Part IIB - Economic Policy
Additional Notes

Daniel Wales

University of Cambridge

Supervision 3: Effective Lower Bound

This model has several features:

- Policy is described by a Taylor Rule.

$$i_t^* = \bar{r} + \pi^* + (1 + \phi_\pi)(\pi_t - \pi^*) + \phi_Y(Y_t - \bar{Y}),$$

- An effective lower bound exists, acting as a constraint on monetary policy-makers, which may prevent a full response to shocks.

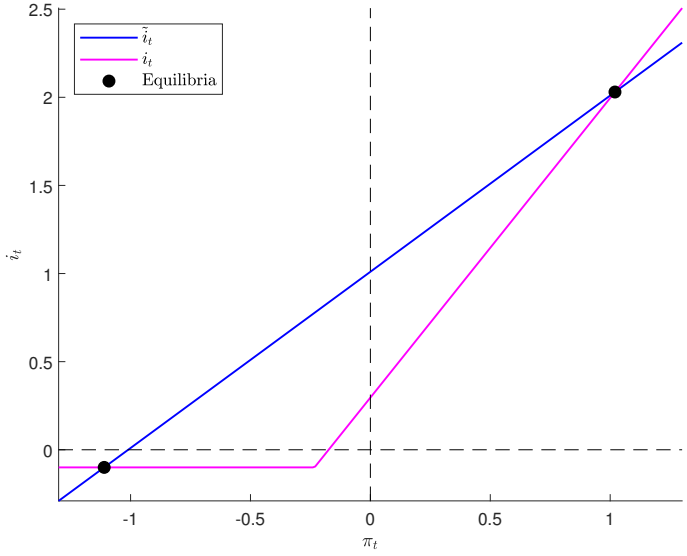
$$i_t = \max\{i_t^*, i_{ELB}\},$$

- A counterfactual level of the nominal interest rate is defined, $\tilde{i}_t$, which would be used (given a shock to inflation) to keep the real interest rate constant at its natural level.

$$\tilde{i}_t = \bar{r} + \pi_t,$$

These three conditions are plotted in Figure 1 (with $i_{ELB} < 0$ assumed) and the dynamics of a response to shocks discussed.

Figure 1: Effective Lower Bound Model



Steady State

The system is in equilibrium when we have $r_t = \bar{r}$. This arises whenever the nominal interest rate chosen by the policymaker, i_t (after accounting for the ELB), coincides with the counterfactual level of the nominal interest rate which would be required to have the real rate at the fundamental natural real interest rate of the economy, i.e. $i_t = \tilde{i}_t$. Alternatively this arises when both $\pi_t = \pi^*$ and $Y_t = \bar{Y}$. Clearly two such equilibria exist, a higher (stable) one, and a lower (unstable) equilibria, at the ELB.

Dynamics

Consider a small positive (negative) perturbation, ε_t, to inflation around the higher steady-state. This occurs such that $\pi_t = \pi^* + \varepsilon_t$. A variety of effects will arise:

1. The monetary policymaker will respond to the shock according to their policy rule.
2. The resultant level of the nominal interest rate will be i_t.
3. Notice that since after the shock $i_t > \tilde{i}_t$ ($i_t < \tilde{i}_t$) the central bank has responded by moving the real interest rate above (below) its natural level.

4. According to the IS curve, output, via investment channels, negatively (positively) responds to this change in the real interest rate, such that $y_t \downarrow (\uparrow)$.
5. Similarly, inflation then responds negatively (positively) to this change in the level of output through the Phillips Curve, such that $\pi_t \downarrow (\uparrow)$.
6. The economy therefore moves back **towards** the original steady state (from either direction). The steady state may be said to be **stable**.

By inspection the same dynamics will be true for a small positive perturbation to inflation around the lower steady-state. Instead, now consider a small negative perturbation about this point:

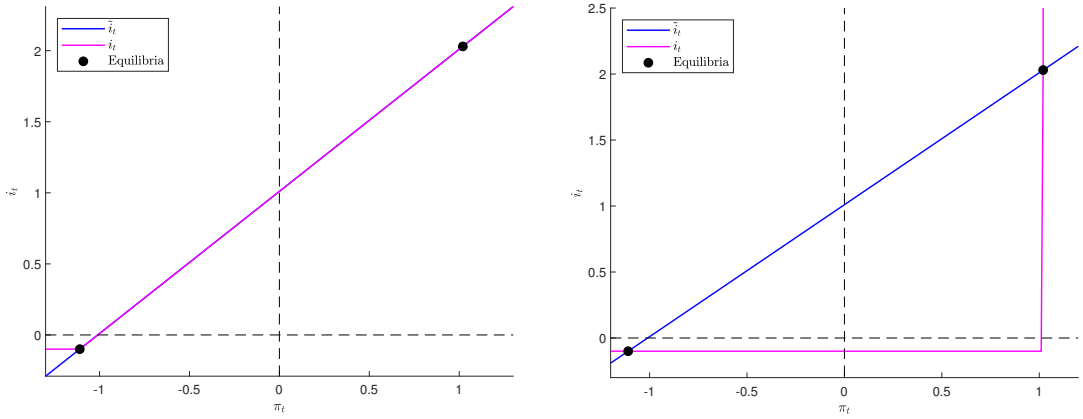
1. The monetary policymaker will respond to the shock according to their policy rule.
2. The resultant level of the nominal interest rate will be i_t.
3. Notice that since $i_t > \tilde{i}_t$ the central bank has responded by moving the real interest rate above its natural level. Alternatively, in the presence of the effective lower bound, the central banker is constrained in their choice for the real interest rate and unable to lower this as far as desired/ far "enough".
4. According to the IS curve, output, via investment channels, negatively responds to this change in the real interest rate.
5. Similarly, inflation then responds negatively to this change in the level of output through the Phillips Curve.
6. The economy therefore moves further from the original (lower) steady state and a **deflationary spiral ensues**.

Limiting Cases of the Model

- It is sufficient to consider only inflationary shocks. Alternatively, output shocks should be translated into inflationary terms before setting out the dynamics. (I.e. start at the point of output feeding through into inflation via the Phillips curve to translate the original shock into inflationary term).
- The trade-off between output gap and inflation stabilisation is implicitly shown here through the slope of the i_t^* curve.

– When policymakers only care about the output gap $\phi_\pi \to 0$ and $\phi_Y \to \infty$. The policy rule is then to keep the real interest rate (and hence output gap) unchanged, $i_t = \tilde{i}_t$, where the intuition is clear. This is shown in Figure 2a.
– In contrast, when policymakers only care about inflation $\phi_\pi \to \infty$ and $\phi_Y \to 0$, such that the nominal interest rate will always attempt to adjust to keep inflation at the central bank's target. Again the intuition here is clear, and is shown in Figure 2b.

Figure 2: Limiting Cases of the Model



(a) No weight on inflation ($\phi_\pi = 0$)

(b) No weight on output gap ($\phi_Y = 0$)