The model of Khan and Thomas (2008)

Recursive formulation

Firm-side problem is as follows:

$$\begin{aligned}
J(k,z;S) &= \pi(k,z;S) + (1-\delta)k + \int_0^{\bar{\bar{\xi}}} \max\{R^*(k,z;S) - \xi w(S), R^c(k,z;S)\} \left(\frac{1}{\bar{\bar{\xi}}}\right) d\xi \\
R^*(k,z;S) &= \max_{k'} -\gamma k' + \mathbb{E}_{z,S} M(S,S') J(k',z';S') \\
R^c(k,z;S) &= \max_{k^c \in [-\nu k, \nu k]} -\gamma k^c + \mathbb{E}_{z,S} M(S,S') J(k^c,z';S') \\
\pi(k,z;S) &= \max_L Azk^\alpha L^\theta - w(S)L
\end{aligned}$$

where γ is the aggregate growth rate adjuster as in Khan and Thomas (2008).

The household-side problem is as follows:

$$\begin{aligned}
V(a;S) = \max_{c,N,a'} \; & log(c) - \eta N + \beta \mathbb{E} V(a';S') \\
\text{s.t.} \quad & c + \int a'(S') d\Gamma_{S'} = a + w(S)N
\end{aligned}$$

The stochastic discount factor $M(S,S')$ and the wage $w(S)$ are determined at the competitive market:

$$\begin{aligned}
[M]: \quad a(S) &= \int J(k,z;S) d\Phi(k,z) \\
[w]: \quad N(S) &= \int \left(L(k,z;S) + \frac{\xi^*(k,z)^2}{2\bar{\bar{\xi}}} \right) d\Phi(k,z)
\end{aligned}$$

where $\xi^*(k,z;S)$ is the threshold rule of lumpy investment defined as follows:

$$\xi^*(k,z;S) = \frac{1}{w(S)} \left(R^*(k,z;S) - R^c(k,z;S) \right)$$