

1. Guess  $L^F$ .

(a) Guess  $g$ .

i. Guess  $w(q, m, n), F(q, n)$ . Compute  $\pi(q)$  from  $L^F$ . Solve for optimal policies and value functions:

A. **Incumbents:** Solve for  $A(q, m, n)$  and policies  $z_I^A(q, m, n)$  using Moll's iterative method. Will take as given innovation intensity by entrants,  $\bar{z}_E(q, m, n) = \xi \min(m, F(q, n))$  (and hence  $\bar{z}_E^0(q) = \xi F(q)$ ). HJBs are

$$\begin{aligned} (r + \theta - g)A(q, m, n) &= \max_z \pi(q) + \theta B(q) \\ &\quad + \chi_I z \phi(z + \bar{z}_E(q, m, n)) (A((1 + \lambda)q, 0, 0) - A(q, m, n)) \\ &\quad - \chi_E \bar{z}_E \phi(z + \bar{z}_E(q, m, n)) A(q, m, n) \\ &\quad + \nu(\bar{z}_E(q, m, n) + z) A_m(q, m, n) \\ &\quad - gq A_q(q, m, n) \end{aligned}$$

and

$$\begin{aligned} (r + \theta - g)B(q) &= \max_z \pi(q) + \chi_I z \phi(z + \xi F(q)) (A((1 + \lambda)q, 0, 0) - B(q)) \\ &\quad - \chi_E \xi F(q) \phi(z + \xi F(q)) B(q) \\ &\quad - gq B'(q) \end{aligned}$$

B. **Entrants:** Solve for  $W^{NC}(q, m, n), W^F(q, m, n)$  and  $F^*(q)$  using Moll's iterative method.

Define  $\tau(q, m, n) = (\chi_I z_I(q, m, n) + \chi_E \bar{z}_E(q, m, n)) \phi(z_I(q, m, n) + \bar{z}_E(q, m, n))$  and  $L(q, m, n) = z_I(q, m, n) + \bar{z}_E(q, m, n)$ . HJBs are

$$\begin{aligned} (r + \theta + \tau(q, m, n) - g)W^F(q, m, n) &= \max_z \chi_E z \phi(z_I(q, m) + \bar{z}_E(q, m)) (A((1 + \lambda)q, 0, 0) - W^F(q, m, n)) \\ &\quad - w(q, m)z - gq W_q^F(q, m) + \nu L(q, m) W_m^F(q, m) \end{aligned}$$

and

$$\begin{aligned} (r + \theta + \tau(q, m) - g + v)W^{NC}(q, m) &= vW^F(q, m) - gq W_q^{NC}(q, m) \\ &\quad + \nu L(q, m) W_m^{NC}(q, m) \end{aligned}$$

Really, it comes down to setting

$$F^*(q, n) = \sup\{m : \chi_E \phi(z_I(q, m, n) + \bar{z}_E(q, m, n)) (A((1 + \lambda)q, 0, 0) - W^F(q, m, n)) \geq w(q, m, n)\}$$

ii. Check consistency

A. Check  $w(q, m) + \nu W^{NC}(q, m) = w$ .

B. Check  $F^*(q, n) = F(q, n)$ . If these things do not hold, update guesses for  $w(q, m), F(q)$  using some rule to be determined, and go back to (1ai).

(b) Check consistency: compute stationary distributions and integrate to compute growth rate  $g^*$ . If not converged, update guess for  $g$  and go back to (1a).

2. Finally, check labor market clearing: make sure that  $L^F + L^I(L^F) + L^{RD}(L^F) = 1$ . If too high, lower  $L^F$  guess and go back to step 1.