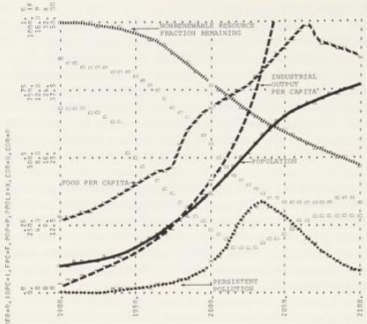

Figure 7-24 Run 7-19: adaptive technological policies—no delays, no costs

Technological advances in reducing per capita resource usage, diminishing pollution, and increasing land yield are assumed to occur in response to a perceived need for the technologies. The maximum rate of change for each technology is assumed to be 5 percent per year. In addition, discrete advances in exploration and extraction technologies, land maintenance technologies, and air pollution technologies are assumed to be implemented in 1975. This run is similar in behavior to Run 7-18, in which technological improvements rise continuously at 4 percent per year. Growth is maintained through the year 2100 because of the absence of significant delays and costs in the development of new technologies.

exponential advances in technology increased continuously after 1975. In Run 7-19, industrial output per capita IOPC increases continuously to nearly 6,000 dollars per person-year in the year 2100. The increase in industrial development causes an overall decrease in the birth and death rates over the 200-year period. By the year 2100, the population has grown to over 12 billion and, as a result of the increase in industrial development, is increasing at only 0.3 percent per year. Technological advances in resource recycling allow population POP and industrial output per capita IOPC to continue to increase without causing an increase in the usage rate of nonrenewable resources. Improvements in land yield technologies cause food per capita FPC to increase to a level of 700 vegetable-equivalent kilograms per person-year by the year 2000.

The similarity in the behavior of Run 7-18 and Run 7-19 stems from the fact that in both runs technology is capable of postponing the ultimate limits modeled in

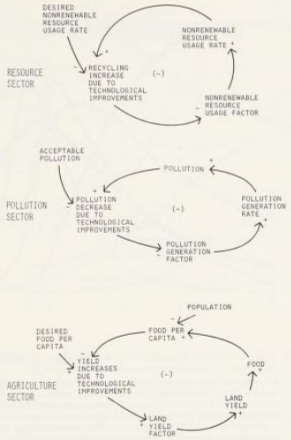

Figure 7-25 Structural additions for adaptive technological policies (with no delays or costs of development and implementation)

World3 at an exponential rate, with no delays in the development or the implementation of these new technologies and with no negative long-term side effects. In Run 7-19, however, these advances in technology occur only in response to a perceived need for the new technologies. Because the automatic exponential advances in technology anticipate the perceived needs for such technologies, the development process depicted in Run 7-18 occurs at a faster rate than in Run 7-19.

Adaptive Technological Policies—The Effects of Limitations to Technological Capabilities Run 7-20 (Figure 7-26) assumes adaptive technological policies identical to those tested in Run 7-19, except that the maximum rate of technological change is assumed to be 2 percent rather than 5 percent per year. This run therefore represents the behavior of the world system when there are significant limitations to the rate at which technology is able to reduce the negative side effects of growth.