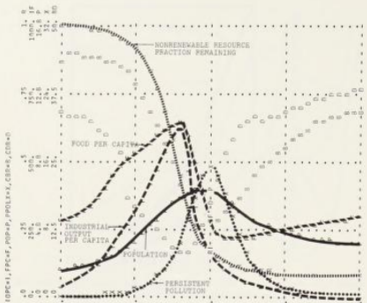

Figure 7-14 Run 7-10: sensitivity of the average lifetime of industrial capital

The average lifetime of industrial capital ALIC is increased 50 percent over its value in the reference run (from 14 years to 21 years), causing capital to grow faster than in the reference run. Although the behavior mode of the model is unchanged, the model variables do not pass through their 1970 historical values. This parameter, as well as the other parameters in the capital growth loop, is an important factor in determining the growth rate of capital.

ratio ICOR, and several other factors. In the growth phase of the reference run, this gain is nearly constant at about 3.6 percent per year, which compares well with historical data. When ALIC is increased to 21 years, however, the gain around the industrial capital growth loop is increased to 5.4 percent per year. To make this sensitivity test consistent with the historical data, a change in the gain caused by a higher ALIC must be offset by changing an additional parameter in the capital sector. When two such offsetting changes are made, the model is again consistent with historical behavior, which is a minimum criterion for any test of the model. An example of a sensitivity test where two such offsetting changes are made in the capital sector is shown in the following run.

Average Lifetime of Industrial Capital ALIC *and Industrial Capital-Output Ratio* ICOR Run 7-10 illustrated the sensitivity of the model's behavior to changes in the average lifetime of industrial capital ALIC. Although the increase in ALIC from 14 to 21 years did not change the model's behavior mode, the change did cause the industrial capital level to grow significantly faster than the historical growth of in-

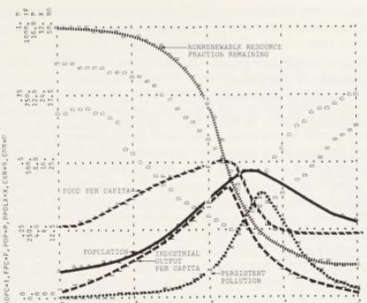

Figure 7-15 Run 7-11: sensitivity of the average lifetime of industrial capital and the industrial capital-output ratio

As in the previous run, the average lifetime of industrial capital ALIC is increased from 14 to 21 years. To ensure that the model duplicates historical behavior, the industrial capital-output ratio ICOR is also increased (from 3 to 3.75). The resulting behavior is very similar to that of the reference run. Changes in the elements affecting capital growth, when constrained to produce behavior consistent with historical behavior, do not significantly affect the behavior of the model.

dustrial capital. To ensure that the resulting model behavior is consistent with historical data, the change in the average lifetime of industrial capital ALIC from 14 to 21 years was accompanied in Run 7-11 (Figure 7-15) by an increase in the industrial capital-output ratio ICOR. That increase (from 3.0 to 3.75) is just enough to slow down the growth in industrial capital to the historical growth rate of 3.6 percent per year. When the additional criterion of reproducing historical behavior is added to the sensitivity test, the resulting run behaves more like the reference run; again, the behavior mode of the reference run is unchanged by these alterations in parameter values.

Runs 7-7 through 7-11 have been presented as examples of the sensitivity of the world model's reference behavior mode to possible errors in parameter estimates. Through this series of runs and many others not reported in this volume, we reached the conclusion that the behavior mode of overshoot and decline exhibited by the model is remarkably insensitive to variations in the estimates of most of the model's parameters.