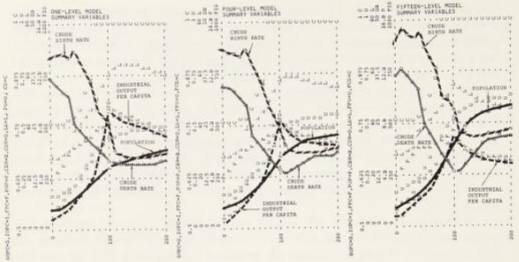

Figure 2-99 Run 2–14: constant total output, perfect fertility control

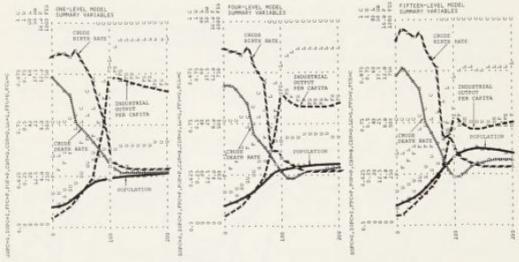

Figure 2-100 Run 2–15: constant total output, perfect fertility control, reduced desired family size

The model runs shown here indicate that from a long-term perspective the population age structure contributes little to the forces shaping the dynamic behavior of this population model. The delays inherent in the age structure cause small instabilities that are extremely important in the short term but of no concern for the sorts of long-term questions we are asking in World3. A more detailed model to be used for short-term decision making certainly must include at least a fifteen-level

representation of the age structure for accuracy in planning. However, to save computational time and keep the level of aggregation consistent with the available data, we used the four-level age structure for the world model runs in Chapter 7 and in most of the following sensitivity analysis runs. This approximation of the population age structure tends to underestimate slightly the potential for growth and instability that a more accurate representation would demonstrate. The approximation is permissible only because the model is not intended for short-term point predictions.

Sensitivity Analysis

Are the behavior modes generated by the population sector equations sensitive to the numerical assumptions included in the equations? A thorough answer to this question would require the inclusion here of hundreds of sample model runs, varying every parameter over its entire reasonable range, with all possible combinations of other parameter variations. In this volume we can include only a fraction of the possible sensitivity analysis model runs, assuming that the interested reader will be able to test other variations for himself. The runs shown here were selected with a special emphasis on those parameters about which we have the least information and those which seem to be the most sensitive to quantitative changes.

The driving function used in all the following sensitivity runs is exponential growth to the year 100, followed by constant total output as shown in Run 2–13. This function was selected because it illustrates both the growth and the equilibrium modes of population dynamics. Unless otherwise indicated, the four-level age structure is used in all runs. For reference, Run 2–13 (Figure 2-98) is repeated in Run 2–16 (Figure 2–101), showing the behavior of all mortality and fertility variables. Run

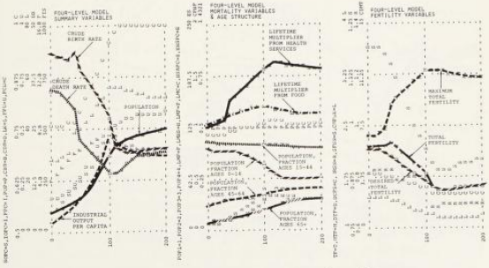

Figure 2-101 Run 2–16: constant total output, reference for sensitivity tests