A Simple RBC Model and the Solution Procedure

The Setup

$$\max E_0 \sum_{t=0}^{\infty} \beta^t \ln(c_t)$$

$$\text{subject to: } c_t + k_{t+1} = \xi_t k_t^{\alpha} + (1-\delta)k_t$$
$$\xi_{t+1} = \xi_t^{\rho} \eta_{t+1}$$
$$\ln \eta_{t+1} \sim (0, \sigma_\eta^2)$$

The Euler conditions are:

$$c_t^{-1} = \beta E_t \left[c_{t+1}^{-1} \left(\alpha \xi_{t+1} k_{t+1}^{\alpha-1} + (1-\delta) \right) \right]$$

$$k_{t+1} = \xi_t k_t^{\alpha} + (1-\delta)k_t - c_t$$

The transversality condition is

$$\lim \beta^t \frac{k_t}{c_t} = 0$$

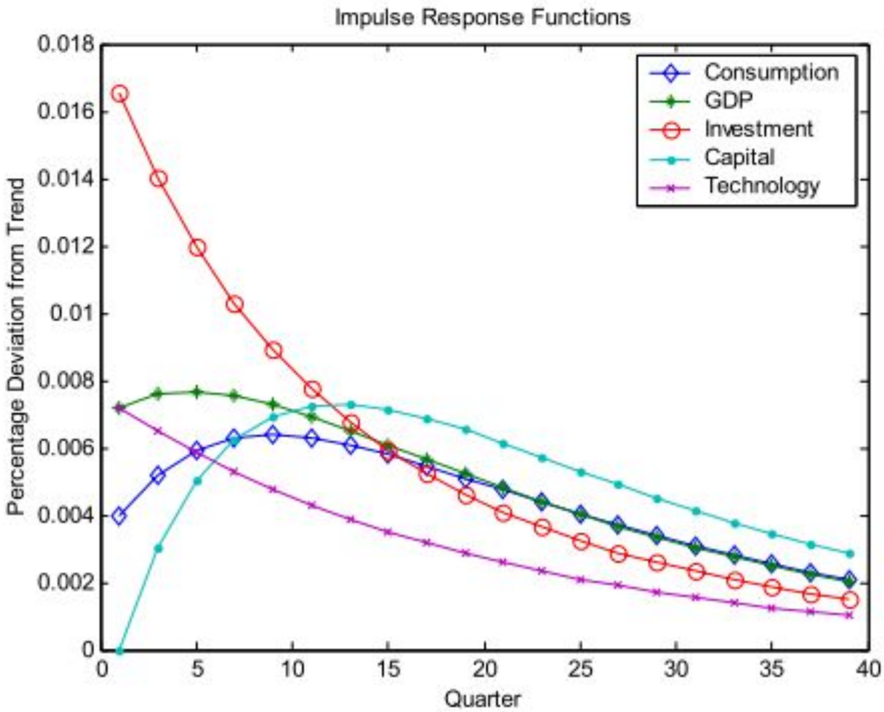
Find the steady state and denote it with no super and subscript.

$$1 = \beta \left[\alpha \xi k^{\alpha-1} + (1-\delta) \right]$$
$$k = \xi k^{\alpha} + (1-\delta)k - c$$

Calibration:

- $\alpha = 0.36$ (See Hansen and Wright 1992)
- $\beta = 0.96$ (Long-run annual rate of interest of 4%)
- $\delta = 0.1$ (So that the k/y ratio to be about 2.57)
- $\sigma_\eta = 0.0072$ (Prescott's calculation of the Solow residual)

It is easy to write a matlab program to compute the impulse response function (namely the right hand side of (2) as a function of the number of quarters j). Here is a figure showing the impulse response functions:



Simulation

We take Prescott's estimate of the standard deviation of the Solow Residual and set $\sigma_\eta = 0.0072$. We use computer-generated normally distributed shocks and simulate a path for $\tilde{\xi}$. Assume the economy is initially at the steady state. The simulated cycle is as follows: