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Q1:



Parameters: alpha1 = 0.8, alpha2 = 0.2, tax rate = 0.2. Government purchases increased from 20 to 30 in 1950 as a shock. The baseline model uses perfect foresight, and the other models use various forms of imperfect expectations according to the requirements.

For the baseline, after the shock, income immediately jumped from 100 to 127.78 in 1951, which is the result of the Keynesian multiplier. . After the immediate response, output gradually rises due to the rise in wealth and the consumption out of wealth, until the system reaches the fixed point where household expenditure equals disposable income. For scenario d, which uses a fixed expectation of disposable income at 25, the pattern is similar to the baseline. In 1951, income immediately jumped from 100 to 110, due to the rise of government expenditure of 10. There is no multiplier since households do not adjust their consumption based on changes in realized income. In the subsequent periods, households increase their consumption with rising wealth. The speed of adjustment is slower than the baseline, as the adjustment purely relies on an increase in wealth, and the propensity to consume out of wealth is smaller than that of income.

For scenarios b and c, the patterns of the output trajectory are quite different from the baseline. For scenario b, which uses a lagged expectation of two periods, there is an immediate jump of output by 10, just as in scenario d. For scenario c, which uses yde = yd(-1) – (g-t), the immediate jump in income is very small at 2.38, as much of the increase in government expenditure is offset by the decrease in the consumption out of expected income, which is reduced by the exact amount of the rise in g. This scenario might describe the economy where households are worried about government deficit and cut back their consumption for whatever reason. For both scenarios b and c, there is a period of time when the output went above the steady-state output. The cause behind this phenomenon is that households consistently realized more savings than they expected due to their wrong expectations, and the rise in wealth kept increasing their consumption. This excess wealth was erased because the high consumption pushed the government into a surplus, which reduced the amount of money outstanding.

The conclusion is that expectations do not alter the new steady state but affect the speed of adjustment and the trajectory of output. Rigid expectations prolongs the adjustment process.

Q2:



In scenario 1, the bill rate was increased from 7% to 12 % in 1930. In 1931, there was an immediate jump in output, which was due to the increased government interest expenditure and increased holdings of bills by households. Output keeps rising until the new steady state. In scenario 2, the bond rate increased from 9% to 10% in 1930. In 1931, there was an immediate decline in output due to the fall in bond price and the negative wealth effect. However, a higher bond rate will increase government interest expenditure, and the output in the new steady state will be higher than the output in the original steady state.

Hysteresis in the textbook means that there is no determinate steady-state solution, although the system still tends towards a long-run equilibrium. The steady-state solution depends on the initial conditions and the path taken by the endogenous variables.



To introduce hysteresis, I added the Target Proportion (TP) policy into the model. The TP policy intends to maintain an even proportion of household holding between bills and bonds. If the proportion of either exceeds 0.505, the government will increase or decrease the price of the bond by 10% to induce households to return to a balanced portfolio.

Scenario 3 is shocked by the same bill rate increase as in scenario 1, but the trajectory of output is very different. In 1931, the output in the two scenarios was the same. However, in 1932, the TP policy took effect in the new model and started to decrease bond prices or raise bond rates. The declining bond price has a negative wealth effect on household consumption, and output declined for several years. However, the higher bond rate increases government interest expenditure on bonds as well, and thus output continued to rise to a much higher level than in scenario 1. This is a situation of hysteresis, as the new steady state is no longer determined solely by the level of the exogenous variables. For example, if we raise the bill rate from 11% to 12%, this kind of continuous rise in output might not happen or happen in a smaller scale, as the TP policy might not get triggered or get triggered only for a short period of time, although the bill rate is 12% in both cases.



Scenario 4 has the same bond rate shock as scenario 2. Still, the output shock in 1930 is the same in the two scenarios. However, in 1931, the TP policy took effect in scenario four and started to reduce the bond rate. The initial wealth effect from the rising bond price spurred consumption, but with the lower government interest expense on bonds, the long-run equilibrium output is much lower than in scenario 2. Still, this might not happen if we raise the bond rate from another level.

In conclusion, hysteresis makes the new steady state dependent on the path taken by the endogenous variables and, thus, the initial conditions. The new steady state might not have clean analytical solutions due to the path dependency.