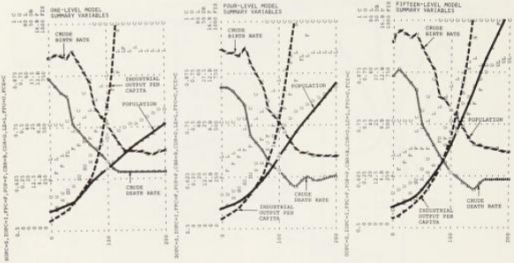

Figure 2-96 Run 2–11: exponential economic growth, perfect fertility control

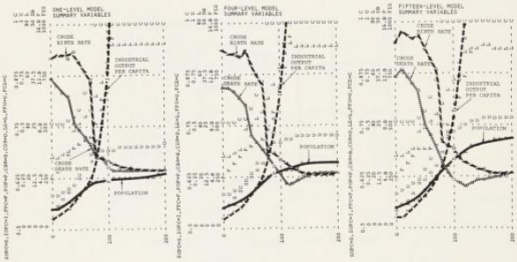

Figure 2-97 Run 2–12: exponential economic growth, perfect fertility control, reduced desired family size

to an eventual equilibrium, rather than the 0.5 percent growth rate of Run 2–7. In response to the rather radical changes in Run 2–12, all three age-structure representations show similar behavior, but the more accurate fifteen-level model shows pronounced short-term fluctuations and a slower approach to equilibrium.

Constant Total Output To investigate the behavior of the population model under a sudden change in economic conditions, we interrupted the driving exponential economic growth functions in the year 100 and held total output of industry, services, and food constant thereafter (per capita values were still free to change as the population size changes). The result is shown in Run 2–13 (Figure 2-98).

In this run, per capita income declines slowly after the year 100, since the population keeps growing while economic output is constant. The birth rate drops initially as the change in income expectation causes families to want fewer children. Eventually, the birth rate rises again, to compensate for the rising death rate. In the year 200 the population is approaching an equilibrium at intermediate birth and death rates, and the per capita income is beginning to stabilize. The delays in the population age structure cause a wider swing in the death rate calculated by the fifteen-level model.

In Run 2–14 (Figure 2-99) fertility control effectiveness was raised to 100 percent in the year 75, twenty-five years before the economic growth functions are held constant. This change decreases the growth of the population after the year 100 and hastens the equalization of birth and death rates. Again, the three models follow the same general behavior modes, with the fifteen-level model showing greater fluctuations in the death rate. The general behavior is similar to that shown in Run 2–13.

In Run 2–15 (Figure 2–100) a desired completed family size of two children is added to the birth control policy in the year 75. This change immediately causes a large decline in the birth rate, so that population equilibrium is nearly attained before industrial output growth is stopped in the year 100.

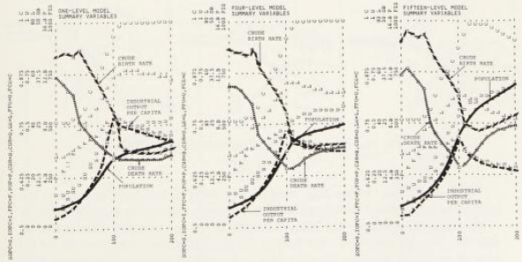

Figure 2-98 Run 2–13: constant total output