

1.

a) a) $au = \pi_{-1} - \pi + au^n + z$

$$u = \frac{1}{a}(\pi_{-1} - \pi + z) + u^n$$

b) $L = \pi^2 + \lambda \left(\frac{1}{a}(\pi_{-1} - \pi + z) + u^n \right)^2$

c) We take the first order condition with respect to π :

$$2\pi - \lambda 2 \left(\frac{1}{a}(\pi_{-1} - \pi + z) + u^n \right) \frac{1}{a} = 0$$

$$a^2 \pi - \lambda (\pi_{-1} - \pi + z) - \lambda au^n = 0$$

$$\pi = \frac{\lambda}{a^2 + \lambda} (\pi_{-1} + z + au^n)$$

d) Higher inflation in the past means that the Phillips curve is higher up. The policymaker faces a worse trade-off and will choose a higher rate of inflation. A positive cost-push shock has a similar effect. A higher natural rate of unemployment means that the policymaker has stronger incentive to pursue expansionary policy so as to reduce unemployment.

e) Setting $\pi = \pi_{-1}$ and $z=0$ we get $\pi = \frac{\lambda}{a} u^n$

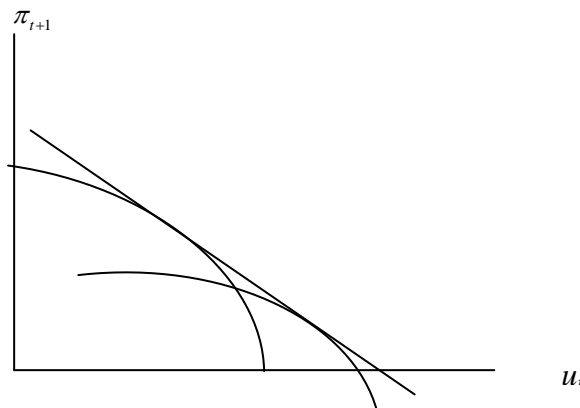
f) A higher weight on employment (high λ) and a flatter Phillips curve (low a) imply stronger incentives to pursue expansionary policy so as to reduce unemployment. In the end, this just leads to a higher long run inflation rate.

2. Proceeding as in the previous exercise we get $\pi = \frac{\lambda}{a^2 + \lambda} (\pi^e + z + au^n)$.

Setting $\pi^e = \pi$ and solving for π we get $\pi = \frac{\lambda}{a^2} (z + au^n)$.

We immediately get the high inflation that we found in the long run in the previous exercise. What inflation was in the past does not matter.

3. A new chairman of the central bank who is more inflation adverse experiences a large utility loss if he moves to a higher point in the Phillips curve. This means that he has more flat indifference curves and thus he will choose a point further to the right on the Phillips curve, with lower inflation and higher unemployment.



4. In the short run, more expansionary monetary policy benefits borrowers since the interest rate is reduced and workers since employment increases. Savers get a lower return on their bank accounts.

In the long run, inflation will be higher. The nominal interest rate will also be higher so the real interest rate should be unaffected. Employment should also be unaffected. Costs and distortions associated with inflation increase and these costs affect all members of society (c.f. Chapter 7).

5.

$$a) \quad L = \frac{1}{2} (\pi_{-1} - a(u - u^n) + z)^2 + \lambda u .$$

$$-\underbrace{(\pi_{-1} - a(u - u^n) + z)}_{\pi} a + \lambda = 0$$

$$\pi = \frac{\lambda}{a} .$$

- b) A higher weight on employment (high λ) and a flatter Phillips curve (low a) imply stronger incentives to pursue expansionary policy so as to reduce unemployment, but the end result is a higher inflation rate.
- c) If there is a cost-push shock, the policymaker keeps inflation constant and increases unemployment. The loss function is linear in unemployment which means that the policymaker dislikes unemployment but the marginal utility loss from higher unemployment is independent of the rate of unemployment. Therefore, unemployment is allowed to vary when there are cost-push shocks.

6.

- a) The long run net debt ratio will be 40 percent of GDP:

$$\frac{D}{Y} = \frac{(G-T-iD)/Y}{\pi + g} = \frac{\text{deficit/GDP}}{\text{growth rate of nominal GDP}} = \frac{0.02}{0.02+0.03} = \frac{2}{5} = 0.40$$

- b) If growth falls to 2 percent the debt ratio will rise to 50 percent of GDP. With lower growth, the denominator does not grow as fast so the ratio stabilizes at a higher level.
- c) If the deficit is instead 4 percent of GDP the debt ratio will rise to 80 percent of GDP.
- d) With 3 percent inflation the long run debt ratio will be one third. In this case, the denominator of the debt ratio rises faster so debt stabilizes at a lower level.

7. Country A:
$$\frac{D}{Y} = \frac{\text{deficit/GDP}}{\text{growth rate of nominal GDP}} = \frac{0.10}{0.05+0.07} = \frac{10}{12} = 0.83$$

Country B:
$$\frac{D}{Y} = \frac{\text{deficit/GDP}}{\text{growth rate of nominal GDP}} = \frac{0.03}{0.02+0.01} = 1.00$$

The long run debt ratio will be higher in country B, 100 percent of GDP as against 83 percent in country A. The deficit is higher in country A but the high growth and inflation keep the debt ratio lower.

8.

a) We use our favourite equation:
$$\Delta\left(\frac{D}{Y}\right) = \frac{G-T}{Y} + (r-g)\frac{D}{Y}.$$

Setting the left hand side to zero and solving for G/T we get:

$$\frac{G}{Y} = \frac{T}{Y} - (r-g)\frac{D}{Y} = 0.31 - (0.04 - 0.02)0.50 = 0.31 - 0.02 \cdot 0.50 = 0.30.$$

Government purchases can be 30 percent of GDP.

b)
$$\frac{G}{Y} = \frac{T}{Y} - (r-g)\frac{D}{Y} = 0.31 - (0.02 - 0.04)0.50 = 0.31 + 0.02 \cdot 0.50 = 0.32.$$

- c) In case b, higher growth increases the denominator of the debt ratio so government expenditure can be higher while keeping the debt ratio at 50 percent.

- d) Now we get 29 and 33 percent. Differences between the real interest rate and the growth rate are more important if the debt ratio is higher.

9.

- a) Citizens may rationally vote for politicians who pursue short-sighted policies if they do not care about future generations. Another possibility is that they do not understand the consequences of the policies.
- b) Any suggestions are welcome! Long-term multi-party agreements which constrain fiscal policy may act as a constraint on day-to-day policies.

10. With financial claims on the private sector equal to 30 percent of GDP a gross debt ratio equal to 60 percent of GDP corresponds to a net debt ratio of 30 percent of GDP. We use the equation:

$$\frac{D}{Y} = \frac{\text{deficit/GDP}}{\text{growth rate of nominal GDP}} \qquad 0.30 = \frac{\text{deficit/GDP}}{0.05}$$

$$\text{deficit/GDP} = 0.05 \cdot 0.30 = 0.015$$

The deficit can be 1.5 percent of GDP.

11. Reducing the primary deficit by increased taxes, reduced transfers and/or reduced government consumption is painful for tax payers and for those who depend on government services or transfers. Reduced government investment will hurt the economy in the long run because of poor infrastructure.

Defaulting on the government on the debt hurts those who own government debt and some of them may go bankrupt. Also, the government will be unable to borrow for considerable time.

To reduce the real value of the debt by inflation is not so easy. The real value of the monetary base is reduced by inflation but the monetary base is only a few percent of GDP. If inflation increases, bond holders will require higher interest on their lending and this reduces the possibilities to reduce the real debt by inflation. If most bonds are short-term it is hard to inflate away the debt. If there is a large quantity of long-term bonds, it is possible to reduce their real value by high inflation, but inflation leads to distortions of the price system and other costs.