Reduction of the Desired Completed Family Size DCFS One of the more commonly recommended social policy changes designed to decrease the pressures of population growth is a reduction in the average family size to 2 children. As discussed in Chapter 2, the model's desired completed family size DCFS is a nonlinear function of income expectations and social norms. Run 7-24 (Figure 7-34) shows the behavior of the model if this assumed dependency is interrupted and the desired completed family size is reduced to 2 children in 1975, regardless of economic changes. This policy still assumes that parents will compensate for high perceived mortality by bearing more than 2 children, if necessary, but that their ultimate goal is 2 surviving children. As a result of this policy, population POP gradually reaches a level of about 5 billion people in the year 2040. Population responds slowly to a change in desired completed family size because of the delays inherent in its age structure and in adjustments to perceived lower mortality.

A comparison of Run 7-24 with the reference run (Figure 7-7) illustrates the effective trade-off between population POP and both industrial output per capita IOPC and food per capita FPC. In Run 7-24, both IOPC and FPC grow to a higher level than in the reference run because the population POP grows more slowly. In both runs, however, growth is eventually halted by rising resource costs.

In the absence of any additional technological policies, Run 7-24 shows that even the lower population POP of 5 billion cannot be sustained past the year 2040 in the model because of the long-term effects of the decline in nonrenewable resources. We conclude that this population policy in itself does not appear to be sufficient to create the conditions for a sustainable level of population, for it is thwarted by continued material growth. However, it does relieve some of the pressures causing resource depletion, higher food needs, and greater amounts of pollution. The reduction of the desired completed family size can thus be a powerful influence on the model's behavior when combined with other social and technological policies, as will be demonstrated later in this chapter.

Increase of Industrial and Service Capital Lifetimes ALIC *and* ALSC Another possible policy for reducing the positive pressures of growth is to increase the average lifetime of the capital plant in the economy, thereby decreasing the depreciation rate of capital and the discarding of used resources. We classify this as a social change primarily because an extension of capital lifetimes will require a new social emphasis on durability rather than newness, more attention to repair, or higher quality standards for capital to stimulate the necessary technological changes. In Run 7-25 (Figure 7-35) we increased the average life of industrial capital ALIC to 21 years and the average life of service capital ALSC to 30 years, both representing a 50 percent increase. Run 7-25 indicates that this policy alone is counterproductive to the goal of reducing positive growth pressures. The extension of the productive lifetimes of capital reduces the rate of capital depreciation in the model. Since capital investment rates are not changed, the capital stock and thus output grow more rapidly and resources are depleted more quickly than in the reference run (Figure 7-7). The rapid depletion of resources leads to an earlier decline of industrial output per capita IOPC in Run 7-25 than in the reference run.

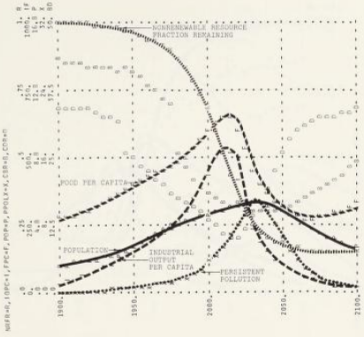

Figure 7-34 Run 7-24: reduction of the desired completed family size
To reduce the pressures of population growth in the reference run, the desired completed family size is reduced to 2 children per family in 1975. Population POP continues to grow gradually for 70 years because of the delays inherent in the age structure. However, the effects of resource depletion again force the population to decline after 2040, as in the reference run. Since population growth is reduced, industrial output per capita IOPC and food per capita FPC rise more rapidly between 1975 and 2020 than in the reference run.

In the world model the process of producing industrial output is primarily responsible for the depletion of nonrenewable resources and the generation of persistent pollutants. The extension of product lifetimes is therefore counterproductive if the uses of output remain the same, for reducing the depreciation of industrial capital without reducing capital investment leads to higher industrial capital growth rates and faster resource depletion. The next run illustrates the behavior of the model if the investment in industrial capital is reduced by a higher preference for food and service outputs.

Shift in the Choice of Output Forms The development patterns described in Chapter 3 are based on the historical choices made by societies among agricultural, service, and industrial goods as their economies developed. It is conceivable, however, that a shift in this choice among output forms might occur through a major change in social values. For example, less emphasis might be placed on industrial output and more emphasis placed on food and service output. Run 7-26 (Figure 7-36)