Method	Failure Rate (pregnancies per 100 woman-years of use) High	Average	Low
No method		90*	
Aerosol foam			29
Sponge and foam powder	35		28
Lactation	26		24
Douche	41		21
Foam tablets	43		12
Coitus interruptus	38		10
Condom	28		7
Suppositories	42		4
Jelly or cream	38		4
Diaphragm and jelly	35		4
Intra-uterine device (IUD)		2.4	
Rhythm	38		0
Steroid pill	2.7		0
Abstinence			0
Abortion			0

*This figure, suggested by Pearl almost forty years ago, is almost certainly too low (D. M. Heer; personal communication).

Figure 2-73 Use-effectiveness of various fertility control methods
Source: Adapted from Southam 1966.

micro approach. First, the apparent costs of various available fertility control methods must be assessed. This assessment can be made largely from data on the mix of methods actually used, the average failure rates, and the stated reasons for using or not using various methods. Second, the perceived cost of producing an unwanted child must be estimated, which is much more difficult, since this assessment depends on a present evaluation of a future event. Individuals as well as institutions often tend to discount future costs when comparing them with immediate costs. It is probable that the undiscounted cost of a child must be perceived as considerably greater than the cost of control before the control method will be utilized. The hypothetical diagram in Figure 2-74 shows the resultant FCE, given the available spectrum of control methods and three different perceptions of the cost of an unwanted child.

The horizontal lines of Figure 2-74, expressing the average cost a population is willing to pay to control its fertility, are influenced by the same social and economic factors that influence the desired total fertility DTF—for example, required standards of raising children, housing limitations, need for mobility, economic role of women, and expectations about future assets. Thus the fertility control model presented here would suggest that industrial development, as it lowers the desired family size by shifting the social cost-benefit balance of having children, also automatically leads to improved fertility control effectiveness by making people more willing to use higher-cost and more effective methods. In World3 we assumed that this motivational

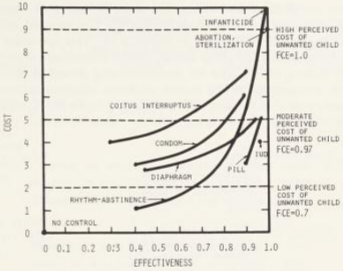

Figure 2-74 Cost-effectiveness curves for birth-control methods

mechanism leading to increased fertility control effectiveness is enhanced by a technological mechanism—the development of more effective, lower-cost methods of fertility control. Two of the relatively low-cost and high-effectiveness measures shown in Figure 2-74, the pill and the IUD, are recent technologies, the result of investment in research and development to fill a newly recognized social need for fertility control.

In World3 the causal mechanism that determines FCE begins with the assumption that fertility control effectiveness will remain at its preindustrial value of about 0.75 unless a recognized *need* for better control exists. The need for fertility control NFC increases when either maximum total fertility MTF increases or desired total fertility DTF decreases. Mathematically, the need for fertility control NFC is defined as:

$$NFC = \frac{MTF}{DTF} - 1.$$

If desired fertility equals maximum fertility, NFC = 0, and no need to improve control is recognized. If, however, DTF is less than MTF, the need for fertility control NFC assumes a positive value, triggering a chain of events that leads to higher fertility control effectiveness FCE.

```
NFC.K=(MTF.K/DTF.K)-1                                    44, A
   NFC    - NEED FOR FERTILITY CONTROL (DIMENSIONLESS)
   MTF    - MAXIMUM TOTAL FERTILITY (DIMENSIONLESS)
   DTF    - DESIRED TOTAL FERTILITY (DIMENSIONLESS)
```