

Investment under Uncertainty by Heterogeneous Firms¹

1 Model Description

Firms choose investment to maximize profits net of investment costs. Investment is subject to a quadratic adjustment cost. A firm's problem is:

$$\begin{aligned} \max_{\{i_t\}_{t \geq 0}} \mathbb{E}_0 \int_0^\infty (z_t k_t^\alpha - x_t - \theta (x_t/k_t)^2 k_t) dt \quad \text{s.t.} \\ \dot{k}_t = x_t - \delta k_t \\ dz_t = \mu(z_t)dt + \sigma(z_t)dW_t \end{aligned}$$

The HJB equation is

$$\rho v(k, z) = \max_x zk^\alpha - x - \theta(x/k)^2 k + \partial_k v(k, z)(x - \delta k) + \partial_z v(k, z)\mu(z) + \frac{\sigma^2(z)}{2} \partial_{zz} v(k, z)$$

2 Algorithm

See `firm.m`. The algorithm is identical to that described in Section 4 of http://www.princeton.edu/~moll/HACTproject/HACT_Numerical_Appendix.pdf (Huggett model with diffusion process)

¹We thank Peter Tian for suggesting this Problem