

Finding an equilibrium after a supply shock

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1 A temporary supply shock

Open "intempopt" and set $\eta = 1.51$ and $B = 1.006$. Then increase $Y2$ until the consumption point and the production star coincide. This should occur with a value for $Y2$ of about $Y_2 = 7.2798$. This is an equilibrium for the economy with an interest rate of $R = .05$ since at that interest rate, $Y_t = C_t$ in both periods, $t = 1, 2$. Recall that without investment, $B_t = 0$. The screen in the Intertemporal optimization program should look like that shown in Figure 1.

The effect of a temporary negative supply shock is to reduce (because of reduced labor productivity) w_t and this causes $Y1$ to decline. This can be seen in Figure 2. The fact that consumption declines means that, since consumption and income are the same in each period in this model, that income declines. Notice that leisure (*ocio*) declines a bit as well, so people are working more in this economy.

Because of the decline in consumption in period 1, we need to see how that changes the interest rate. Because the supply shock is temporary, the labor productivity and the wage will return to the initial values in period 2, so production will be the same as without the temporary shock. Return to the Intertemporal optimization screen, turn the Hold button On and reduce $Y1$ to 6.0401. The screen should appear as in Figure 3.

Notice that in Figure 3, the consumption and output are not the same. This cannot be an equilibrium because one of the conditions for an equilibrium (with no capital or investment) is that savings in period 1 is zero. As the economy stands, the the interest rate at $R = .05$, everyone wants to borrow in period 1 to be able to consume more than they are producing. This can't be an equilibrium (where do the goods come from?). To get to an equilibrium, the interest rate needs to rise. Increase the interest rate (using the slider) until the consumption (the circle on the solid line) and production (the star on the solid line) coincide. This should occur with an interest rate near $R = .311$. Your screen should look like the one in Figure 4.

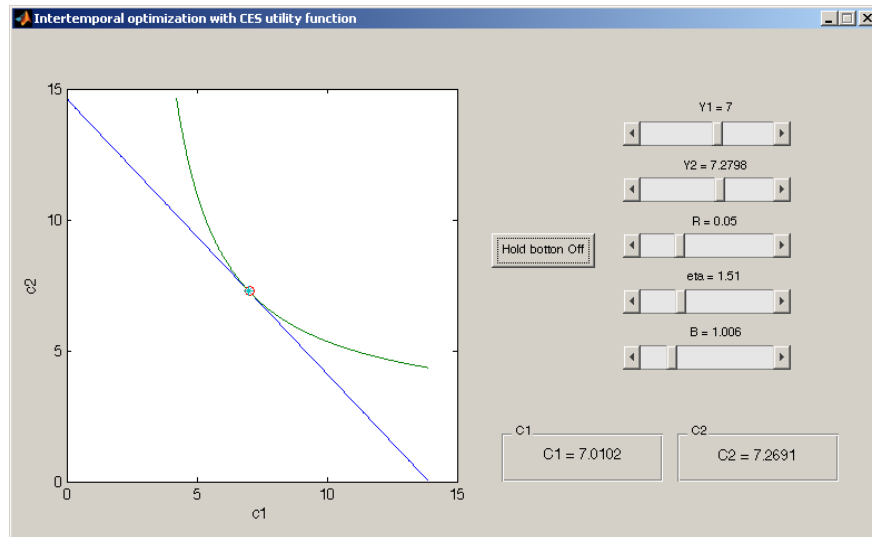


Figure 1: Set values to those shown here

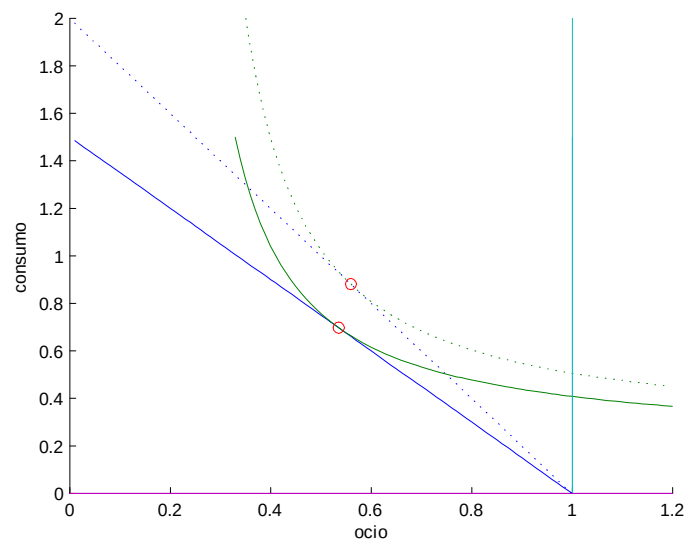


Figure 2: Effects of a decline in wage in period 1

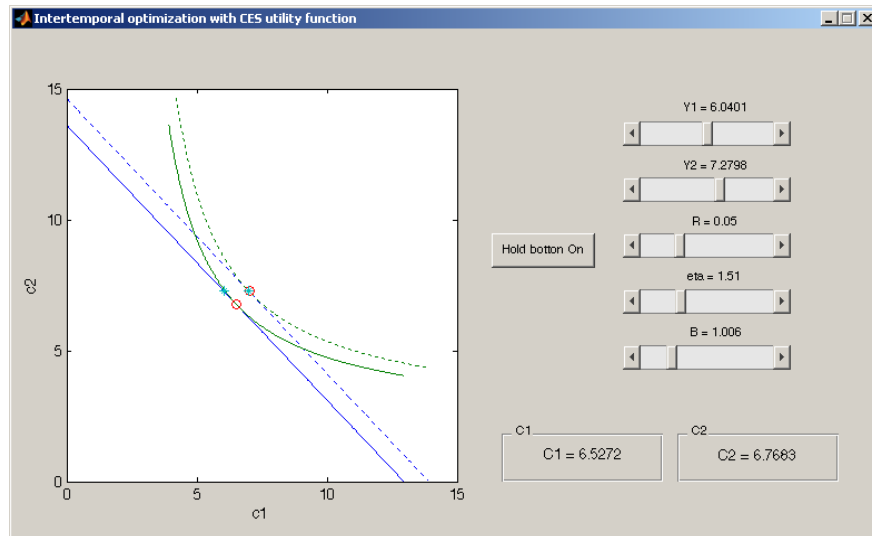


Figure 3: Reducing $Y1$ to near 6

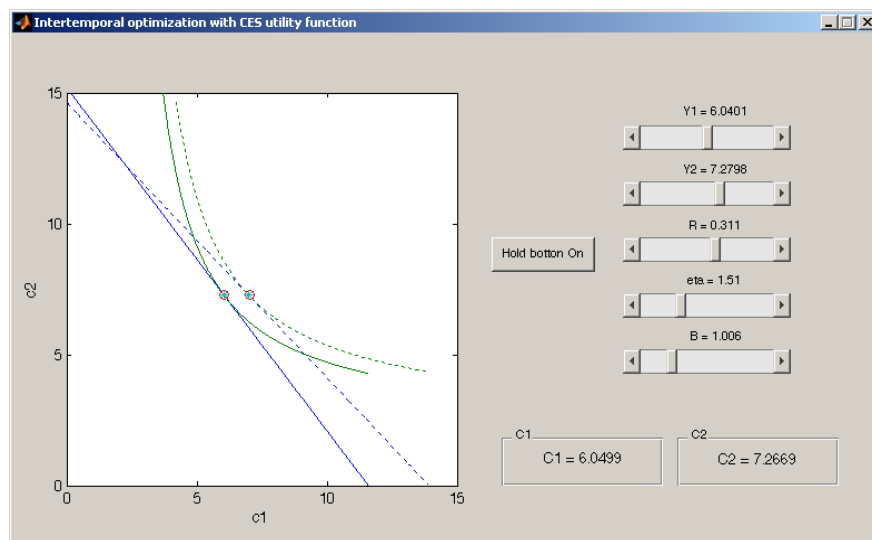


Figure 4: Returning to an equilibrium

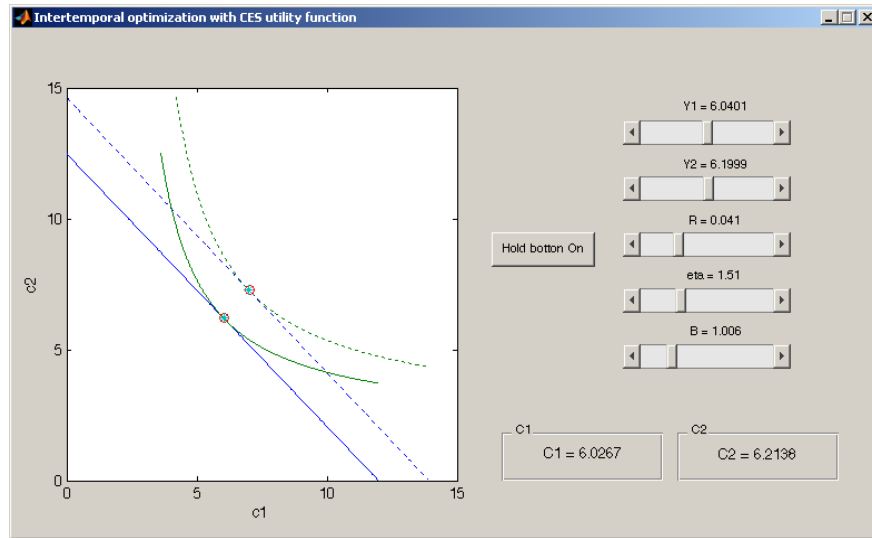


Figure 5: Effects of a permanent supply shock

2 A permanent supply shock

A permanent supply shock means that the wages are lowered during both periods of life and the effects of the consumption-leisure trade-off is that consumption goes down in both periods of life. To show this, we leave the value of output in the first period, Y_1 at the value of $Y_1 = 6.0401$ and cause Y_2 to fall to 6.1999. With the interest rate still at $R = .311$, consumption in the first period is now lower than production and in the second period, higher than production. This cannot be an equilibrium, so that interest rates must fall until the two are equal. Reduce interest rates until the consumption (the circle) and the star (production) coincide. This occurs with the interest rate near $R = .041$. These results are shown in Figure 5. The effects of the permanent shock (where both outputs decline) on interest rates are much smaller than those of a temporary shock (where only the output in period 1 declines).

Exercise 1 Show what happens if there is an anticipated temporary negative supply shock in the second period.