Economics 2B
Suggested Solutions - Tutorial 6

Max Schroder

February 24, 2020

Abstract

This guide is supposed to be complementary to the official solutions supplied by the lecturer. All errors are my own.

Question 1

This question is important, because the IS-LM-PC model is the basis for the assignment, so I will try and be quite detailed with the explanations. Before we start, let's look at the new PC that we will be dealing with today:

$$\pi_t = \pi_t^e + \alpha(Y_t - Y_n)$$

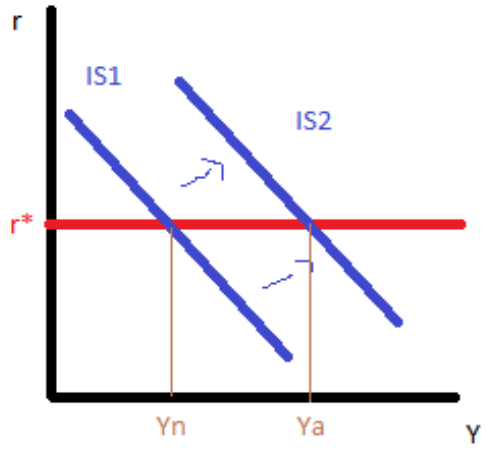
comparing this to last weeks PC, we note two things: 1. instead of -α we have +α 2. instead of deviations from the natural rate of unemployment we now use the output gap. It is somewhat obvious that unemployment and output are inversely linked: if more workers are employed they can produce more output and vice versa.

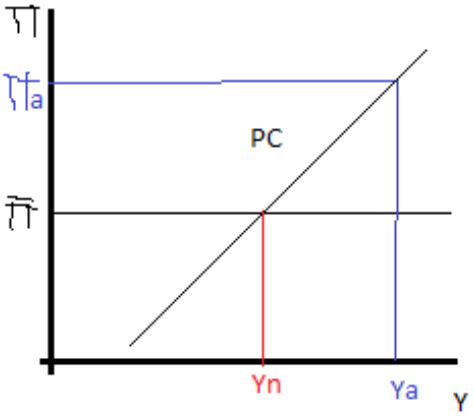
a)

The first picture below shows the outward shift of the IS curve as a result of the increase in exogenous consumer spending. Note that the IS is drawn here with the **real** rate of interest on the horizontal axis. Generally we think that businesses and consumers care about the real rate when making decisions. The central bank, however controls the nominal rate of interest. The two are linked by the Fisher equation: $i = r + \pi^e$. In most scenarios we will simply assume that the central bank changes the nominal rate as to keep the real rate constant.

So we can see that in the short run, output is above the natural level. The next picture shows the development on the Phillips Curve:

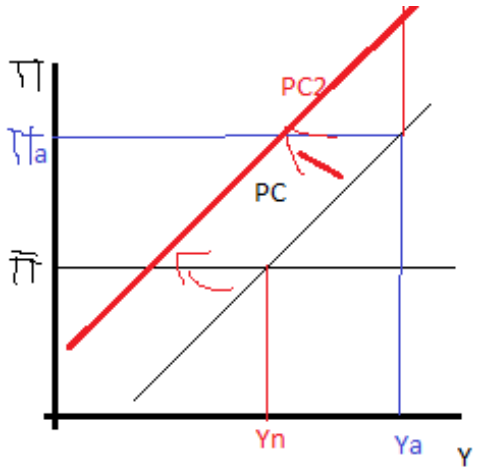
As you can see, when output is at the natural level, inflation is going to be at the level of expectations. However in this case output is above the natural level, so inflation is also higher.


r
IS1
IS2
r*
Yn
Ya
Y


PC
Yn
Ya
Y

b)

In period $t+2$ the IS curve is still shifted outward from its original position, and the central bank keeps the real rate constant, so output is still above the natural rate: $Y_{t+2} = Y_{t+1} > Y_n$. What has indeed changed in this case are the expectations of inflation, which are now $\pi^e_{t+2} = \pi_{t+1} > \bar{\pi}$. This has two effects: 1. the central bank has to increase the nominal rate in order to keep the real rate constant: $i \uparrow = r + \pi^e \uparrow$. 2. The PC shifts up to account for the new level of expectations, and because output is still above the natural level, the realized level of inflation is bigger as well: $\pi_{t+2} > \pi_{t+1} > \bar{\pi}$. Just like last week, we get runaway inflation.



Obviously the same happens in the next period as well:

$$\pi^e_{t+3} = \pi_{t+2} > \pi_{t+1}$$
$$Y_{t+3} = Y_{t+2} = Y_{t+1} > Y_n$$
$$i_{t+3} > i_{t+2} > i_{t+1} = i_t$$
$$\pi_{t+3} > \pi_{t+2} > \pi_{t+1} > \bar{\pi}$$

c)

If inflation expectations don't move, because they are anchored, then things are a little more benign. Output will still be above the natural rate, and inflation will be above expectations, but it won't be increasing every period, as the PC stays put and doesn't shift. Similarly, the CB doesn't need to change the nominal interest rate, because inflations expectations don't change.

d)

Again we see that whether we get runaway inflation or not very much depends on how expectations are formed. The curious thing is that both ways of forming expectations lead to underestimations of actual realized inflation levels. Only that if people have backward looking expectations, they are constantly trying to catch up with actual inflation, while in the case of anchored expectations they are always off in the same way.

e)

Note that ultimately these two modes of expectation formation are only simplified versions of what is happening in reality. The general point is to show you that expectations matter, and they matter a great deal.

Question 2

a)

Very similar setup to before, the only difference being that in this case, the output gap is created by the natural level of output moving to the left. Clearly the value of $(Y_t - Y_n)$ changes the same way, if $Y_t \uparrow$ or if $Y_n \downarrow$. Hence, all the calculations from the previous question apply in the same way as before.

As an aside: obviously no one knows for sure, what the natural level of output is. All we observe is the actual level. This makes an economist's job so much more difficult. Suppose, you saw that inflation increased, so what has happened? Has output gone above the natural level? Or has the natural rate fallen? Or have inflation expectations just gone up? It's a very difficult job to try and distentangle all these things.

e)

Generally, if expectations are anchored, then the CB can get immediately back to its desired level of inflation, simply by closing the output gap. However, if expectations are backward looking, then closing the output gap will only stop inflation from increasing further, whilst the level of inflation is going to be above the initial level. To bring it back down it is necessary to engineer a negative output gap (i.e. a recession) to change the inflation expectations by lowering actual inflation. These recessions can be quite painful (see for example the Volcker recession in the US in the 1980's) and therefore central banks try their best to manage the publics expectations of inflation (i.e. they try to anchor them) in order to avoid the need for painful disinflation periods.

Question 3

a)

The government cuts spending, and the IS curve moves inwards. At the new intersection, output is lower. Note that under other circumstances, the central bank might have counteracted this move by reducing the nominal interest rate, thereby pushing down the real rate (LM curve) and keeping output stable. But in this situation we are at the ZLB and the CB is assumed to be unable to reduce the nominal interest rate any furher. Generally, economists and central bankers have been very suspicious about enacting nominal interest rates below 0, even though there have been a couple of (scandinavian) countries who experimented with negative rates after the financial crisis.

Remember that we are talking about **nominal** interest rates here. The **real** rate can, and often might be negative, even if the nominal interest rate is positive. Remember the Fischer equation: $r = i - \pi^e$

b)

This one is pretty standard: because output has fallen, we have a negative output gap (recession) hence inflation will fall.

c)

Now it becomes interesting: because of the fall of inflation in the last period, expectations are now lower as well. But look at the Fischer equation: $r \uparrow = \bar{\imath} - \pi^e \downarrow$ if $\pi^e \downarrow$ then there is upward pressure on the real rate. In normal times, the CB would be able to compensate for the change in expectations, by lowering the nominal rate, but at the ZLB we are stuck. Hence the real rate increases, causing output to fall even even more, which decreases inflation and the cycle continues in a deadly deflationary spiral.

d)

The possibility of a deflationary spiral has often been used as an argument for moderately positive levels of inflation. Suppose you wanted to have a real rate of 3%. In this case, it doesn't matter if you set the nominal rate to 3% and aim for 0% inflation, or set the nominal rate to 8% and aim for 5% inflation. The only difference between the two cases is that at 8% nominal interest rate, you have a lot more buffer before you hit the ZLB, which might allow the CB more flexibility in its actions.

"We're paying you to dance and be fun, not to drink and mope."