

Solutions to Review Questions - Chapter 10

1. Let $C = .7Y_p$, $I = .20Y_p - .3Y_p(R - r)$, and $G = .15Y_p$, where Y_p is potential output. Let Y denote actual output and r the marginal product of capital. For this problem, let $r = 0$.

- (a) $Y = C + I + G \Rightarrow Y = .7Y_p + .20Y_p - .3Y_pR + .15Y_p = 1.05Y_p - .3Y_pR$. Divide through by Y_p to get $Y/Y_p = 1.05 - .3R$. Now subtract 1 from both sides to get the output gap, $(Y - Y_p)/Y_p = .05 - .3R$, which is the IS curve. If $R = .05$, then the current output gap is $.05 - .3(.05) = .05 - .015 = .035$, or 3.5%.
- (b) Adding $G = .20Y_p$ to the problem means that we add .05 to our previous solution. So the new IS curve is $(Y - Y_p)/Y_p = .10 - .3R$. At $R = .05$, the output gap is now $.10 - .3(.05) = .085$, or 8.5%.
- (c) The Fed wants to ensure that the previous output gap of 3.5% is maintained. Therefore, with the new IS curve, it must set R^* , such that $.035 = .10 - .3R^*$, or $.3R^* = .065$. This implies that $R^* = .22$, or 22% (which happens to be quite high).
- (d) $Y = C + I + G \Rightarrow Y = .7Y_p - .5Y_pR + .20Y_p - .3Y_pR + .15Y_p = 1.05Y_p - .8Y_pR$. This tells us that dividing by Y_p , $Y/Y_p = 1.05 - .8R$. Subtracting 1, we get $(Y - Y_p)/Y_p = .05 - .8R$. At $R = .05$, the current output gap is $.05 - .8(.05) = .01$, or 1%. If government spending increases to $G = .20Y_p$ because of hurricane damage, then $(Y - Y_p)/Y_p = .10 - .8R$. The output gap at $R = .05$ is simply $.10 - .8(.05) = .06$, or 6%. To reduce this output gap back to the original level of 1%, the Fed must set R^* such that $.01 = .10 - .8R^*$, or $.8R^* = .09$. This implies that R^* approximately $.11 = 11\%$. The reason why the Fed has to change interest rates less dramatically is because the IS curve is steeper. Any change in R leads to greater changes in the output gap because of the negative effect of real interest rates on consumption. Therefore the Fed only raises R^* to 11%, and not 22%.