Garicano-Rossi-Hansberg JPE

Effect of the knowledge economy on the structure of organizations and wages.

Problems $z \overset{pdf}{\sim} f(z)$, cdf $F(z)$

- assume $f'(z) < 0$

agent's knowledge : $[0, \bar{z}]$ (overlapping knowledge)

- $z(q)$ = knowledge required to solve fraction q of problems (ie $F(z(q)) = q$) $z', z'' > 0$

agent's ability is $\alpha \overset{pdf}{\sim} \varphi(\alpha)$ on $[0,1]$ (commonly observed)

- cost of learning $[0, z]$ is $c(\alpha, \underbrace{t}_{\text{technology parameter}})z = (t-\alpha)z$
- high α-types have a comparative advantage in knowledge acquisition

Bottom of the hierarchy: workers

Top of the hierarchy: entrepreneurs

Middle of the hierarchy: managers

Bottom:
- call q_0 what workers can solve $= F(z_0)$
- n_0 workers
- $n_1 = n_0(1-q_0)\cdot h$ managers needed in layer 1.
- $n_2 = n_0(1-q_1)\cdot h$ $q_1 > q_0 \Rightarrow n_2 < n_1$
- $n_L = n_0(1-q_{L-1})h$
- output: $y = q_L n_0$

Problem of a firm with L layers:

wage is net of training cost

$$\max_{\alpha_\ell, q_\ell, n_\ell} \pi(L) = q_L n_0 - \sum_{\ell=0}^{L} n_\ell [c(\alpha_\ell; t) z(q_\ell) + w(\alpha_\ell)]$$

s.t. $hn_0(1-q_{L-1}) = n_L \equiv 1$ (normalization) - entrepreneur

$hn_0(1-q_{L-k}) = n_{L-k+1}$

$\vdots$

$hn_0(1-q_0) = n_1$

$\longrightarrow w'(\alpha) = -c_\alpha(\alpha,t)\cdot z(q)$

FOC wrt α:

(α): $w'(\alpha) = -\overbrace{c'(\alpha)}^{=1} z(q)$

$\Rightarrow w'(\alpha) = z(q)$

$\boxed{\text{firm's problem is actually } \max_L \max \Pi(L)}$

Individual: (announce type)

$$\max U(\alpha) = \overbrace{w(\alpha') + c(\alpha',t)z(q(\alpha'))}^{\text{total compensation}} - \overbrace{c(\alpha,t)z(q(\alpha'))}^{\text{actual training cost}}$$

$\underline{\text{FOC}}$: $\underbrace{w'(\alpha^*)}_{=-c_\alpha(\alpha,t)z(q)} = -c_\alpha(\alpha^*,t)z(q(\alpha^*))$

$- z'(q(\alpha^*))q'(\alpha^*)[c(\alpha^*,t) - c(\alpha,t)]$

$\Rightarrow$ in equilibrium, have $\alpha^* = \alpha$.

$\Rightarrow U(\alpha) = w(\alpha)$

Let $n(\alpha)$ = total number of workers or managers hired as direct subordinates of managers or entrepreneurs of ability α

$a(\alpha)$ = ability of managers assigned to employees of ability α

A_S = set of individuals who have subordinates

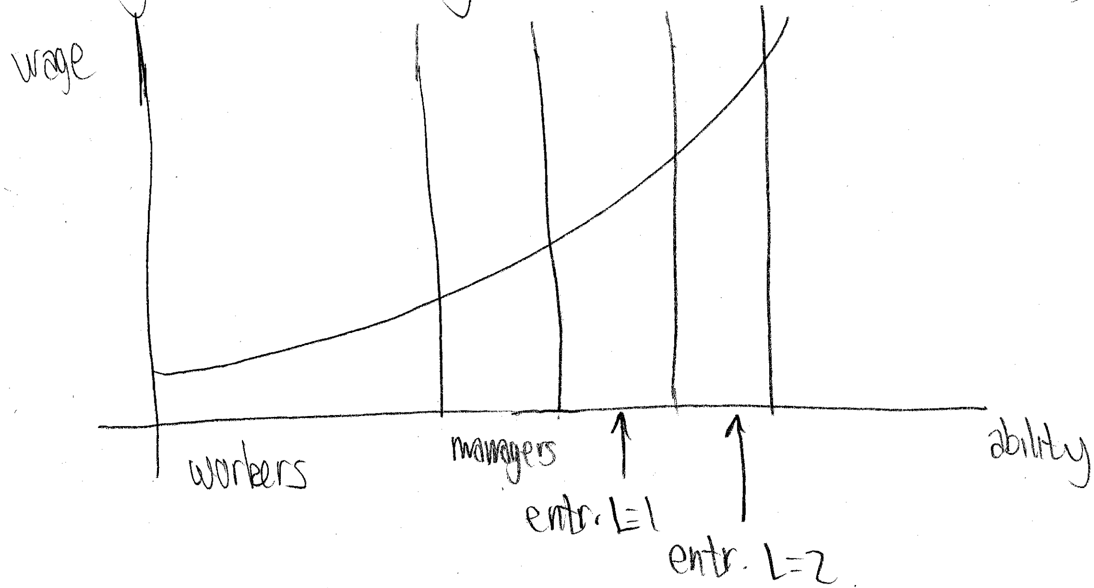
A_M = set of individuals who are not entrepreneurs

Labor market clearance if $\forall \alpha \in A_M$,

$$\underbrace{\int_{[0,\alpha]\cap A_M} \varphi(\alpha')d\alpha'}_{\text{labor supply}} = \underbrace{\int_{[a(0),a(\alpha)]\cap A_S} \frac{n(\alpha')}{n(a(\alpha'))}\varphi(\alpha')d\alpha'}_{\text{labor demand}}$$

Results:

- There is positive sorting: $a'(x) > 0$
  - someone of higher ability has higher ability managers
  - corollary: higher ability people get more training
- wage is increasing and convex in ability



- this ability to specialize will increase wage inequality.