

## An Economic Analysis of Fertility

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THE inability of demographers to predict western birth rates accurately in the postwar period has had a salutary influence on demographic research. Most predictions had been based either on simple extrapolations of past trends or on extrapolations that adjusted for changes in the age-sex-marital composition of the population. Socio-economic considerations are entirely absent from the former and are primitive and largely implicit in the latter. As long as even crude extrapolations continued to give fairly reliable predictions, as they did during the previous half century, there was little call for complicated analyses of the interrelation between socio-economic variables and fertility. However, the sharp decline in birth rates during the thirties coupled with the sharp rise in rates during the postwar period swept away confidence in the view that future rates could be predicted from a secularly declining function of population compositions.

Malthus could with some justification assume that fertility was determined primarily by two primitive variables, age at marriage and the frequency of coition during marriage. The development and spread of knowledge about contraceptives during the last century greatly widened the scope of family size decision-making, and contemporary researchers have been forced to pay greater attention to decision-making than either Malthus or the forecasters did. Psychologists have tried to place these decisions within a framework suggested by psychological theory; sociologists have tried one suggested by sociological theory, but most persons would admit that neither framework has been particularly successful in organizing the information on fertility.

Two considerations encouraged me to analyze family size decisions within an economic framework. The first is that Malthus' famous discussion was built upon a strongly economic framework; mine can be viewed as a generalization and development of his. Second, although no

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single variable in the Indianapolis survey<sup>1</sup> explained more than a small fraction of the variation in fertility, economic variables did better than others. Section I develops this framework and sets out some of its implications. Section II uses this framework to analyze the actual effects of income on fertility. Section III speculates about some further implications of the discussion in I and II.

### *I. The Economic Framework*

#### GENERAL CONSIDERATIONS

In societies lacking knowledge of contraception, control over the number of births can be achieved either through abortion or abstinence, the latter taking the form of delayed marriage and reduced frequency of coition during marriage. Since each person maintains some control over these variables, there is room for decision-making even in such societies. Other things the same, couples desiring small families would marry later and have more abortions than the average couple. Yet the room for decision-making would be uncomfortably small, given the taboos against abortion, the strong social forces determining the age of marriage, and the relative inefficiency of reductions in the frequency of coition. Chance would bulk large in determining the distribution of births among families.<sup>2</sup>

The growth of knowledge about contraception has greatly widened the scope of decision-making, for it has separated the decision to control births from the decision to engage in coition. Presumably, such a widening of the scope of decision-making has increased the importance of environmental factors, but which of the numerous environmental factors are most important? To simplify the analysis of this problem I assume initially that each family has perfect control over both the number and spacing of its births.

For most parents, children are a source of psychic income or satisfaction, and, in the economist's terminology, children would be considered a consumption good. Children may sometimes provide money income and are then a production good as well. Moreover, neither the outlays on children nor the income yielded by them are fixed but vary in amount with the child's age, making children a durable consumption and production good. It may seem strained, artificial, and perhaps even immoral to classify children with cars, houses, and machinery. This classification does not imply, however, that the satisfactions or costs associated with

<sup>1</sup> *Social and Psychological Factors Affecting Fertility*, ed. by P. K. Whelpton and C. V. Kiser, Milbank Memorial Fund, Vols. 1-4.

<sup>2</sup> The effect of chance will be fully discussed in a subsequent paper.

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children are morally the same as those associated with other durables. The satisfaction provided by housing, a "necessity," is often distinguished from that provided by cars, a "luxury," yet both are treated as consumer durables in demand analysis. Abstracting from the kind of satisfaction provided by children makes it possible to relate the "demand" for children to a well-developed body of economic theory. I will try to show that the theory of the demand for consumer durables is a useful framework in analyzing the demand for children.

### TASTES

As consumer durables, children are assumed to provide "utility." The utility from children is compared with that from other goods via a utility function or a set of indifference curves. The shape of the indifference curves is determined by the relative preference for children, or, in other words, by "tastes." These tastes may, in turn, be determined by a family's religion, race, age, and the like. This framework permits, although it does not predict, fertility differences that are unrelated to "economic" factors.

### QUALITY OF CHILDREN

A family must determine not only how many children it has but also the amount spent on them—whether it should provide separate bedrooms, send them to nursery school and private colleges, give them dance or music lessons, and so forth. I will call more expensive children "higher quality" children, just as Cadillacs are called higher quality cars than Chevrolets. To avoid any misunderstanding, let me hasten to add that "higher quality" does not mean morally better. If more is voluntarily spent on one child than on another, it is because the parents obtain additional utility from the additional expenditure and it is this additional utility which we call higher "quality."

### INCOME

An increase in income must increase the amount spent on the average good, but not necessarily that spent on each good. The major exceptions are goods that are inferior members of a broader class, as a Chevrolet is considered an inferior car, margarine an inferior spread, and black bread an inferior bread. Since children do not appear to be inferior members of any broader class, it is likely that a rise in long-run income would increase the amount spent on children.<sup>3</sup>

<sup>3</sup> This is also suggested by another line of reasoning. It is known that  $\sum k_i n_i \equiv 1$ , where  $k_i$  is the fraction of income spent on the  $i$ th commodity, and  $n_i$  is the income

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For almost all other consumer durables, such as cars, houses, or refrigerators, families purchase more units as well as better quality units at higher income levels, with the quantity income elasticity usually being small compared to the quality elasticity.<sup>4</sup> If expenditures on children responded in a similar way, most of the increased expenditures on children would consist of an increase in the quality of children. Economic theory does not guarantee that the quantity of children would increase at all, although a decrease in quantity would be an exception to the usual case. Thus an increase in income should increase both the quantity and quality of children, but the quantity elasticity should be small compared to the quality elasticity.

Malthus, on the other hand, concluded that an increase in income would lead to a relatively large increase in family size. His argument has two major components. First, an increase in income would cause a decline in child mortality, enabling more children to survive childhood. If a decrease in births did not offset the decrease in child mortality, the number of children in the average family would increase. His second argument is less mechanical and takes greater account of motivation. An increase in income increases fertility by inducing people to marry earlier and abstain less while married.

My analysis has generalized that of Malthus by relating the quantity of children to the quality of children and by permitting small (even negative) quantity income elasticities as well as large ones. My conclusion that in modern society the quantity elasticity is probably positive but small differs from his for the following reasons. First, child mortality has fallen so low that the ordinary changes in income have little effect on the number of survivors out of a given birth cohort. Moreover, it is doubtful that even a large decline in child mortality would have much effect on family size, for parents are primarily interested in survivors, not in births per se. Therefore, a decline in child mortality would induce a corresponding decline in births.<sup>5</sup> Second, births can now be controlled without abstinence and this has greatly reduced the psychic costs of birth

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elasticity of the amount spent on the  $i$ th commodity. Other things the same, the larger  $k_i$  is, the less likely it is that  $n_i$  is either very small or very large. In particular, the less likely it is that  $n_i$  is negative. In most families the fraction of income spent on children is quite large and this decreases the likelihood that the income elasticity for children is negative.

<sup>4</sup> Chow estimated the total income elasticity for automobiles at about +2. Cf. G. C. Chow, *Demand for Automobiles in the United States*, North Holland Publishing Co., Amsterdam, 1957; however, the quantity elasticity is only about +0.31. Cf. *Federal Reserve Bulletin*, August, 1956, p. 820.

<sup>5</sup> This will be discussed more fully in a future publication.

control. "Human nature" no longer guarantees that a growth in income appreciably above the subsistence level results in a large inadvertent increase in fertility.

## COST

In principle the net cost of children can be easily computed. It equals the present value of expected outlays plus the imputed value of the parents' services, minus the present value of the expected money return plus the imputed value of the child's services. If net costs were positive, children would be on balance a consumer durable and it would be necessary to assume that psychic income or utility was received from them. If net costs were negative, children would be a producer durable and pecuniary income would be received from them. Children of many qualities are usually available, and the quality selected by any family is determined by tastes, income, and price. For most families in recent years the net expenditure on children has been very large.<sup>6</sup>

Real incomes per capita in the United States have increased more than threefold in the last 100 years, which must have increased the net expenditure on children. It is possible that in the mid-nineteenth century children were a net producer's good, providing rather than using income. However, the marginal cost of children must have been positive in families receiving marginal psychic income from children; otherwise, they would have had additional children. Even in 1850, the typical family in the United States was producing fewer children than was physically possible. Some more direct inferences can be drawn from the data on Negro slaves, an extreme example of a human producer's good. These data indicate a positive net expenditure on male slaves during their first eighteen years.<sup>7</sup> Slave raising was profitable because the high price that an eighteen-year-old could bring more than offset the net cost during the first eighteen years. Presumably, in most families expenditures on white children during their first eighteen years were greater than those on slaves. Moreover, after eighteen, white children became free agents and could decide

<sup>6</sup> See J. D. Tarver, "Costs of Rearing and Educating Farm Children," *Journal of Farm Economics*, February, 1956, pp. 144-153, and L. I. Dublin and A. J. Lotka, *The Money Value of a Man*, Ronald Press, 1946, ch. 4. Most studies consider only the costs and returns before age eighteen. It is possible that returns bulk larger than costs at later ages; but because these ages are heavily discounted and because costs are so large before age eighteen, there is little chance that a correction of this bias would substantially reduce the net cost of children.

<sup>7</sup> See A. H. Conrad and J. R. Meyer, "The Economics of Slavery in the Ante Bellum South," *Journal of Political Economy*, April, 1958, p. 108. At an 8 per cent discount rate (about the estimated rate of return on slaves), the present value of the net costs is + \$35, or about one-third of the present value of gross costs. The data are subject to considerable error and are at best a rough indication of the magnitudes involved.

whether to keep their income or give it to their parents. The amount given to parents may have been larger than the costs before eighteen, but it is more likely that costs before eighteen dominated returns after eighteen. This conclusion does not imply that monetary returns from children were unimportant, and indeed, they are stressed at several points in this paper. It does imply, however, that a basic framework which treats children as a consumer's good is relevant not only for the present, but also for some time in the past.

A change in the cost of children is a change in the cost of children of *given quality*, perhaps due to a change in the price of food or education. It is well to dwell a little on this definition for it is widely misunderstood. One would not say that the price of cars has risen over time merely because more people now buy Cadillacs and other expensive cars. A change in price has to be estimated from indexes of the price of a given quality. Secular changes in real income and other variables have induced a secular increase in expenditures on children, often interpreted as a rise in the cost of children. The cost of children may well have risen (see pp. 227-28) but the increase in expenditure on children is no evidence of such rise since the quality of children has risen. Today children are better fed, housed, and clothed, and in increasing numbers are sent to nursery schools, camps, high schools, and colleges. For the same reason, the price of children to rich parents is the same as that to poor parents even though rich parents spend more on children.<sup>8</sup> The rich simply choose higher quality children as well as higher qualities of other goods.<sup>9</sup>

It is sometimes argued that social pressures "force" richer families to

<sup>8</sup> One qualification is needed because the rich may impute a higher value than the poor to the time spent on children. The same qualification is needed in analyzing the demand for other goods.

<sup>9</sup> As an example of how prevalent this error is, even among able economists, we refer to a recent discussion by H. Leibenstein in *Economic Backwardness and Economic Growth*, John Wiley, 1957, pp. 161-170. He tries to relate cost of children to level of income, arguing, among other things, that "The relation between the value of a child as a contributor to family income and changes in per capita income is fairly clear. As per capita income increases, there is less need to utilize children as sources of income. At the same time the level of education and the general quality of the population implied by a higher income per head mean that more time must be spent on child training, education, and development, and, therefore, less time is available to utilize the child as a productive agent. Therefore, the higher the income, the less the utility to be derived from a prospective child as a productive agent" and "The conventional costs of child maintenance increase as per capita income increases. The style in which a child is maintained depends on the position and income of the parents; therefore, we expect such costs to rise as incomes rise. . . ." (*ibid.*, pp. 163-164.)

By trying to relate cost to income Leibenstein confused cost and quality, and succeeded only in inadvertently relating quality to income. His technique would imply that the relative price of almost every group of goods rose over time because the quality chosen

spend more on children, and that this increases the cost of children to the rich. This higher cost is supposed to explain why richer families have fewer children than others and why richer societies have fewer children than poorer ones. However, since the cost of different goods is given in the market place, social pressures cannot change this, but can only change the basket of goods selected. That is, social pressures influence behavior by affecting the indifference curve structure, not by affecting costs. To put this differently, social pressures may affect the income elasticity of demand for children by rich (and poor) families, but not the price elasticity of demand. Therefore, the well known negative relationship between cost (or price) and quantity purchased cannot explain why richer families have had relatively few children. Moreover, nothing in economic analysis implies that social pressures would make the quantity income elasticity of demand for children negative. Thus my conclusion that the quantity income elasticity is relatively small but positive and the quality elasticity relatively large is entirely consistent with an analysis which emphasizes social pressures.

Suppose there was an equal percentage decline in the price of all qualities of children, real income remaining constant. Although economic theory suggests that the "amount" of children consumed would increase, it does not say whether the amount would increase because of an increase in quantity, quality, or both—the last, however, being most likely. It also has little to say about the quantitative relationship between price and amount. There are no good substitutes for children, but there may be many poor ones.<sup>10</sup>

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rose, an obvious impossibility. This flaw in his procedure greatly weakens his analysis of the secular decline in birth rates.

Bernard Okun also applied economic analysis to the population area, and explicitly assumed that the cost of children is higher to rich people because they spend more on children (see *A Rational Economic Model Approach to the Birth Rate*, Rand Corp. Series, P1458, August, 1958). His argument, like Leibenstein's, would imply that the cost of many (if not most) goods is greater to richer families than to poorer ones. Also see S. H. Coontz, *Population Theories and the Economic Interpretation*, Routledge, London, 1957, Part II.

<sup>10</sup> Let  $x$  be the quantity of children,  $p$  an expenditure measure of the quality of  $x$ ,  $y$  an index of other goods,  $I$  money income,  $U$  a utility function,  $\alpha$  a parameter shifting the cost of each quality of  $x$  by the same percentage, and  $\pi$  the price of  $y$ . A consumer maximizes  $U(x, y, p)$  subject to the constraint  $\alpha px + \pi y = I$ . This leads to the equilibrium conditions

$$\frac{U_x}{\alpha p} = \frac{U_p}{\alpha x} = \frac{U_y}{\pi}$$

The marginal utility from spending a dollar more on the quantity of children must equal the marginal utility from spending a dollar more on their quality.

After a draft of this paper was written I came across an article by H. Theil, "Qualities, Prices, and Budget Inquiries," *The Review of Economic Studies*, xix, pp. 129-147, which

## SUPPLY

By and large, children cannot be purchased on the open market but must be produced at home. Most families are no longer self-sufficient in any major commodity other than children. Because children are produced at home, each uncertainty in production is transferred into a corresponding uncertainty in consumption, even when there is no uncertainty for all families taken together. Although parents cannot accurately predict the sex, intelligence, and height of their children, the distribution of these qualities is relatively constant for the country as a whole. This uncertainty makes it necessary to distinguish between actual and expected utility. Thus suppose a group of parents received marginal utility equal to  $U_m$  from a male child and  $U_f$  from a female child. The expected utility from an additional child equals  $EU = PU_m + (1 - P)U_f \cong \frac{U_m + U_f}{2}$ ,

where  $P$ , the probability of a male is approximately equal to  $1/2$ . They would have additional children whenever the expected utility per dollar of expected cost from an additional child were greater than that from expenditures elsewhere. The actual utility is either  $U_f$  or  $U_m$ , which differs from  $EU$  as long as  $U_f \neq U_m$ . In fact, if  $U_f$  (or  $U_m$ ) were negative, some parents would receive negative utility.

A second important consequence of uniting consumption and production is that the number of children available to a family is determined not only by its income and prices but also by its ability to produce children. One family can desire three children and be unable to produce more than two, while another can desire three and be unable to produce fewer than five.<sup>11</sup> The average number of live births produced by married women in societies with little knowledge of contraception is very high. For example, in nineteenth-century Ireland, women marrying at ages 20-24 averaged more than 8 live births.<sup>12</sup> This suggests that the average family more frequently had excess rather than too few children.

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treats the interaction of quality and quantity in an elegant manner. Also see, in the same issue, H. S. Houthakker, "Compensated Changes in Quantities and Qualities Consumed," pp. 155-164. Theil differentiates equations like these and shows that a compensated decrease in the price of a good of given quality must increase either the quantity of goods or the quality, or both.

<sup>11</sup> There is some ambiguity in the last part of this sentence since abstinence enables a family to produce as few children as desired. The terms "unplanned," "excess," or "unwanted" children refer to children that would not be conceived if there were perfect mechanical control over conception. No children are unplanned in terms of the contraceptive knowledge and techniques actually known.

<sup>12</sup> See D. V. Glass and E. Grebenik, *The Trend and Pattern of Fertility in Great Britain*, Paper of the Royal Commission on Population, Vol. vi, p. 271.

Relatively effective contraceptive techniques have been available for at least the last 100 years, but knowledge of such techniques did not spread rapidly. Religious and other objections prevented the rapid spread of knowledge that is common to other technological innovations in advanced countries. Most families in the nineteenth century, even in advanced Western countries, did not have effective contraceptive information. This information spread slowly from upper socio-economic groups to lower ones.<sup>13</sup>

Each family tries to come as close as possible to its desired number of children. If three children are desired and no more than two are available, two are produced; if three are desired and no fewer than five are available, five are produced. The marginal equilibrium conditions would not be satisfied for children but would be satisfied for other goods, so the theory of consumer's choice is not basically affected.<sup>14</sup> Families with excess children consume less of other goods, especially of goods that are close substitutes for the quantity of children. Because quality seems like a relatively close substitute for quantity, families with excess children would spend less on each child than other families with equal income and tastes. Accordingly, an increase in contraceptive knowledge would raise the quality of children as well as reduce their quantity.

## II. An Empirical Application

Having set out the formal analysis and framework suggested by economic theory, we now investigate its usefulness in the analysis of fertility patterns. It suggests that a rise in income would increase both the quality and quantity of children desired; the increase in quality being large and the increase in quantity small. The difficulties in separating expenditures on children from general family expenditures notwithstanding, it is evident that wealthier families and countries spend much more per child than do poorer families and countries. The implication with respect to quantity is not so readily confirmed by the raw data. Indeed,

<sup>13</sup> For evidence supporting the statements in this paragraph see the definitive work by N. A. Himes, *Medical History of Contraception*, The Williams and Wilkins Company, Baltimore, 1936.

<sup>14</sup> A consumer maximizes a utility function  $U = u(x_1, \dots, x_n)$  (neglecting quality considerations) subject to the constraints  $\sum_{i=1}^n p_i x_i \equiv Y$ , and  $x_1 \geq$  or  $\leq c$ , where  $p_i$  is the price of the  $i$ th commodity,  $Y$  is money income, and  $x_1$  refers to children. If the second constraint were effective,  $x_1$  would equal  $c$ . Then the consumer would maximize  $U = U(c, x_2, \dots, x_n)$  subject only to  $\sum_{i=2}^n p_i x_i \equiv Y' \equiv Y - p_1 c$ , and this gives the usual marginal conditions for  $x_2, \dots, x_n$ .

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most data tend to show a negative relationship between income and fertility. This is true of the Census data for 1910, 1940, and 1950, where income is represented by father's occupation, mother's education, or monthly rental; the data from the Indianapolis survey, the data for nineteenth century Providence families, and several other studies as well.<sup>15</sup> It is tempting to conclude from this evidence either that tastes vary systematically with income, perhaps being related to relative income, or that the number of children is an inferior good. Ultimately, systematic variations in tastes may have to be recognized; but for the present it seems possible to explain the available data within the framework outlined in section I, without assuming that the number of children is an inferior good. First, it is well to point out that not all the raw evidence is one way. In some studies, the curve relating fertility and income flattens out and even rises at the higher income classes, while in other studies the curve is positive throughout.<sup>16</sup> Second, tastes are not the only variable that may have varied systematically with income, for there is a good deal of general evidence that contraceptive knowledge has been positively related to income. Himes, in his history of contraception, indicates that the upper classes acquired this knowledge relatively early.<sup>17</sup> If such knowledge spread gradually from the upper classes to the rest of society, fertility differentials between classes should have first increased and then narrowed. This was clearly the pattern in England and was probably the pattern in the United States.<sup>18</sup>

Such evidence does little more than suggest that differential knowledge of contraceptive techniques might explain the negative relationship between fertility and income. Fortunately, the Indianapolis survey makes it possible, at least for 1941, to assess its quantitative importance. Table 1 presents some data from this study. In column (1) the native-white Protestant couples in the sample are classified by the husband's income, and column (2) gives the number of children born per 100 couples in each income class. The lowest income class was most fertile (2.3 children per couple) and a relatively high class least fertile (1.5

<sup>15</sup> U.S. Bureau of the Census, *Census of Population, 1940; Differential Fertility 1910 and 1940*, Government Printing Office, Washington, 1945; U.S. Bureau of the Census, *Census of Population, 1950; Fertility*, Government Printing Office, Washington, 1955; *Social and Psychological Factors Affecting Fertility*, by P. K. Whelpton and C. V. Kiser, eds., Milbank Memorial Fund, 1951; A. J. Jaffe, "Differential Fertility in the White Population in Early America," *Journal of Heredity*, August, 1940, pp. 407-411.

<sup>16</sup> K. A. Edin and E. P. Hutchinson, *Studies of Differential Fertility*, London, 1935; W. H. Banks, "Differential Fertility in Madison County, New York, 1865," *Milbank Memorial Fund Quarterly*, Vol. 33, April, 1955, pp. 161-186.

<sup>17</sup> Himes, *op. cit.*

<sup>18</sup> See the papers by C. V. Kiser and G. Z. Johnson in this volume.

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children per couple), but the highest class averaged slightly more children than the next highest. This relationship between economic level and fertility was about the same as that shown by the 1940 Census.<sup>19</sup> Sterility did not vary systematically with income, so column (3), which is restricted to relatively fecund families, differs only slightly from column (2).

TABLE 1  
Children Ever Born per 100 Couples in Indianapolis Classified by  
Husband's Income and Planning Status  
(native-white Protestants)

Income (1)	All Couples (2)	Relatively Fecund (3)	Number and Spacing Planners (4)	All Planners (5)	Desires of Relatively Fecund (6)
\$3,000+	159	180	149	175	171
2,000-2,999	149	176	182	161	170
1,600-1,999	163	194	91	126	153
1,200-1,599	189	229	97	144	175
1,200 and less	227	266	68	146	193

Source: *Social and Psychological Factors Affecting Fertility*, P. K. Whelpton and C. V. Kiser, eds., N.Y., Milbank Memorial Fund, 1951, Vol. 2, part 9. Columns (2) and (3) from Table 4; columns (4) and (5) computed from Figure 8; column (6) computed from Figures 8 and 21.

It is well known that rich families use contraception earlier and more frequently than poor families. It has been difficult to determine whether poor families are ignorant of contraceptive methods or whether they desire more children than richer ones. The Indianapolis survey tried to separate ignorance from tastes by classifying couples not only by use of contraception but also by control over births. Column (4) gives the average number of children for "number and spacing planning" couples, including only couples who had planned all their children. A positive pattern now emerges, with the richest families averaging more than twice as many children as the poorest families. The income elasticity is about +0.42. Column (5) presents data for "number planned" couples, including all couples that planned their last child. These data also show a positive pattern, with an elasticity of +0.09, lower than that for number and spacing planners.

Fecund couples having excess children were asked questions about the number of such children. Column (6) uses this information and that in column (5) to relate income to the number of children desired by all

<sup>19</sup> Whelpton and Kiser, eds., *op. cit.*, Vol. 2, p. 364.

fecund couples. The elasticity is negative, being about  $-0.07$ .<sup>20</sup> After an intensive study, however, Potter found evidence that the number of desired children was overestimated; his own estimates of desired fertility show a positive relationship with income.<sup>21</sup> Thus evidence from the Indianapolis survey indicates that differential knowledge of contraception does convert a positive relation between income and *desired* fertility into a negative relation between income and *actual* fertility.<sup>22</sup>

Several other surveys provide information on desired fertility. For example, in 1954 a group at Michigan asked Detroit area families; "In your opinion what would be the ideal number of children for a young couple to have, if their standard of living is about like yours?" There was a distinct positive relationship between the ideal number of children and income of the family head.<sup>23</sup>

If knowledge of contraceptive techniques did not vary with income, the relation between actual fertility and income would equal that between desired fertility and income. Contraceptive knowledge is said to be diffused among all income classes in Stockholm, and the fertility of Stockholm families from 1917-1930 was positively related to income.<sup>24</sup> Contraceptive knowledge was said to be very primitive in *all* income

<sup>20</sup> These elasticities are estimates of the slope of the regression of the logarithm of fertility on the logarithm of income. The mean of the open end income class is assumed to be \$4,000, and the mean of the other classes is assumed to be at their mid-points.

<sup>21</sup> R. G. Potter, *The Influence of Primary Groups on Fertility*, unpublished Ph.D. dissertation, Department of Social Relations, Harvard University, 1955, Appendix A, pp. 277-304.

<sup>22</sup> This conclusion must be qualified to allow for the possibility that tastes and costs also varied with income. Since all couples lived in the same city the cost of children was presumably the same. Age, religion, color, and nativity were held constant in an attempt to limit the systematic variation in tastes. Education did vary with income, but for number and spacing planners it was possible to separate the effect of income from the effect of education. The simple correlation coefficient between fertility and income is  $+0.24$  and between fertility and education  $+0.17$ , with both significant at the 1 per cent level. The partial correlation coefficient between fertility and income, holding education constant is  $+0.23$ , about the same as the simple coefficient, and is also significant at the 1 per cent level. The partial correlation between fertility and education is only  $+0.04$ , not significant even at the 10 per cent level. (For these correlations see Whelpton and Kiser, eds., *op. cit.*, Vol. 3.) Holding education constant has little effect on the relationship between income and fertility.

<sup>23</sup> See R. Freedman, D. Goldberg, and H. Sharp, "'Ideals' about Family Size in the Detroit Metropolitan Area, 1954," *Milbank Memorial Fund Quarterly*, Vol. 33, April, 1955, pp. 187-197. An earlier survey asked about the ideal family size for the average American couple, and found a negative relationship between ideal size and income of the head. But ideal size should be related to the income *assumed* by a respondent, rather than to his own income; and there is no way to do this. R. G. Potter has criticized both surveys because of their tendency to show larger ideal than realized families. See his "A Critique of the Glass-Grebenik Model for Indirectly Estimating Desired Family Size," *Population Studies*, March, 1956, pp. 251-270. It is not possible to determine whether this bias is systematically related to income.

<sup>24</sup> See Edin and Hutchinson, *op. cit.*

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classes of prewar China, and a positive relation between fertility and income also seemed to prevail there.<sup>25</sup> Graduates in the same college class are probably relatively homogeneous in contraceptive knowledge and values as well as in formal education. I have the impression that income and fertility of these graduates tend to be positively related, but I have been able to examine only one sample. Some graduates from Harvard and Yale were classified by occupation and "degree of success." Within each occupation, the more successful graduates usually had more children.<sup>26</sup>

Information has been obtained on the family income, education, earners, and dependent children of a sample of the subscribers to Consumers Union.<sup>27</sup> This sample is particularly valuable for our purposes since it primarily consists of families with a keen interest in rational, informed consumption. If my analysis is at all relevant, fertility and income should be more positively related in this group than in the U.S. population as a whole. Table 2 presents the average number of dependent

TABLE 2  
Average Number of Dependent Children for Single Earner Families with Head Age 35-44 in a Sample of Subscribers to Consumers Union, April, 1958

Income Class	Average Number of Dependent Children by Education Class of Head			
	High School Graduate or Less	Some College	Graduate of Four Year College	Graduate Degree
Less than \$3,000	2.43	1.61	2.50	2.17
\$ 3,000-3,999	2.15	2.47	2.18	2.23
4,000-4,999	2.70	2.40	2.04	2.18
5,000-7,499	2.68	2.73	2.88	2.67
7,500-9,999	2.80	2.94	3.00	3.03
10,000-14,999	2.89	3.03	3.12	3.23
15,000-24,999	2.85	3.04	3.04	3.31
25,000 and over	3.12	3.23	3.28	3.60

Source: Unpublished data from consumer purchases study by Thomas Juster at National Bureau of Economic Research.

<sup>25</sup> See H. D. Lamson, "Differential Reproductivity in China," *The Quarterly Review of Biology*, Vol. 10, no. 3, September, 1933, pp. 308-321. Abstinence, which is equally available to lower and upper classes, is the major form of birth control when contraceptive knowledge is limited.

<sup>26</sup> See E. Huntington and L. F. Whitney, *The Builders of America*, New York, Morrow, 1927, ch. xv. Although they did not clearly define "success," it appears that income was a major factor in ranking persons within an occupation and a less important factor in ranking occupations.

<sup>27</sup> This is part of a study by Thomas Juster on buying plans, and I am indebted to him for making the data available to me.

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children for single earner families with the head aged 35-44, each family classified by its income and by the education of the head. There is a substantial positive relationship between income and children within each educational class; education *per se* has relatively little effect on the number of children. The income elasticity is about 0.09 and 0.14 for graduates of a four year college and of a graduate school respectively. These data, then, are very consistent with my analysis, and indicate that well-informed families do have more children when their income increases.

Contraceptive knowledge in the United States spread rapidly during the War, largely fostered by the military in its effort to limit venereal disease and illegitimacy. We would expect this to have reduced the relative fertility of low income classes, and Census Bureau studies in 1952 and 1957 confirm this expectation. Table 3 presents the data for urban and rural nonfarm families for 1952 and all families for 1957 with column (1) giving husband's income, column (2) the age-standardized number

TABLE 3  
Fertility by Husband's Income

Husband's Income (1)	Children Under 5 per 100 Married Men 20-59 (age standardized) (2)	Children Born per 100 Wives 15-44 Years Old (age standardized) (3)	Children Born per 100 Wives over 45 (4)
Part I: In Urban and Rural Nonfarm Areas in the United States in 1952			
\$7,000+	53	189	194
6,000-6,999	52	188	210
5,000-5,999	50	188	210
4,000-4,999	52	177	217
3,000-3,999	52	184	240
2,000-2,999	51	189	256
1,000-1,999	40	181	279
1,000 and less	40	211	334
Part II: For the United States in 1957			
\$7,000+	—	216	213
5,000-6,999	—	220	230
4,000-4,999	—	221	240
3,000-3,999	—	236	279
2,000-2,999	—	247	304
1,000-1,999	—	289	341
1,000 and less	—	—	383

Source I. U.S. Bureau of the Census, *Current Population Reports*, Wash., Government Printing Office, 1953, no. 46, p. 20.

II. U.S. Bureau of the Census, *Current Population Reports*, Wash., Government Printing Office, 1958, no. 84, p. 12.

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of children under 5 per 100 men aged 20 to 59, column (3) the age-standardized number of children ever born per 100 wives aged 15 to 44, and column (4) the number ever born per 100 wives aged 45 and older. Columns (2) and (3) deal primarily with childbearing since 1940 and show a much weaker negative relationship between fertility and income than does column (4), which deals primarily with childbearing before 1940.

The relationship between fertility and income can be investigated not only with cross-sectional income differences but also with time series differences. Cyclical fluctuations in income have regularly occurred in Western nations, and, if our analysis is correct, a change in income would induce a change in fertility in the same direction. For our purpose cyclical fluctuations in fertility can be measured by the cyclical fluctuations in births (although see p. 227). Some earlier studies presented evidence that births do conform positively to the business cycle, even when adjusted for fluctuations in the marriage rate.<sup>28</sup>

I have related some annual figures since 1920 on first and higher order birth rates—brought forward one year—to the National Bureau annual business cycle dates. Column (3) of Table 4 gives the percentage change per year in first and higher order birth rates from the beginning of one phase to the beginning of the next phase. The strong secular decline in births before World War II makes most of these entries negative before that time and hence obscures the effect of cyclical fluctuations in economic conditions. If economic conditions affected births they should have declined more rapidly (or risen less rapidly) during a downswing than during an upswing. This can be detected from the first differences of the entries in column (3), which are shown in column (4). Aside from the wartime period, 1938-1948, second and higher order births conform perfectly in direction to the reference dates and first births conform almost as well. So reference cycle analysis strongly indicates that business conditions affect birth rates. This effect is not entirely dependent on cyclical fluctuations in the marriage rate since second and higher order births conform exceedingly well.

The next step is to relate the magnitude of the movement in births to that in general business, and to compare this with corresponding figures for other consumer durables. Time series giving net national product and purchases of consumer durables were analyzed in the same way as birth

<sup>28</sup> V. L. Galbraith and D. S. Thomas, "Birth Rates and the Interwar Business Cycles," and D. Kirk, "The Relation of Employment Levels to Births in Germany," both in *Demographic Analysis*, J. J. Spengler and O. D. Duncan, eds., Free Press, Glencoe, 1956.

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TABLE 4  
Reference Cycle Pattern of Birth Rates for U.S. Since 1920

REFERENCE CYCLE DATES <sup>1</sup>	<i>Birth Rates per 1,000 Women 15-44 Years of Age, Brought Forward One Year at Reference Cycle Dates<sup>2</sup></i>		FIRST BIRTHS		<i>Excess of Annual Percentage Change During Business Expansion Over Preceding Contraction</i> <i>Succeeding Contraction</i>	
			<i>Annual Percentage Change During a Business</i>			
			<i>Expansion</i>	<i>Contraction</i>		
Peak (1)	Trough (2)	At Peak	At Trough	(3)	(4)	(5)
1920		39				
1921			34		-12.82	
1923		34		0.00		+12.82
1924			34		0.00	0.00
1926		32		-2.94		-2.94
1927			30		-6.25	-3.31
1929		30		0.00		+6.25
1932			25		-5.57	-5.57
1937		31		4.80		+10.37
1938			31		0.00	-4.80
1944		29		-1.06		-1.06
1946			46		28.33	+29.39
1948		36		-10.87		-39.20
1949			33		-8.33	+2.54
1953		34		0.76		+9.09
1954			33		-2.94	-3.70
1957		33*		0.00		+2.94
HIGHER ORDER BIRTHS						
1920		82				
1921			78		-4.88	
1923		78		0.00		+4.88
1924			74		-5.13	-5.13
1926		68		-4.05		+1.08
1927			64		-5.88	-1.83
1929		60		-3.12		+2.76
1932			52		-4.45	-1.33
1937		48		-1.53		+2.92
1938			47		-2.08	-0.55
1944		57		3.46		+5.54
1946			67		8.47	+5.01
1948		71		2.98		-5.49
1949			73		2.81	-0.17
1953		84		3.77		+0.96
1954			85		1.19	-2.58
1957		88*		3.53		+2.34

\* Last figure is for 1956.

Source: <sup>1</sup> See National Bureau of Economic Research Standard Reference Dates for Business Cycles.

<sup>2</sup> See Dudley Kirk, Appendix to "The Influence of Business Cycles on Marriage and Birth Rates," this volume.

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rates were. The figures for birth rates in column (4) of Table 4 and corresponding figures for purchases of consumer durables were divided by corresponding figures for national product to obtain cyclical income elasticities for births and consumer durables. These figures, shown in Table 5, are positive for almost all phases, and this indicates that cyclical

TABLE 5  
Cyclical Income Elasticities for Births and Consumer Durable  
Purchases During Reference Cycle Phases

<i>Reference Cycle Phases (1)</i>	<i>First Births (2)</i>	<i>Higher Order Births (3)</i>	<i>Purchases of Consumer Durables (4)</i>	
1920-1921	Down	0.81	0.31	2.48
1921-1923	Up	0.00	.58	2.96
1923-1924	Down	-1.55	.57	6.63
1924-1926	Up	.87	.48	5.26
1926-1927	Down	2.05	.90	4.05
1927-1929	Up	.37	.09	1.40
1929-1932	Down	.47	.13	1.51
1932-1937	Up	.26	.03	1.96
1937-1938	Down	-.09	.46	1.38
1938-1944	Up	4.26	.73	9.20
1944-1946	Down	3.89	.54	5.33
1946-1948	Up	-.44	.03	0.11
1948-1949	Down	.88	.09	0.01
1949-1953	Up	.78	.54	1.78
1953-1954	Down	1.19	.95	3.23
1954-1957	Up			
Simple Average excluding				
1938-1948		.56	.42	2.84
and negative figures		.77	.42	2.84

Source: Birth rates from column (4) of Table 4; similar figures were computed for consumer durable purchases and net national product. The durable figures were from Raymond W. Goldsmith, *A Study of Savings in the United States*, Vol. 1, Tables Q-6 and A-25 for 1920-1949 and from U.S. Dept. of Commerce, *Survey of Current Business*, July, 1958, Table 2, for 1949-1957. Net National Product figures were from Simon Kuznets, Technical Tables (mimeo), T-5, underlying series in *Supplement to Summary Volume on Capital Formation and Financing* for 1920-1955 and from U.S. Dept. of Commerce, *Survey of Current Business*, July, 1958, Table 4, for 1955-1957.

changes in births and purchases of consumer durables have been in the same direction as those in national output. The cyclical change in first births was usually greater than that in higher order births, and both were usually less than the change in output. Changes in first and higher order births were, however, far from insignificant, averaging 74 and 42 per cent of the corresponding change in output.

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Cyclical changes in births are small compared to those in consumer durables. The latter averaged about 2.84 times the change in output, or about 4 and 7 times the change in first and higher order births respectively. This is consistent with our emphasis on inadequate knowledge of birth control; inadequate knowledge seems to explain much but not all of the difference between the average cyclical change in higher order births and in purchases of durables.<sup>29</sup> Some would be explained by the fact that the data for children include only fluctuations in numbers, while those for durables include both fluctuations in numbers and in quality. The rest may be explained by other differences between children and consumer durables.

For example, to purchase a consumer durable it is necessary to make a down payment with one's own resources and to finance the remainder either with one's own or with borrowed resources. The economic uncertainty generated by a depression increases the reluctance to use own or borrowed resources and induces creditors to raise standards and screen applicants more carefully.<sup>30</sup> Therefore some purchases of durables would be postponed until economic conditions improved. The "purchase" of children, however, is less apt to be postponed than the purchase of other durables. The initial cost of children (physician and delivery charges, nursery furniture, expenses, and so on) is a smaller fraction of its total cost than is the initial cost of most other durables because expenditures on children are more naturally spread over time. Hence children can be "purchased" with a smaller down payment and with less use of borrowed funds than can most other durables.

There is still another reason why the "purchase" of children is less apt to be postponed. *Ceteris paribus*, the demand for a good with a lengthy construction period is less sensitive to a temporary economic movement than the demand for more readily constructed goods, since delivery is likely to occur when this movement has passed. The construction and delivery period is very short for durables like cars and quite long for

<sup>29</sup> An estimate of the desired change in births of planned families can be readily obtained if we assume that the distribution of contraceptive knowledge among U.S. whites is the same as among families in the Indianapolis study, that for planned families the actual change in births equals the desired change, and that for other families the actual change is nil. Then the desired change equals the actual change (averaging 42 per cent of the change in output) divided by the fraction of all births in planned families (31 per cent), or about 136 per cent of output. This is about half of the change for consumer durables.

<sup>30</sup> For evidence relating credit conditions to cyclical fluctuations in the demand for housing, see J. Guttentag, *Some Studies of the Post-World War II Residential Construction and Mortgage Markets*, unpublished Ph.D. dissertation, Department of Economics, Columbia University, 1958.

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children. It takes about 10 months on the average to produce a pregnancy and this period combined with a nine-month pregnancy period gives a total average construction period of nineteen months. This period is sufficiently long to reduce the impact on the demand for children of temporary movements in income.

There are also some reasons why the "purchase" of children is more apt to be postponed. For example, since children cannot be bought and sold they are a less "liquid" asset than ordinary durables, and the economic uncertainty accompanying a depression would increase the community's preference for liquid assets. A more complete analysis would also have to take account of other factors, such as the accelerator and the permanent income concept, which may have produced different cyclical responses in fertility and consumer durables. Our aim here, therefore, is not to present a definitive explanation of the relative cyclical movement in fertility but only to suggest that economic analysis can be useful in arriving at such an explanation.

Although the data on cyclical movements in fertility appears consistent with our analysis, another piece of time series data is in apparent conflict with it. Over time per capita incomes in the United States have risen while fertility has declined, suggesting a negative relationship between income and fertility. Of course, many other variables have changed drastically over time and this apparent conflict in the secular movements of fertility and income should not be taken too seriously until it can be demonstrated that these other changes were not responsible for the decline in fertility. Three changes seem especially important: a decline in child mortality; an increase in contraceptive knowledge; and a rise in the cost of children.

The number of children in the average completed urban white family declined by about 56 per cent from 1870 to 1940. The decline in child mortality explains about 14 percentage points or 25 per cent of this decline.<sup>31</sup> Some evidence already presented indicates that a large secular increase in contraceptive knowledge occurred in the United States. It is not possible, however, to estimate its magnitude precisely enough to compare it to the decline in fertility.

I have emphasized that the increase over time in expenditures on children is not evidence that the cost of children has increased since the quality of children has also increased. Changes in the relative cost of children have to be assessed from indexes of the relative cost of given

<sup>31</sup> Taken from my unpublished paper "Child Mortality, Fertility, and Population Growth."

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quality children. There are several reasons why the relative cost of a given quality child may have changed over time. The decline in child mortality decreased the cost of a given quality child, although it may have only a small effect. The growth of legislation prohibiting child labor and requiring education may have raised the cost of children, but largely made compulsory only what was being done voluntarily by most parents.<sup>32</sup> This is another aspect of the increase in quality of children and does not imply any increase in their cost. If such legislation raised costs at all, it did so primarily for the poorest families since they would be less apt to give their children much education. Therefore, legislation may have been partly responsible for the narrowing of fertility differentials by income class in the last fifty years.<sup>33</sup> The movement from farm to urban communities raised the average cost of children to the population as a whole since it is cheaper to raise children on a farm, but did not appreciably affect the cost within urban communities. Because technological advance has probably been more rapid in the market place than in the home, the imputed cost of time and effort spent on children probably rose, perhaps by a substantial amount. This discussion suggests that there was a secular rise in the cost of children which also contributed to the secular decline in fertility.

Secular changes in educational attainment, religious attachment, discrimination against women, and so on, may also have decreased fertility, and presumably there were changes other than the growth of income which increased fertility. It would take a major study—and even that might be inconclusive—to determine whether the factors decreasing fertility were sufficiently strong to produce a secular decline in fertility in spite of the secular rise in income. At present, it seems that the negative correlation between the secular changes in fertility and income is not strong evidence against the hypothesis that an increase in income would cause an increase in fertility—tastes, costs, and knowledge remaining constant.

### *III. Some Further Implications*

Section II tries to show that the economic analysis of section I is very useful in understanding the effect of income on fertility. This section sketches some additional implications. Our understanding of temporal

<sup>32</sup> See G. J. Stigler, *Employment and Compensation in Education*, National Bureau of Economic Research, Occasional Paper 33, 1950, Appendix B.

<sup>33</sup> This analysis casts doubt on the view that the sharp decline in British fertility during the 1870's and 1880's resulted from the introduction of compulsory education. The decline was greatest in the upper classes which were least affected by this legislation.

fluctuations in births would be deepened if it were more widely recognized that births are "flows" to the "stock" of children, just as new car purchases are flows to the stock of cars. Flows are determined not only by variables determining stocks, but also by depreciation rates, acceleration, savings, and, as shown in our discussion of cyclical movements in births, by considerations of timing. The recent work relating births to parity shows that demographers as well as economists are beginning to stress the interaction between stocks and flows.<sup>34</sup> This work needs to be extended in a systematic fashion.

The discussion in section I made it clear that the quantity and quality of children are intimately related. An increase in income or a decline in the cost of children would affect both the quantity and quality of children, usually increasing both. An increase in contraceptive knowledge would also affect both, but would increase quality while decreasing quantity. The quality of children is very important in its own right, for it determines the education, health, and motivation of the future labor force. It is a major contribution of an economic framework to bring out the mutual interaction of quantity and quality—an interaction that has been neglected all too often in writings both on population and on the quality of the labor force.

It is often said that farm families are larger than urban families because of a difference in tastes. Since farmers have a comparative cost advantage in raising children as well as in raising foodstuffs, they would tend to be more fertile even without any difference in tastes. The rural advantage may not be the same at all qualities and, indeed, presumably is less at higher qualities where child labor and food are less important. Over time, rural as well as urban families have moved to higher quality children, and this may have contributed to the narrowing of urban-rural fertility differentials in recent decades. The influence of differences in the cost of children deserves much more systematic study, for it may partly explain not only these urban-rural fertility differences but also the secular decline in fertility up to World War II and the apparent secular narrowing of fertility differentials among urban economic classes.

In the Western World, birth rates in the early postwar period were well above rates of the thirties. In some countries, including the United States and Canada, they have remained at about the early postwar level; in others, including Great Britain and Sweden, they have drifted down to about their 1940 level; in still others, including France, they have

<sup>34</sup> Both economists and demographers found that wartime effects on stocks had important consequences for postwar flows.

drifted down to a position intermediate between their immediate pre- and postwar levels. The analysis in this paper does not readily explain these differences, but it does explain why birth rates in all these countries are well above levels predicted from their secular trends. The secular decline in child mortality and the secular increase in contraceptive knowledge were important causes of the secular decline in births. By 1945 the level of child mortality was so low that little room remained for a further improvement. Although contraceptive knowledge was not well spread throughout every layer of society, the room for its further improvement was also more limited than it had been. With the weakening of these forces, much of the steam behind the secular decline in birth rates has been removed. Positive forces like the growth in income are now opposed by weaker negative forces, and it is not too surprising that fertility has ceased to decline and even has risen in some countries.

Several recent studies of consumption have used a measure of family size as an independent variable along with measures of income and price.<sup>35</sup> This procedure is justifiable if family size were a random variable or completely determined by "non-economic" factors.<sup>36</sup> If, on the other hand, family size were partly determined by economic factors, this procedure would result in misleading estimates of the regression coefficients for the other independent variables. Thus, suppose family size were positively related to income, and food consumption varied with income only because family size did. The regression coefficient between food consumption and income, holding family size constant, would be zero, an incorrect estimate of the long-run effect of an increase in income on food consumption. One would not estimate the effect of income on gasoline consumption by finding the regression coefficient between gasoline consumption and income, holding the number of cars constant. For gasoline consumption might increase with income largely because the number of cars does, just as food consumption might increase because family size does. This discussion, brief as it is, should be sufficient to demonstrate that students of consumption economics need to pay more attention to the determinants of family size than they have in the past.

<sup>35</sup> See, for example, Theil, *op. cit.*, S. J. Prais and H. S. Houthakker, *The Analysis of Family Budgets*, Cambridge, Cambridge University Press, 1955. Measures of family size often include not only the inner core of parents and their children but also other relatives living in the same household. My discussion refers only to the inner core; a somewhat different discussion is required for "other relatives."

<sup>36</sup> Prais and Houthakker appear to believe that family size is determined by non-economic factors when they say "It might be thought that since household size is, in a sense, a noneconomic factor. . . ." *ibid.*, p. 88.

## IV. Summary

This paper employs an economic framework to analyze the factors determining fertility. 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.

Each family must produce its own children since children cannot be bought or sold in the market place. This is why every uncertainty in the production of children (such as their sex) creates a corresponding uncertainty in consumption. It is also why the number of children in a family depends not only on its demand but also on its ability to produce or supply them. Some families are unable to produce as many children as they desire and some have to produce more than they desire. Therefore, actual fertility may diverge considerably from desired fertility.

I briefly explored some implications of this theory. For example, it may largely explain the postwar rise in fertility in Western nations, the relatively small cyclical fluctuation in fertility compared to that in other durables, some observed relations between the quantity and quality of children, and why rural women are more fertile than urban women.

I tested in more detail one important implication, namely that the number of children desired is directly related to income. Crude cross-sectional data show a negative relationship with income, but the crude data do not hold contraceptive knowledge constant. When it is held constant, a positive relationship appears. This view is supported by the positive correspondence between cyclical movements in income and fertility. The secular decline in fertility may also be consistent with a positive relationship since the secular decline in child mortality and the secular rise in both contraceptive knowledge and child costs could easily have offset the secular rise in income.

## C O M M E N T

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I. For many years economists have taken variations in rates of population growth, and in family size, as *data* which help to explain various economic phenomena but which cannot themselves be explained in terms of economic theory. Becker has done us a real service in bringing economic analysis to bear on the problem once more. He has not only worked out

the implications of traditional economic theory for demographic theory but has also gone some distance in testing those implications against the empirical data.

Becker argues that those couples with sufficient contraceptive knowledge to control births have to decide how many children to have. For most people, children produce certain satisfactions and have a net cost. In those circumstances we expect (with some qualifications) that the number of children per family will rise with income just as we expect the number of cars or chairs or cubic feet of housing space per family to rise with income. But just as in those cases we expect the quality of cars or chairs or houses to rise with income as well as the number, we also expect the quality of children to rise with income as well as the number. That is, we expect the children of the rich to be better housed, fed, and educated than those of the poor.

Becker then qualifies the argument by taking into account the fact that in some circumstances children may yield their parents a net income instead of having a net cost. In that case the theory of investment is relevant as well as the theory of consumption. He has brought in a number of other considerations which I need not review but which lead to only minor qualifications of his main arguments.

After reviewing the implications of economic theory, Becker then faces the fact that for many years the raw data on differential fertility have shown a fairly strong negative relationship between variations in income and variations in numbers of children per family. Moreover, until recently the average number of children per completed family has been declining although average family income has been rising secularly.

Becker maintains that the negative correlation between income and family size is due to the negative association between income and knowledge of contraceptive methods. I think that most of us would agree that differential knowledge does explain a large part of the apparent negative relation between income and family size.

The evidence of the Indianapolis study certainly supports that conclusion. Becker, however, tries to use the study to support his conclusion that there should be a positive association between income and family size. I must say that the evidence he cites did not strike me as exactly overwhelming.

The empirical evidence offers, I would say, rather ambiguous support for Becker's hypothesis. That may be because we have only a limited amount of the right kind of data but there are, I think, some reasons for thinking that Becker's theoretical case may not be so open and shut as

appears. Those reasons have to do with the nature of the "cost" of children and with the limitations on the possibility of substitution between quantity and quality of children.

II. Becker has taken the occasion to correct the simple-minded who fail to distinguish between the cost of children of given quality and expenditure per child. Now, of course, it is correct to regard changes in prices (or relative prices) of a given quality of a good as changes in the cost of that good and changes in amount or quality of the good purchased (at a given price schedule) as changes in expenditure not involving changes in cost. But not all of those who say that the cost of children rises with income are so simple-minded as Becker suggests, though their language may not be exact. What Leibenstein, for example, appears to mean is that the expenditure per child which the parents consider to be necessary rises with income.

Questions of semantics aside, there is an important substantive difference between Becker's approach and that taken by economists whose approach is, if he will excuse the expression, more sociological.

I used to tell my students that the difference between economics and sociology is very simple. Economics is all about how people make choices. Sociology is all about why they don't have any choices to make.

Becker assumes that any couple considers itself free to choose any combination it wishes of numbers of children and expenditure per child (prices of particular goods and services being given). I submit that a sociologist would take the view that given the educational level, occupation, region, and a few other factors, most couples would consider that they have a very narrow range of choice. To take only one example, I suggest that there is no one in the room, not even Becker, who considers himself free to choose either two children who go to university or four children who stop their education after high school. It may be said that that still leaves lots of room for variation, but I think it can be said that no one in this room considers seriously having, say, four children who attend third-rate colleges at low cost per head or three who attend better ones.

For this audience I need not go through the whole routine about roles, goals, values, and so on. It will be sufficient to remark that there is no area in which the sociological limitations of freedom of choice apply more strongly than to behavior in regard to bringing up children.

Effective freedom of choice between quantity and quality of children is also limited by more mundane and mechanical considerations. The principle of substitution which is at the basis of Becker's argument

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suggests that if the parents have low quality children, as he puts it, they can spend more of their income on something else. Quality of children means, in Becker's terminology, nothing more than expenditure per child (with a given price schedule). But in many respects the standard of living of the children is mechanically linked to that of the parents. Is it possible to have crowded housing conditions for the children and uncrowded conditions for the parents? As the father of four I am in a position to answer with an unqualified negative. Children may eat a different menu from their parents, but if so, it is because they *like* peanut-butter sandwiches. I could go on but I am sure it's unnecessary. A final point in this connection is the non-cash cost of improving quality in children. Becker has used the term quality as though it were just another expression for expenditure at constant prices. But in the more ordinary sense of the term, quality has to be bought with time as well as money. Most parents think (probably mistakenly) that their children are better off if the parents spend time with them. Now time can be bought in the sense that domestic help and appliances can be bought to free time for other things. But even if one had nothing else to do, the marginal disutility of Cub Scout and PTA meetings rises rapidly. These non-cash costs must certainly be of some importance in determining family size.

Becker will say that this is merely an aspect of the diminishing marginal utility of numbers of children. He is correct, of course, but the investment of time in children is not a matter of individual choice any more than the investment of money. The time which parents spend on children is largely determined by social conventions. Those conventions differ among social classes. Since social class is often associated with income, the non-cash costs I have mentioned will influence the apparent relation between income and family size in many cross-sections.

Those considerations lead me to the following conclusions: (1) the effect of income on family size which Becker expects will be greatly weakened by the tendency for the standard of living for children to advance more or less proportionately with that of the parents, and (2) standards of education and of expenditure of time on children will vary with social class. Social class in turn will be associated with income but not in a unique way. In some societies it may turn out that the "cost" of children rises faster than income, in others more slowly.

To put it more generally, economic factors are certainly likely to influence the number of children born to those who are able to plan births. But I do not feel that we are likely to find out much about their influence by simply drawing an analogy between children and durable goods.

## ECONOMIC ANALYSIS OF FERTILITY

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Rupert Vance, in his Presidential address before the Population Association of America at Princeton in 1952, prescribed for demographers "a good stiff dosage of theory, adequately compounded."<sup>1</sup> Gary Becker has heeded Vance's prescription, and in addition has presented us with an interesting and challenging paper.

The essence of Becker's theory of the demand for children can be reduced to two propositions. First, as family income increases, parents will provide their children with a higher level of living. Second, as income increases, parents will probably increase the number of children which they demand. My comments will strongly concur with the first proposition, but will question the second.

In his economic theory, Becker treats children like consumer durables. His justification for treating children in this fashion is that, like automobiles, children are a source of utility and require a considerable outlay of expenditures. It is then contended that the nature of the demand for children is similar to that for automobiles—higher income families demand more automobiles and better quality automobiles; similarly, they demand more children and spend more per child.

In his analysis, Becker distinguishes two components in the expenditures on a child. The first relates to the size and nature of the basket of goods and services which the child consumes. The second relates to the prices of the goods and services which the child consumes. Expenditures per child can change either because of a change in the composition of the child's consumption basket, or because of a change in the prices of the components of the basket. Becker equates the additional utility received by the parents resulting from an increase in expenditures of the first kind, i.e., expenditures directed toward an improvement in the composition of the basket, with the increase in the "quality" of the child. Such expenditures shall be referred to as quality expenditures. Becker defines a change in expenditures per child resulting simply from a change in the prices of one or more components of the basket, that is, the second kind of change, as a change in the "cost" of a child. Thus, in Becker's framework, the concept of a change in the cost of a child is a very narrow one. It refers only to a change in expenditures per child, where the child continues to consume a fixed basket of goods and services.

A word of caution is necessary here. Becker has related quality expenditures to the amount of utility that children provide for their parents. This relation, however, is valid only within a given family unit. One

<sup>1</sup> Rupert B. Vance, "Is Theory for Demographers?", *Social Forces*, Vol. 31, 1952, p. 13.

cannot conclude that the family which purchases less for their child derives less total utility from him in comparison with the family which purchases more. Such a conclusion implies an unwarranted inter-personal comparison of utility. If the Jones boy is paying for dancing lessons while the Smith boy is reading a borrowed copy of Marshall's *Principles*, one cannot conclude that the Joneses are deriving more utility than the Smiths with regard to these alternative pursuits of their respective sons.

Becker has imputed much theoretical significance to his distinction between the concepts of quality expenditures and cost expenditures. For example, in his conclusion, it is suggested that a secular increase in the "cost" component contributed to a secular decline in fertility. Nothing is said about the effect of a secular change in the "quality" component. We shall return to this point shortly.

Becker's paper suggests a second distinction between the quality and cost components. The cost of a child, which depends on the prices of commodities and services, is determined by the market forces of supply and demand. Cost, therefore, is not a family decision variable, and is independent of family income. On the other hand, quality expenditures are a family decision variable and are positively related to income. Becker stresses that higher income families have higher quality children (spend more per child), and that this is a voluntary decision. According to Becker, "The rich simply choose higher quality children."

Is the quality expenditure component purely a decision variable? Do the rich really have a choice? To a large extent, I submit that they do not. It is almost impossible to conceive of a child who is raised at a much lower level of living than that of his parents. He lives where they live, tends to eat what they eat, and in general, as a matter of course, shares about the same standard of living that they do, by virtue of his living with them. Surely, the child cannot be sent to live in the slums of the Lower East Side while his parents dwell in a penthouse on Park Avenue. Thus, automatically, when parents raise their own level of living, their child's is also raised, and quality expenditures per child *must* rise.

When demographers, economists, or anybody, for that matter, speak of a decline in the birth rate, they are referring to a decline in the number of children born divided by either total population or some component of population (for example, women of childbearing age). The total number of children born is not weighted by a quality index—every child is given a weight of unity. Thus, if we are to turn to economic theory for an explanation of the decline in the birth rate, one must argue that *expenditures* (as opposed to "cost") per child have risen over time. It is

theoretically irrelevant to distinguish between quality expenditures and "cost" expenditures. Becker's conclusion that an increase in "cost" expenditures per child contributed to the decline in the birth rate is useful only if he is referring to a decline in the birth rate of children of homogeneous quality. But since quality expenditures per child have increased over time, this is not the case. Therefore, in explaining birth-rate trends or fertility differences by income, where quality expenditures per child vary in a systematic way, although not reflected in the measurement of the birth rate, Becker's distinction between quality and "cost" expenditures is not useful. The relevant economic variable is simply expenditures per child.

It is for the reasons cited above that I wish to defend Harvey Leibenstein against Becker's criticism. I might add that I have a vested interest in doing so since an argument similar to Leibenstein's appears in one of my own writings.<sup>2</sup> Becker quotes Leibenstein as follows: "The conventional costs of child maintenance increase as per capita income increases. The style in which a child is maintained depends on the position and income of the parents; therefore, we expect such costs to rise as incomes rise. . . ."<sup>3</sup>

Although Becker is correct in noting that Leibenstein failed to make the statistical distinction between quality and "cost" expenditures, this is not the relevant distinction that should be made in a theory of the demand for children which attempts to link income and fertility. The relevant distinction, if any, is voluntary expenditures versus involuntary expenditures. To a large extent, the higher income and social position of the family *require* that it spend more per child. In this sense, a rise in income necessarily results in a relative increase in expenditures per child. This, economic theory suggests, would have a depressing effect on the quantity of children demanded. Consequently, the quantity income elasticity of demand for children is quite low. Indeed, for most of the income range, the quality income elasticity may be so high that it contributes to a negative quantity income elasticity of demand.

On the other hand, the quantity income elasticity for consumer durables is generally much higher. Several distinctions between children and consumer durables account for this. One distinction has already been alluded to in the preceding discussion. The quality of a child as a function of income is less of a decision variable than, for example, the

<sup>2</sup> See Bernard Okun, *Trends in Birth Rates in the United States Since 1870*, The Johns Hopkins Press, Baltimore, 1958, pp. 177-180.

<sup>3</sup> Harvey Leibenstein, *Economic Backwardness and Economic Growth*, John Wiley, 1957, pp. 163-164.

quality of an automobile. This may tend to cause the quality income elasticity of consumer goods to be less than that for children, and this would allow a higher quantity income elasticity for consumer goods.

For consumer goods, quantity appears to be a closer substitute for quality than in the case of children. Two lower-price cars may be considered equivalent to one high-priced car for the high income family. But is it just as likely that this family would be indifferent toward having two children who are untrained or not well-educated, or having one well-educated child? Probably not. In fact some parents may derive disutility if their children fall below their quality standards.

Probably a more common occurrence among higher income two-car families is that they will own one high-priced car, and also own a lower quality second car. Are they apt to follow a similar policy with regard to children—that is, we already have one son who is a Princeton graduate, so we can plan to finance our second son only through high school? I think not. This unwillingness to diminish the quality of successive children tends to diminish the quantity income elasticity of demand for children, relative to that for commodities.

For reasons cited above, it is suggested here that unlike the typical case for consumer durables, the quantity income elasticity of demand for children may well be negative, or if positive, be very low. Briefly restated, our main point is that as income increases, quality expenditures per child do—and in a large measure must—increase to such an extent that parents tend to reduce their demand for children. Note, however, an exception to this proposition—in the very high income families, where family size tends to be larger than in the middle income families, it seems evident that parents can satisfy their quality requirements without having to restrict the quantity of children by the same degree as the somewhat lower income families.

The weight of the empirical evidence presented at this National Bureau conference as well as that of other studies supports the proposition that, for most of the income range, fertility varies inversely with income. Becker contends that these data do not apply to his theory because lower income people have inadequate knowledge of birth control. If all families had perfect control over family size, Becker contends that the relationship would be reversed. In this fashion, he defends the position that the quantity income elasticity is positive.

Becker notes correctly that knowledge of birth control is ever-increasing. If the quantity income elasticity of the demand for children is positive, one would expect the inverse birth-rate differentials by income to be

ever-narrowing as birth-control knowledge continuously spreads. While a narrowing trend has occurred, it has been far from persistent. For example, Clyde Kiser found, in comparing family size and income in the United States in 1952 and 1957 that "the apparent enlargement of the differentials by income was quite pronounced."<sup>4</sup> This is a finding which clearly weakens Becker's point that differentials in birth-control knowledge are the factor accounting for the inverse relation between income and family size.

There is also strong evidence to suggest that where social or economic forces prevail which tend to diminish the size of family desired, the lack of knowledge of modern birth-control techniques is not an obstacle in the path of declining family size. For example, according to Whelpton's figures, in the Southern United States, which was largely rural in 1800 as well as in 1870, the fertility rate declined by more than 50 per cent from 1800 to 1870—a period long before modern birth-control methods were known.<sup>5</sup> A similar experience occurred in France after 1800. This evidence tends to weaken the contention that an improvement in birth-control knowledge explained a significant share in the secular decline in fertility.

Becker also attempts to support his thesis that income and the demand for children are positively related by pointing to the positive conformity of the birth rate to fluctuation in the business cycle. I feel that during a business cycle, the time period may be too short for parents' views and standards regarding quality of children to change significantly as a result of a change in income. During the downswing, parents will strive to maintain their standard of living and the quality of their children. Faced with this economic pressure, they will postpone having more children. During the peak stages, income may be rising faster than child-quality standards, and couples can think in terms of having more children without encroaching on their accustomed level of living and their child-quality standards.

The well-known "making-up" theory may partly account for the positive association between fluctuations in income and fertility over the business cycle. This theory holds that the business cycle mainly affects the timing of the arrival of children, but has no or but negligible effect on completed family size. For all these reasons, a positive association between changes in income and the birth rate over the cycle is readily explained.

<sup>4</sup> Clyde V. Kiser, "Differential Fertility in the United States," in this volume.

<sup>5</sup> P. K. Whelpton, *Forecasts of the Population of the United States 1945-1975*, Bureau of the Census, 1947, p. 16.

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In the long run, however, standards of living and child quality standards adjust to a secular rise in income. The secular rise in income causes an increase in the quality of children, and therefore expenditures per child rise. This tends to diminish the quantity of children demanded, and the well-known empirical inverse relation between income and the birth rate reasserts itself.