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BECKER AND THE DEMOGRAPHIC TRANSITION

Ronald Lee
University of California, USA

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1. THE DEMOGRAPHIC TRANSITION

It was a different era when Gary Becker did his groundbreaking work on the economics of fertility, during the years from the late 1950 through the early 1990s. There was great concern then about the "population explosion" due to sustained high fertility in the developing world after mortality declined following World War II. In 1968, Paul Ehrlich published "The Population Bomb" predicting disaster and mass starvation due to rapid population growth: "The battle to feed all of humanity is over. In the 1970s, the world will undergo famines – hundreds of millions of people are going to starve to death . . . ." Robert McNamara, then the President of the World Bank, in 1984 said "Short of thermonuclear war itself, population growth is the gravest issue the world faces over the decades immediately ahead. If we do not act, the problem will be solved by famine, riots, insurrection and war."

But what would it mean to "act"? At the Bucharest World Population Conference in 1965, the developing nations put forward the slogan that "Development is the best contraceptive". At the same time, many analysts and policy makers believed that direct provision of contraceptives through organized family planning programs was necessary for fertility decline, and that economic development in itself would not be enough, and indeed might be impossible without prior fertility decline. Serious scholars sought to draw lessons from the past about the causes of fertility decline in Europe to better understand what policies might be successful elsewhere. Economists Coale and Hoover published an influential macroeconomic simulation concluding that sustained high fertility in India would slow economic development relative to a scenario of fertility decline.

These debates were not just academic, they were echoed and cited in government ministries and legislatures around the world, and they influenced policy on the ground. Into this heated debate came Becker with his analytic approach to understand fertility as rational choice, a premise that itself was in question. But before understanding his theories of the demographic transition, I will begin by describing it.

The "demographic transition" is a phrase used by demographers to refer to the process through which a population moves from high fertility and mortality to

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low fertility and mortality, with associated changes in the age distribution of the population, a process that unfolds on the scale of one and a half to two centuries for an individual population (Lee 2003). Typically fertility is initially around 5 or 6 births per woman and life expectancy at birth is 25 to 35 years. With some exceptions, the transition begins when mortality starts to decline, while fertility decline does not start until a few decades later. No place in the world has yet completed this transition since the consequences of fertility decline for population aging would take decades more to unfold even if there were no further changes in fertility or mortality, and it is not yet clear what the end-point of fertility decline may turn out to be, while mortality decline is still proceeding rapidly even in those populations where life is already longest.

Becker's work mainly addressed the fertility transition, which posed a number of problems for any economic explanation. It seems clear enough that children are a normal good, yet fertility fell at the same time that incomes were rising, and wealthier couples generally had lower fertility than poorer couples. Although fertility results from what are potentially economic decisions, it is also a biological process linked to passionate sex, reproductive biology and contraceptive technology. While couples may have feelings about fertility itself, the main object of choice is surviving children rather than births, so the role of health and mortality must be taken into account. Couples may want children and be unable to have them, and may prefer not to have children but end up with them anyway. All these features and more make the economics of fertility a challenging topic.

2. TRANSITION THEORY BEFORE BECKER

2.2. Transition Theory

The classic statement of demographic transition theory (at least as it pertains to fertility) is due to the demographer Notestein, and the following passage from Notestein (1953) is most frequently quoted:

> In a period of rapidly developing technology, new skills were needed and new opportunities for individual advancement arose. Education and a rational point of view became increasingly important. As a consequence, the cost of child-rearing grew and the possibilities for economic contributions by children declined. Falling death rates at once increased the size of the family to be supported and lowered the inducements to have many births. Women, moreover, found new independence from household obligations and new economic roles less compatible with childbearing.

Many of the basic ideas that Becker subsequently developed were briefly listed in this passage, including increased returns to education, the resulting increase in the cost of child-rearing, the reduced possibilities for child labor, increased child survival that meant fewer births were needed, and women's economic activities becoming less compatible with raising children. Yet this passage could be viewed as a list and not a coherent theory. Becker gave us a coherent theory built on a

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sound foundation of established economic principles, incorporating the elements mentioned by Notestein and adding new factors as well.

Becker was not the only economist to develop theories about the fertility transition. A few years before Becker's first paper on fertility in 1960, Leibenstein (1957) published a theory of fertility decline that incorporated some useful structure, with parents deriving utility from children's labor, old age support, and psychic satisfaction. However, the formulation was less rooted in standard economic theory, less formal, and it was not taken up by others. Other theories from around this time were advanced by the economist Easterlin (1969) and sociologists Caldwell (1976), and Davis (1963), among others. These also were not rooted in standard economic theory, and none has been so centrally important as Becker's work, nor has been used so widely as a foundation for the development of further theory and a guide for empirical work. Becker's theory came to dominate the field on this topic in all academic disciplines.

However, when Becker developed and published his theory, the world was not ready for it and at first most researchers rejected it out of hand. There was and still is a deep divide between structural or socioeconomic theories of the fertility decline on the one hand and diffusionist/cultural views on the other, with important policy implications. Becker's theories are clearly in the structural camp. The so-called Princeton study, involving many leading demographers and led by Ansley Coale, examined the timing of fertility change and its covariates at the provincial level in Europe, and concluded in favor of the diffusionist/cultural view.

A second divide, related to the first, separated many who believed that fertility before the transition was not subject to rational choice or control from those who believed it was. Becker and most economists were on the rational choice side. Demographers tended to line up on the side of no conscious choice. The evidence here came from analyses of detailed micro genealogic studies based on linked parish register data, using methods pioneered by the French demographer, Louis Henry. These studies found that marital fertility in pre-transitional European populations was independent of the duration of marriage or the number of surviving children, and depended only on the age of the woman. Had there been a fertility target toward which couples were aiming, we would have expected that at each age those who had been married longer or who had more surviving children would have lower fertility, and this was not the case.

So as an explanation of the fertility transition, Becker's theory started with two strikes against it. First, it assumed rational choice which seemed inconsistent with the "natural fertility" finding of historical demography, and second it was structuralist which seemed inconsistent with the Princeton project's findings.

3. BECKER AND THE TRANSITION

3.1. His Basic Model

It is Becker's earlier publications on fertility (1960, with Lewis 1973, and his *Treatise on the Family* in 1981, with second edition in 1991) that had a great

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influence on fertility theory in general and transition theory in particular. In this theory, a couple derived utility from its own consumption, from the number of its surviving children, and from the average quality of those children who were usually treated as homogeneous for simplicity. Children were viewed as a kind of consumer durable because they yielded psychic satisfaction to their parents over a long period. He recognized that they could also be producer durables, since in some contexts they might provide significant labor services over an extended period. Becker abstracted from the temporal and sequential aspects of the choices to be made, again for simplicity – leading to the derisive "single litter" characterization.

The couple's income was divided between parental consumption of a basket of goods times its price, and expenditures on children which were equal to their number times the average basket of quality goods times the price of quality. Thus, quantity and quality of children interacted multiplicatively in the budget constraint. The couple made a choice based on their preferences, their income, and the prices of parental goods and child goods. As noted above, Becker did appreciate the market value of women's time as an important factor, but he did not formally develop that aspect of his theory (although others did, including Mincer, Willis, T. P. Schultz). Nor did he formally develop the idea that the couple would also choose how much work their child would do, although he viewed economic contributions by children as reducing their cost, and presumably also as reducing their quality.

3.2. The Role of Mortality Decline

Becker, in 1960 and subsequently, assumed that parents care about their number of surviving children rather than their number of births, so that a 10% increase in the probability of a child surviving to maturity would reduce the demand for births by 10% as a first order impact. But he also envisioned further effects. On the one hand, lower mortality and higher survival rates would reduce the cost of achieving a mature child of a given quality, and that might raise the demand for numbers of children through both income and substitution effects. On the other hand, lower mortality would have a greater effect on the price of quality than quantity of children, because it would raise the rate of return to investments in quality. So, lower mortality might induce substitution of quality for quantity of children leading to fertility decline. Overall, Becker believed that mortality decline was a powerful driver of fertility decline over the fertility transition.

The general idea that parents either choose a target number of surviving children or at least adjust their fertility in response to the increase in family size that results from improving child survival was already current in the literature and not new to Becker. However, his discussion of the ensuing price and income effects was new indeed. Other economists then developed related theory around fertility hoarding (bearing extra kids in anticipation of mortality), the replacement of children who died, and related ideas. There is a substantial empirical literature that addresses the role of mortality decline over the transition as an explanation of fertility decline, but it is not conclusive. One of the complexities is that the death of an infant

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terminates breastfeeding by the mother, causing her to resume ovulation earlier and, under the conditions of pretransitional Europe, to have a shorter birth interval and higher fertility, apparently for biological rather than behavioral reasons.

3.3. Value of Time Approach

Although Mincer (1963) is usually credited with the theory that the female market wage measured the value of the time women spent rearing children, so that secular increase in female wages would have led to an increased cost of children and a decline in fertility, Becker advanced this idea earlier in his initial paper: "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." (Becker 1960: 228). Here, Becker clearly identifies the fundamental cause of the rising opportunity cost of women's time spent in child-rearing as the greater effect of technological progress on the productivity of female time in the market than in home production. He discusses this point at greater length in his later work (Becker 1991: 140). This important idea formalizes and potentially quantifies the general ideas in the last sentence in the Notestein paragraph quoted earlier.

3.4. Quantity–Quality Approach

Becker assumed that both quantity and quality of children had positive income elasticities with their prices held constant. However, as income rose secularly with economic growth and development, the demand for quality was assumed to be more elastic and rise more rapidly. As a consequence, the rising demand for quality raised the shadow price of a child sufficiently to lead to an actual reduction in the quantity or number of children demanded. There is a separate article in this issue of the journal on this important topic, so I will not expand on it, and I trust that this brief summary will provide the necessary background for the discussion of contraception that follows.

3.5. Contraception and Family Planning Programs

Becker tended to discount the role of contraceptive technology in the fertility transition, and suggested that advances in contraceptive technology were more likely the consequence of a reduction in the demand for children than the cause of falling fertility. Nonetheless, he had a number of interesting and original ideas on the topic, and formally modeled the relation of contraception to fertility outcomes. His most interesting theoretical insight here was that in the absence of contraception, sexual pleasure was a kind of subsidy to the quantity of children, with pleasure offsetting and reducing the shadow price of a child. Once cheap and effective contraception becomes available, however, this subsidy vanishes because sexual pleasure can

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be enjoyed with near zero risk of pregnancy. Therefore, contraceptives raise the price of quantity of children relative to quality, leading to substitution away from quantity toward child quality and perhaps toward parental consumption.

He made another very important point about contraception: If the availability of contraceptives did lead directly or indirectly to a reduction in numbers of births as a first order impact, this reduction in quantity would lead to an increase in the quality of child which would then lead to further decline in the number of children, and so on, magnifying the original effect. He thought this sort of multiplier effect through the economic response could be quite substantial, and would amplify the importance of contraception and family planning in the transition.

> Although family planning might take credit for the whole decline in births because it is the initiating force, the induced increase in the demand for higher-quality children and induced decrease in the demand for quantity of children are responsible for more than half of the decline in births. (Becker 1991: 151).

In my view, these important ideas have been insufficiently recognized and used in the ongoing theoretical and empirical literature on the role of family planning programs in the fertility decline.

4. BECKER WITH ALTRUISM AND INTERGENERATIONAL RELATIONS

With Barro, Becker (1988) extended his theory by defining the quality of a child as its future adult utility. In this approach, a parent's utility depends on the utility of her children, and since the same is true of the children's utility which depends on that of their own future children, and so on forever, the setup is recursive and the utility of a parent today is a sum over infinite future generations. The parent can affect her children's adult utility by investing in their human capital and thereby raising their future earnings, or alternatively by leaving them a bequest which could be either inter vivos or at end of life. Although parents do care about their children's future utility, they also care about their own utility including in retirement, and consequently the amount that parents with lower income choose to invest in their children's human capital is limited and may be less than the optimal amount – which is the amount of human capital such that the rate of return on a marginal increment would equal the market rate of return. Alternatively, higher income parents will invest in the optimal amount of human capital and if they choose to give even more to their children, it will be in the form of a bequest that earns the market rate of return.

Becker and Murphy (1988) draw on this framework to propose an explanation of the origin of public education and public pensions, a topic that does not concern us directly here. However, Willis (1994) built on this set of ideas to develop an important but little known interpretation of the fertility transition that I view as a natural extension of Becker's work, incorporating institutional context.

Willis describes several stages of the fertility transition. Before the transition, the rate of return to investment in human capital is very low, so parents choose

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higher quantity and lower quality for their children. In this case there is high fertility, child labor, and relatively large material bequests rather than human capital investments. In the next stage, returns to human capital begin to rise due to technical progress. People are still poor, so their rising investments in human capital lead to fertility decline (quality is substituted for quantity), and child labor declines as part of rising quality. In this stage, parental investment in children's human capital may exceed their altruistic limit, so in addition to transfers they make implicit loans to children for the excess investment, leading to an efficient level of human capital investment. In this stage, adult children support their elderly parents as a repayment of these implicit loans. But, these implicit parental loans to children and the resulting efficient outcome can occur only if there are supportive norms and institutions to ensure that the children actually repay their implicit debts. This appears to have been the case in East Asia, where strong familial support of the elderly goes hand in hand with heavy investments in a small number of children.

More often, perhaps, there is a failure to invest optimally in human capital, due to an inability to enforce repayment to parents of implicit loans (negative bequests). In this common situation there is too little investment in education and fertility remains relatively high. This is the setting for the Becker and Murphy (1988) theory that public education arises to remedy the failure of the family to invest efficiently in education, and that public pensions arise to remedy the loss suffered by the generations of adults who pay for the start-up of public education while receiving no education themselves.

Finally, as income and wealth rise, parents choose to make larger intergenerational transfers to their children including optimal human capital, so children no longer have implicit debt and familial support of the elderly declines. In the end, parents come to make transfers to their children at every life cycle stage as in the rich industrial nations today. Fertility falls to very low levels commensurate with the very high cost of transfers to children including human capital investments and other inter vivos and perhaps end-of-life transfers.

This framework pulls together a number of Becker's ideas in a very fruitful way that could structure an empirical analysis of the fertility transition, but this has not yet been attempted.

5. CONCLUSIONS

Becker's theory has been highly influential in shaping our understanding of the demographic transition. In the heated atmosphere of controversy and advocacy at the time it appeared, he took us beyond vague notions of modernization to specific, well-formulated, testable hypotheses derived from a formal theory. He pinpointed mechanisms and measures for the way economic development might raise the costs of children and lead to fertility decline despite rising incomes. Again drawing on his core theory, he showed us how the effects of family planning programs and

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contraceptive availability could be much more complex than they seemed, a lesson that has still not been incorporated in our assessments of their roles.

However, this is not to say that hypotheses derived from his theories have been widely and systematically tested and confirmed using historical data. The limitations of historical and developing country data constrain what can be done. Nonetheless, Becker's views of fertility and the family, and the concepts and vocabulary he gave us for discussing them, have become central to the way scholars in all disciplines think about the fertility transition, and enable us to assemble our various pieces of information into a coherent picture.

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