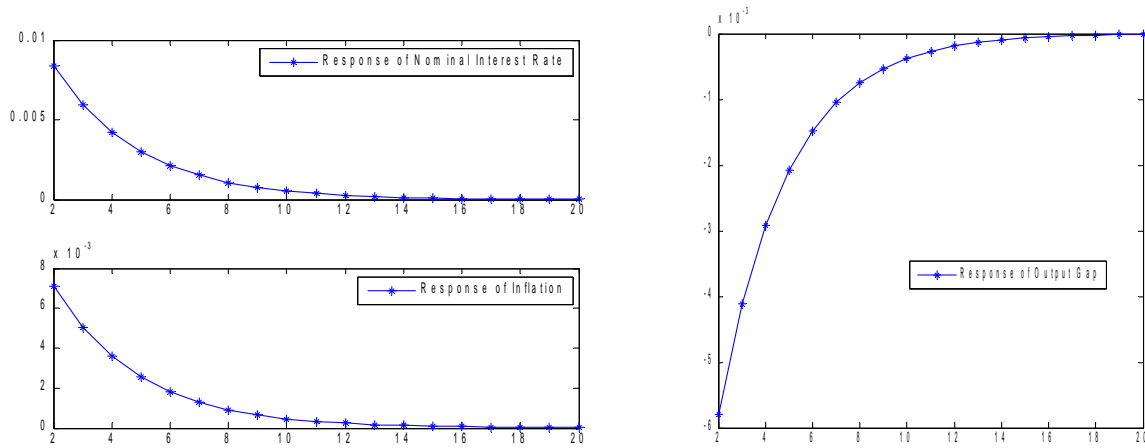


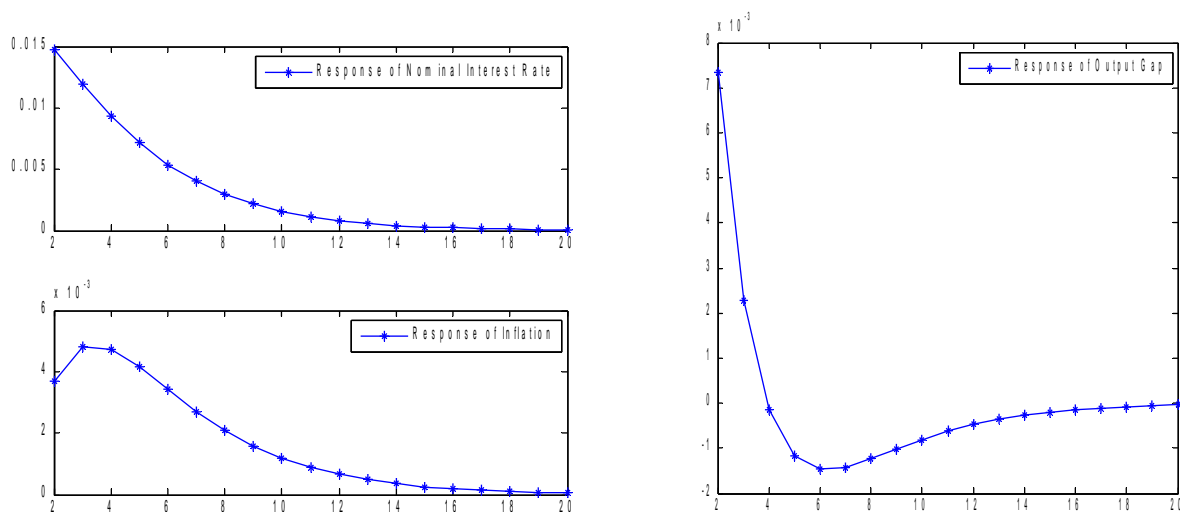
Homework 7

1. No shocks, but positive initial level of inflation.



The interest rate rule requires the central bank to respond to the initial level of inflation and raise nominal interest rates. With the initial parameters $\phi_\pi = 2$, so the response in the nominal interest rate is greater than the initial level of inflation. To gradually eliminate inflation from the economy, the central bank accepts a temporary drop in the output gap.

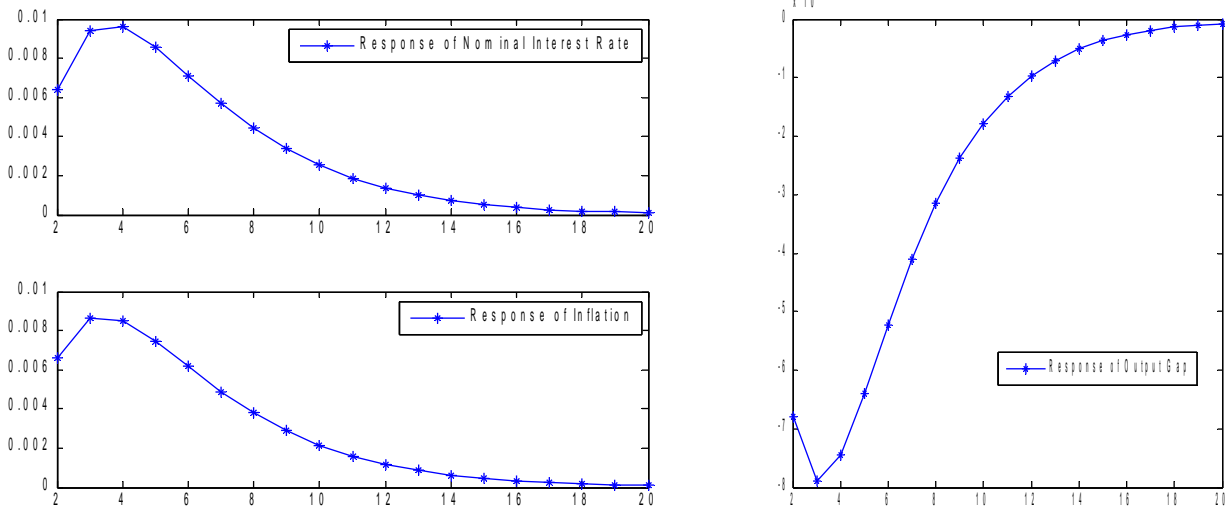
2. Shock to government spending: **shockg = 0.01**



Increased government spending acts as a positive demand shock and raises the output gap. A positive output gap feeds through to inflation since increased demand for goods gives firms an incentive to raise prices. The central bank responds by raising the nominal interest rate to bring both inflation and the output gap back down. The increase in the nominal interest rate is

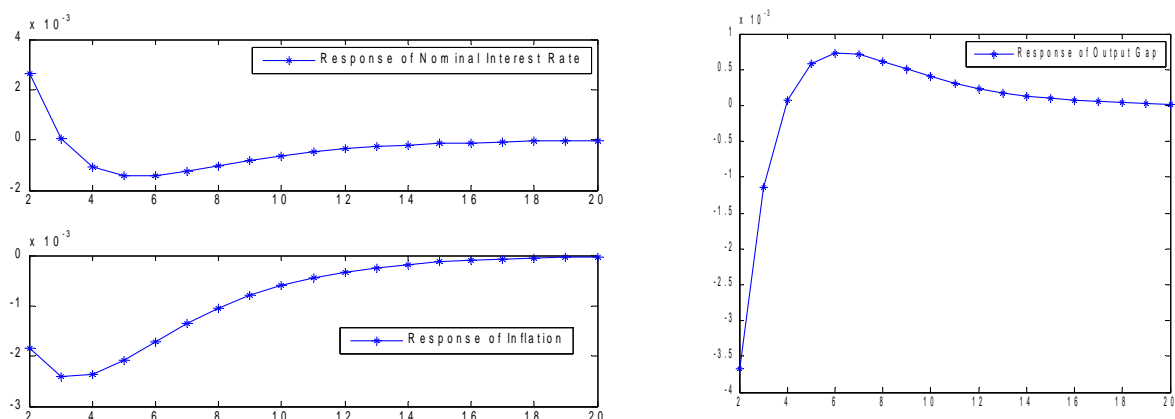
larger than the increase in inflation partly because the interest rate rule requires a larger response, and partly because the interest rate is also responding to the positive output gap. Due to the adaptive expectations, the central bank must eventually bring the output gap below its initial level in order to eliminate inflation from the economy (see question 1).

Shock to inflation: **shocku** = 0.01



The shock to inflation acts similarly to an initial level of inflation. This is not surprising since the terms π_{t-1} and u_t enter the Phillips curve in the same way. There is a difference however, since the shock to u_t is persistent. The central bank responds to the inflation shock by raising nominal interest rates, and again it will accept a lower output gap to eliminate inflation from the economy. The persistence in the shock leads the central bank at time $t+1$ to respond to both last period's inflation and the persistent component of the shock. It therefore raises nominal rates further which further suppresses the output gap. The persistent effect of the shock dies away however, and the economy starts its trajectory back to the steady state. (As an extra exercise: set the persistence of the inflation shock to 0 and repeat this experiment. Compare to the output you got in question 1.)

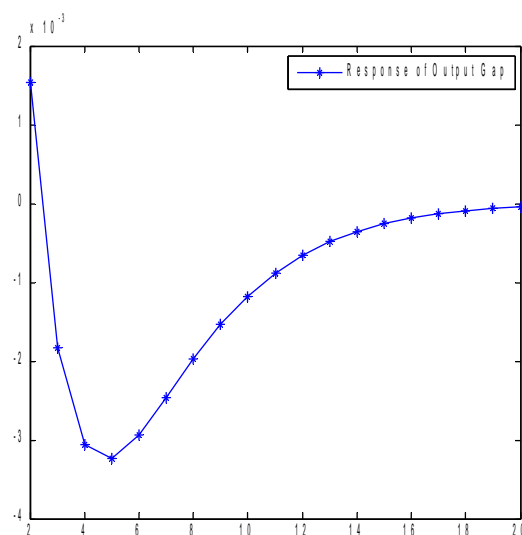
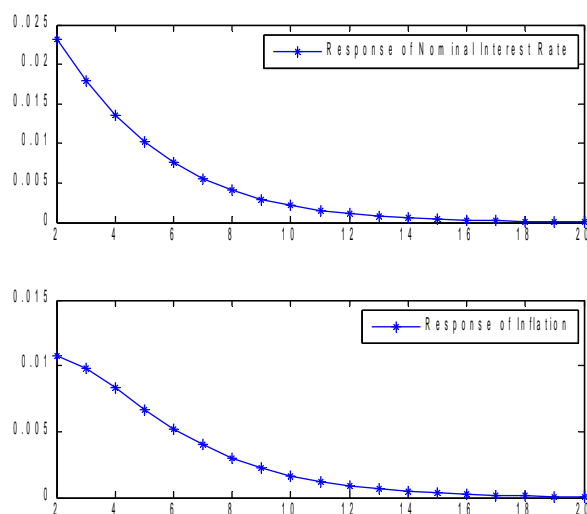
Shock to the interest rate: **shockeps** = 0.01 (this should have been named shockv ...)



A shock that raises the nominal interest rate reduces demand and hence the output gap. Lower demand gives firms an incentive to lower prices and hence causes a drop in inflation. The central bank, following the rule, wants to bring both inflation and the output gap back to their initial levels. It cuts interest rates to stimulate demand, but must reduce interest rates below the initial level to create a temporarily higher output gap. When the private sector have adaptive expectations, a positive output gap is necessary to bring inflation back up to the target level.

3. When a shock hits the economy and there is an initial level of inflation (I considered $\pi_{init}=0.01$, as I think the large initial inflation in the question is a typo), then the central bank will respond to the shock as before, but will also want to eliminate the initial level of inflation. The dynamics of the economy are then jointly determined by these two forces.

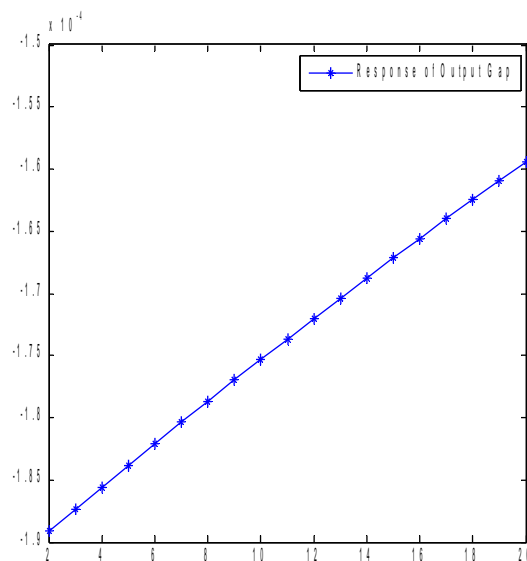
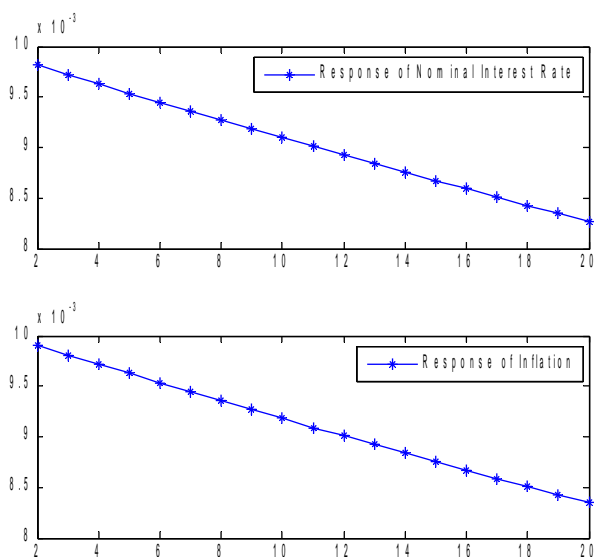
In the case of a positive government spending shock the central bank is left with two reasons to raise the nominal interest rate: a) reduce demand to reduce the impact of the shock, and b) eliminate the initial inflation. These two effects amplify each other, and the movement in the nominal interest rate is larger than when the central bank was acting based on only a) or only b).



In the case of a positive shock to inflation, the response is pretty much the same as before, but with a larger response from the central bank. The larger response is necessary to eliminate both the initial level of inflation and the positive shock, but the dynamics are pretty much the same.

In the case of a positive interest rate shock, the shock raises interest rates which is what the central bank wants to do anyway to eliminate the initial inflation.

4. With a smaller coefficient on inflation in the interest rate rule, the central bank's response to inflation is smaller. For example if there is an initial level $\pi_{t-1} = 0.01$ as in question 1, the response from the central bank is:



The central bank must again accept a lower output gap to eliminate the initial inflation, but the

response in the output gap is much smaller than in question 1. A central bank that places a low weight on inflation will not allow the output gap to deviate far from steady state, and will rather accept sustained deviations in inflation from steady state.

The response to a government spending shock is similar to before, but the government does not bring the output gap below 0 as quickly as in the plots in question 2. Now that less emphasis is placed on inflation in the interest rate rule, the positive effects on the output gap last for longer as the central bank is now more willing to accept the higher inflation that goes along with this higher output gap.

5. With a very persistent shock to the Phillips curve and a very weak response to inflation in the interest rate rule, the path of inflation is an initial increase followed by a very gradual decline back to its initial level. Since the emphasis on inflation is so low the central bank is not willing to lower the output gap and quickly bring inflation back down. Instead it chooses to leave the output gap only slightly below 0 for an extended period of time to very gradually reduce inflation.

