it not better to make our benefit-cost analysis explicit? But the economist's approach to optimality is, like the statistician's approach to randomness one of choosing correct procedures and not one of choosing a correct outcome. We have many options to alter prices (which are, after all, simply guides and incentives) to take account of private and external costs and benefits of children. The externalities of

congestion and the price distortions from income maintenance programs, subsidized day care, and other subsidies to children deserve our attention, although they do not require drastic action. A much more important issue, I believe, is the serious obstacles to full parental control over having the number of children actually wanted.

Action to improve the functioning of the market, however, is severely hampered by the paucity of our empirical knowledge. We have almost no satisfactory empirical estimates of elasticities of the quantity of children demanded with respect to income and prices. I might mention some research using cross-sectional observations of fertility rates in standard statistical metropolitan areas in 1960 and 1940, in which the effect of income on fertility was found to be positive but small [8]. The income elasticity of children fell somewhere in between that for cars and houses. The wage rate of the wife was negative in its effect and larger in absolute value than the income effect.[14] But the data for this research, as all data used to date in economic research on fertility, was inadequate. Even aside from the nonexperimental nature of the data, the observations were not (except for wives 45-49) measures of the required dependent variable--completed family size, and the income and price variables did not apply to the entire span of the childbearing period of the wives. The task of estimating price and income effects on completed cohort fertility is analogous to that of estimating the total number of cars purchased over the lifetime of a cohort. Our current cross-section and time series data are not well suited to this estimation task.

Even less satisfactory is our evidence on the effects of the price of housing, education, day care, or other services relevant to children. I can mention only the journalistic evidence of the anti-natalist effects of

housing restrictions, incentives to female labor, and provision of contraceptive means in the eastern European and Scandinavian countries and in Japan. It is plausible that Japan's birth rate is also held down by the emphasis on and high private costs of education.

It should be frankly acknowledged, therefore, that the feasibility of attaining a benign rate of population growth, even in the terms of arguments which are conventional in economics, rests on limited scientific evidence. Let me conclude by mentioning some of the qualifications to the argument which are, conventionally, outside of economics.

The assumption of the dominance of nonmalevolent and rational behavior of man is something of an article of faith. Population growth, unlike warfare, is, however, a gradual process and the result of millions of decentralized decisions. This provides some flexibility in outcomes, but raises other issues. One is whether the welfare of future generations of people and even nonhuman species will be taken into account. This depends on the persuasiveness of the arguments to do so. There is evidence that people behave in the interests of their children and grandchildren, at least, and, indeed the current generation sacrifices consumption to pass on savings which contribute to a rising per capita income of future generations. I cannot get excited about the concern for future generations under conditions of projected growth in per capita income.

Finally, a challenge to rational decision making is posed by a version of the index number problem. The argument is that we might adopt only one style of life as population grows--in particular, high density urban living--and so fully adapt to this way of living that no comparisons are possible. Ardrey's rats can end up with a revealed preference for a way of life that we, in our present state of minds, abhor [1]. I believe, however, that a

diversity of life styles--of family sizes and living arrangements--remains open to us for the foreseeable future and that we can choose more wisely than rats.

APPENDIX

Direct and Indirect Costs of Raising a Child

1: Direct Costs

The computation of the direct costs of raising a child are taken from "The Costs of Raising a Child," which bases its estimates on six budget studies which used data from (1) the 1960-61 Survey of Consumer Expenditures of the Bureau of Labor Statistics (BLS), U.S. Department of Labor; (2) a 1970 BLS budget standard, the Annual Price Survey-Family Budget Costs (October, 1965) published by the Community Council of Greater New York; and (3) studies of the Department of Agriculture. These studies were used to compile an average "moderate budget" for a family of four in the United States in 1969. The dollar amounts by item and age of child which formed the basis for the calculations shown in the paper are given below.

The sum of the present values of these amounts (that is, the total of all the columns) is $13,335, not including college expenses. (Including college expenses, the present value of the sum is $13,750.) An 8 percent discount rate was used for these calculations. The rate is high, but note that the attempt here is to estimate costs as perceived by the individual households, not by the government (acting as society's agent), and discount rates of 6 to 10 percent are probably appropriate.

TABLE A.1

Dollar Expenditures on Components of the Costs of Raising a Child, First 18 (or 22) Years (Data Refer to 1969)

Year	Food[a]	Clothing[a]	Personal[a]	Birth[b]	Housing[c]	Transp.[d]	Medical[e]	Educ. & Other[f]
1	$240	$ 70	$--	$575	$240	$ 0	$138	$ 49
2	290	147	23		240	0	138	49
3	290	147	23		240	0	138	49
4	290	147	23		240	0	138	49
5	360	173	27		360	0	138	49
6	360	173	27		480	0	138	49
7	360	173	27		480	211	138	98
8	427	197	30		480	211	138	98
9	427	197	30		480	211	138	98
10	427	197	30		540	211	138	98
11	510	220	37		540	211	138	98
12	510	220	37		540	211	138	98
13	510	220	37		540	419	138	157
14	590	260	40		600	419	138	157
15	590	260	40		660	419	138	157
16	590	260	40		660	419	138	157
17	417	243	30		660	419	138	203
18	417	243	30		660	419	138	203
19								500
20								500
21								500
22								500

(All page numbers refer to "The Cost of Raising A Child" [25].)

[a]Food, clothing and personal care expenditures were given as totals for the years encompassing the following ages of the child (p. 9):

Age of Child

	0-1	1-4	4-7	7-10	10-13	13-16	16-18
Food	$240	$870	$1080	$1280	$1530	$1770	$1250
Clothing	70	440	520	590	660	780	730
Personal care	--	70	80	90	110	120	90

The entires in Table A.1 are annual allocations of these amounts, obtained by a simple division of the numbers of years, per age group, into the amounts.

[b]P. 5.

[c]Housing expenditures (p. 8), which include an allowance for maintenance and furnishings, were given as a total of $8,590 for the entire 18 years. I allocated this total to each age to reflect the space-using costs of children of different ages. No justification exists for these particular allocations, except that they sum to $8,600 and appear "reasonable." According to the assigned table values, the rent (or rent-equivalent) of apartments and houses costs the parents $20 more per month if they have an additional child aged under 5, and the rental costs rise to $55 more a month if they have a child over 15 years of age.

[d]Transportation expenses (pp. 8, 20) are given as a total for 18 years, but the table on page 20 allocates a zero amount for a child under 6 and an amount for children aged 12-18 which is twice that for children aged 6-12. My allocation by age in Table A.1 reflects this.

[e]Medical care (p. 8) was given as a total and the amount was allocated evenly to each age.

[f]A single lump sum of $1,920 was given for "Recreation, Reading, Education, and Other" (p. 8) and was said to cover "school materials, private music lessons, and other such items." Note: That this amount was allocated by age in accordance with the ratios of expenditures by age shown in a supplementary table (p. 22). The amounts for expenditures on a college education are added to the table by the present writer. They are rather arbitrary; I assume the costs to the parents are $1,000 for each of the four years and that these costs are weighted by a probability of one-half that they will be incurred.

2: Indirect Costs--Opportunity Costs of Market Work and Leisure Forgone by a Wife Because of the Birth of a Child

Wage Rate

The value of an hour of market work is assumed to be the wage a woman would receive if she worked at a full-time job. In 1968 the median annual earnings of women who worked year round at full-time jobs was $4,560 (Current Population Reports, 1969, Number 66). This amounts to roughly $2.25 per hour for a work year of 2,000 hours (40 hours per week for 50 weeks). Let us assume that the wage for women who do bear children would on the average be somewhat lower, say $2.00 per hour, if these women did not bear children and were to work full- or part-time instead. A lower wage reflects the fact that there probably has been some selectivity among women with higher earnings capacity to choose full-time work compared with all married women. Furthermore, we will not assume that the women who choose to have children would otherwise choose to work full-time; rather that they would work on a half-time basis, which is about as much work as other married women do who do not have children under 14 (see the next section on hours worked).

Hours Worked in the Market

The procedure for estimating the hours of market work forgone by a mother is to determine the observed difference between hours worked per year for a mother with a youngest child of different ages, and to compare this amount of hours worked with that of a woman without a child under 14 years of age. I assume that only children under 14 affect (i.e., reduce) the market work by a woman, and I assume that the number of her children is irrelevant and that it is the age of her youngest child that is affecting labor-market behavior. This last assumption is artificial, but not too far from

the truth. It is used partly because of data limitations--data are not easily accessible for mothers of children by both age and number of children--and partly because I am attempting to focus on the concept of opportunity costs of a child, as if it were an "additional" child, whether the first or the seventh or whatever number. Obviously, the concept is highly abstract, and the costs will be crude approximations, since the true measure of opportunity cost would differ by the age of the wife, the number of her other children (if any), and the ages of these other children (if there are other children). A comprehensive set of calculations of the opportunity cost for an "additional child" would require calculations for up to hundreds of cases.

The data on hours worked per year is obtained from the comprehensive study of labor force participation by Bowen and Finegan [6]. The data refer to 1960, but updating the hours worked figures to 1969 would not much change the differentials between wives with and without young children. My procedure will be to use the Bowen-Finegan labor-force participation rates which are: (1) adjusted for the effects of color, age, schooling, other family income, and employment status of the husband; and (2) adjusted to translate less than 40 hours per week of work as an equivalent lower labor-force participation rate.

1. The standard: wives with no children under 14

For married women aged 14-54 in urban areas, with no children under 14 years of age, the "adjusted full-time equivalent labor force participation rate" was 51 percent (using a weighted average of the rates for wives with children 14-17 only and wives with no children under 18) [6, p. 101]. A labor-force participation rate of 50 percent translates to about 1,000 hours of work per year (out of 2,000).

2. Wives with young children

Wives with children under age 6 only have an adjusted, full-time equivalent labor-force participation rate of 11 percent; and wives with children aged 6-13 only have a rate of 31 percent. (The rates for wives with children in these ages and in other ages as well--e.g., under 6 and 6-13, etc.--are between 11 and 31 percent, and these rates are ignored in the calculations below.) Rates of 11 and 31 percent are equivalent to 220 and 620 hours of work per year, respectively.

A second step in the calculation of the age-of-child/hours-of-work relation is to distribute the 11 percent rate for mothers of children under 6 to mothers with children of specific ages. A table on page 102 of Bowen-Finegan [6] provides the necessary information. The ratio of adjusted labor-force participation rates of women with children at each single-year age under 6 ($LFPR_i$) to the average adjusted LFPR ($\overline{LFPR}$) of women with children under 6 is as follows:

Age of Child	Ratio ($LFPR_i/\overline{LFPR}$)	Adjustment in Hours Worked[a]
< 1	.483	106
1	.866	191
2	.995	219
3	1.078	237
4	1.267	279
5	1.313	289

[a]The average hours worked is 220.

No adjustment was made in the hours of work for mothers with children aged 6-13 to take account of the differential LFPR's by single year of age.

Such differences should not be large--at least, not large relative to the differences among mothers of children aged 0-5.

The hours worked per year for women by age of child is shown in column 1 of Table A.2. This amount is subtracted from 1,000 hours--the amount assumed to be worked by wives with no young children--and the difference is shown in column 3. The dollars forgone is column 3 x $2. The present value of the dollar amounts is calculated using a 7 percent discount rate--which is derived from an 8 percent "true" discount rate for the household and a 1 percent growth rate in wages. The present value of the stream of market earnings, forgone is shown to be $11,743.

A second source for a measure of the wife's forgone market earnings from bearing and raising a child is available in a Department of Labor study. Perulla [18] reports that the Department has estimated that the birth of a first child reduces the average number of years a married women works by about 10 years, and the birth of each additional child further reduces the average work-life expectancy by 2-3 years. Using the costs for one child to be 10 years less work, the costs would be at a maximum if the 10 years occurred immediately after the birth. Assuming that the 10 years of labor-force participation forgone would average 1,000 hours per year at $2.00 per hour, the present value of the earnings forgone (at a 7 percent discount rate) is $14,047. This is higher than the figure of $11,743 estimated above, and indeed, the Labor Department estimate of the reduction in market work appears too high.

Hours of Additional Child-Care Homework for Mothers

Several arbitrary assumptions were made to measure the costs in leisure forgone because of child-related homework. The hours spent at such homework

were assumed to be 14 per week for children aged 0-3, 10 hours per week for children 4-6, and 5 hours thereafter until the children were 14 years of age. Note that these figures do not purport to measure the time a mother spends with her child (most of which is a form of leisure) but rather the homework component of this time. Even limited to this concept, the number of hours appears conservatively low.

The value of the time of this component of forgone leisure--in effect, the home wage rate--was assumed to be $1.50 per hour. I realize that at the margin, and in equilibrium, the home wage ought to equal the market wage (which is assumed to be $2.00), but I prefer a lower estimate to account for both the (probably) lower average home wage (which is relevant for measuring the <u>total</u> value of the leisure time forgone) and to account for (possible) imperfections or rigidities that could cause a discrepancy between home and market wages.

TABLE A.2

Costs to the Wife of Forgone Earnings and of Forgone Leisure from Bearing and Raising a Child

Market Work				Homework		
Age of Child (1)	Hours Worked by Mother (2)	Hours Forgone 1000-(2) (3)	Dollars Forgone $2 x (3) (4)	Age of Child (5)	Hours (6)	Cost = (6) x $1.50 (7)
-.5-.5[a]	106	894	$1788	0-1	728	$1092
.5-1.5	191	809	1618	1-2	"	"
1.5-2.5	219	781	1562	2-3	"	"
2.5-3.5	237	763	1426	3-4	520	780
3.5-4.5	279	721	1442	4-5	"	"
4.5-5.5	289	711	1422	5-6	"	"
5.5-6.5	620	380	760	6-7	260	390
6.5-7.5	"	"	"	7-8	"	"
7.5-8.5	"	"	"	8-9	"	"
8.5-9.5	"	"	"	9-10	"	"
9.5-10.5	"	"	"	10-11	"	"
10.5-11.5	"	"	"	11-12	"	"
11.5-12.5	"	"	"	12-13	"	"
12.5-13.5	"	"	"	13-14	"	"
13.5-14.5	"	"	"			
Present value of sum =			$11,473	Present value of sum =		$6088
				Total present value = $17,561		

[a]Some time is lost to the market because of pregnancy.

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NOTES

[1]I wish to express my gratitude to colleagues at the University of Wisconsin, Princeton University, the National Bureau of Economic Research, and elsewhere, for their helpful comments on this paper.

[2]Another component of the rate of growth of a population is the length of a generation, often expressed as the mean age of childbearing. This component, however, does not change much and in a society with low mortality and low fertility. The effects of changes in the length of a generation are small. (See [10] and [11]).

[3]The number of children per completed fertility rate currently required for a U.S. Population that is just replacing itself (which is the sense in which I use the expression "ZPG"), is 2.11 per woman, which amounts to about 2.22 per women ever married and 2.39 per ever married mother [20].

[4]Note also that in the original report by Ryder and Westoff of this survey, the mean number of children "intended," "desired," and "ideal," per family were 3.24, 3.29, and 3.29 respectively [23].

[5]A synthetic measure of completed cohort fertility is obtained by summing the 1968 age-specific birth rates for females of all childbearing ages, yielding 3.11. The sum of the average age-specific rates for the last nine years, 1960-1968, for which data are available, yielding 3.11 [20]. I am indebted to the computer program provided by Ansley J. Coale and Etienne Van de Walle for the population projections.

[6]For a perspective on these figures, consider that Japan had 1620 persons per square kilometer of habitable land in 1955, when the United States had 90 and Europe had 275 (see [14], p. 416); in 1968 Holland had 565 [5].

[7]Separate consideration of "institutions" and "culture"--difficult terms to define; hence the quotation marks--is arbitrary and will depend on the convenience of the analyst. Generally, I prefer to specify how changes in institutions and culture affect tastes and prices, and in this way take them into account. For example, laws liberalizing abortion can be viewed as lowering its price, both directly and by eliminating the costs of crime and punishment, and as shifting tastes toward making abortion more acceptable.

[8]These costs do not allow for the costs of a college education. (See Appendix for cost calculation.) If the probability of going to college for four years is one-half, and we assume that the costs to the parents is $1000 per year, the expected present value of the costs of raising children increases by $400 to around $13,700. No allowance is made for earnings by the child, but this may be justified by assuming the child keeps all his earnings. My calculations are crude, but I believe they would be relatively insensitive to the many arbitrary decisions involved.

[9]For measures of the quantity of work time lost I have relied upon the rich detail available in the research of Bowen and Finegan [6]. The wage forgone was assumed to be $2.00 per hour. These computations are shown in the appendix.

[10]Another, but more strained, argument is somewhat as follows: Society imposes on parents a new price structure for the quality goods associated with children and that this set of prices rises with income. Lower prices exist for a range of quality goods (e.g., housing space), but richer parents are not free to choose the lower quality goods; moreover, they get no more pleasure from higher quality goods (a private bedroom for the child) than they would for a lower quality good (a shared bedroom). (The reader is referred to [3] for a general discussion along these lines.)

[11]The desire to have a child of both sexes appears to lead to more births among families where existing children are all of one sex (especially if they are all female) ([26], pp. 205-7; [24]).

[12]Those familiar with income maintenance systems will recognize a dilemma here. Given a sizeable guarantee for a family (with no other income), a low tax rate on earned income requires a high breakeven point (where the net income transfer is zero). A high breakeven point means that more families are covered by the program and therefore are faced with higher tax rates than they otherwise would be. Lower breakeven points and the reduced numbers of families covered by the plan imply, however, even higher tax rates for those who are covered.

[13]Insofar as eugenics deals with the quality of the population, one might argue that it is a necessary consideration in determining the optimality of a population size. I view this as the topic of a Super Optima and would defer its analysis to others.

[14]On the basis of the 1960 data and the mean income coefficients of white households, where the wives were aged 25-29, 30-34, 35-44, and 45-49, the income elasticities were around .2 or .3. In absolute terms, an increase of $9,000 per family was required to bring about an increase of one more child. The regression coefficient on the wage variable for wives indicated that an increase of $4,000 in annual earnings would lead to one less child. The pure substitution elasticity of the wage effect was -.4 to -.5 [8].