# Computer Algorithm: permanent non-competes

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1. Guess $L^F$

   (a) Guess $g$

      i. Guess $w(q,m)$, the wage paid to labor not bound by non-competes[1]

         A. Guess $M(q)$, which implies guess for $L^E(q,m) = \xi \min(m, M(q))$

         B. Guess $x(q,m)$, the non-compete policy of the incumbent[2].

         C. Using these guesses, solve for $V(q,m), W(q,m)$ using Moll's algorithm. For now, just set boundary conditions on initial (really, final) guess and hope it works, come back to this if it doesn't. Boundary on $V(q,m,T)$ comes from $V(0,m) = 0$ and $V_m(q,m) = 0$ for $m > M(q)$. Boundary on $W(q,m,T)$ comes, again, from $W(0,m) = 0$ and $W(q,m) = 0$ for $m > M(q)$.

         D. Check that $x(q,m)$ is consistent with incumbent optimality: $x(q,m) = 1$ exactly when $|V_m(q,m)| < W(q,m)$ and zero $x(q,m) = 0$ otherwise. If not, return to (1aiB) and guess a new value $x(q,m)$.[3]

         E. Check that $M(q)$, and hence $L^E(q,m)$, is consistent with entrant optimality: that is,

$$M(q) = \sup\left\{m : \chi_E \phi(L^I(q,m) + L^E(q,m)(V((1+\lambda)q,0) - W(q,m)) > w(q,m)\right\}$$

         If not, return to (1aiA) and guess a new value for $M(q)$.[4]

[1] Labor bound by non-competes will receive wage $\overline{w}$, which can be written in closed form as function of parameters

[2] Entrants are infinitesimal relative to their industry $j$ hence not take into account their effect on industry $j$ aggregates; hence, they perceive no cost from leaking knowledge and endogenously do not require their employees to sign non-competes

[3] I think this will converge, but it's not entirely obvious since there is a strategic interaction - the guess $x(q,m)$ affects $W(q,m)$ which then affects the optimal $x(q,m)$.

[4] Again, not 100% sure if this will converge...

ii. Check that $w(q,m) = \overline{w} - \nu W(q,m)$. If not, return to (1ai) and make a new guess.

(b) Now, given $L^I(q,m), L^E(q,m)$ computed above, compute stationary distribution of $(q,m)$ and then aggregate to compute growth rate $g^*$. If not equal to guess $g$, return to (1a) and guess a new value of $g$.

2. Finally, the above allocation gives us functions $L^I(L^F), L^{R\&D}(L^F)$. Check that $L^I + L^{R\&D} + L^F = 1$; otherwise, go back to (1) and guess a new value of $L^F$.