Theories about why efficient for large plants to hire skilled labor

- Management Diseconomies (e.g. Walter Oi).
  - Explanation for assortative matching
  - Assume

    $$Q = \theta E$$

    where θ is management ability and E is labor in efficiency units.
  - Suppose $E = qL$ where L is number of worker and q is quality.
  - Suppose $L \leq \overline{L}$ (span of control)

- Then social planner allocates highest quality workers to highest θ managers.

Economies of Scale for replacing unskilled with capital. (Holmes and Mitchell)

- Unit measure of tasks z

- Level of task z denoted $x(z)$

- Gross output is Leontief

$$q = \min\{x(z)\}$$

- One unit of any factor delivers one unit of task:

- Tasks above z_{skill} must be done by skilled labor.

- Tasks below z_{skill} can be done by unskilled labor or capital (or skilled labor)

- To get capital to be able to perform a task, need to spend $\phi(z) > 0$ in fixed cost, where $\phi(0) = 0$ and $\phi'(z) > 0$.

- Optimal Allocation: A Cutoff Rule

- In any equilibrium

$$w_K < w_U \leq w_S$$

- Look at cost minimization problem for fixed q. Which factor does job $z < z_{skill}$? Between capital or unskilled labor pick

$$\text{min}\{w_K q + \phi(z), w_U q\}$$

So cutoff rule $\hat{z}$, hire capital for $z < \hat{z}$ where $\hat{z}$ solves

$$q = \frac{\phi(z)}{(w_U - w_K)}$$

- So $\phi(z)$ increasing implies $\hat{z}$ increases with q.

- Capital Labor Ratio

$$\text{Capital Labor Ratio} = \frac{\hat{z}q}{(1-\hat{z})\,q} = \frac{\tilde{z}}{1-\hat{z}}$$

increases with q (but what about with $employment = (1{-}\hat{z})q$

- Skill share:

$$\frac{z_{skill}q}{(z_{skill}-\hat{z})\,q}$$

- Paper deals with another issue: z_{skill} could be endogenous....

Models of Grabbing

- Firms vary in productivity parameter θ density $h(\theta)$ on [$\underline{\theta}$,$\bar{\theta}$].

$$Q = \theta f(K, L)^{\gamma}$$

where

$$f(K, L) = (\alpha K^{\rho} + (1 - \alpha) L^{\rho})^{\frac{1}{\rho}}$$

where

$$\sigma = \frac{1}{1 - \rho} < 1$$

- Setup cost ϕ

- Competitive wage w_c.

- Workers showing up to a particular firm of form a union at cost

- Directed search, given θ type firm $m(\theta)$ show up.

- Union makes take-it-or-leave it offer to supply up to $m(\theta)$ at a given wage that they pick $w(\theta)$.

  - Now assume that $w(\theta) + \xi \leq w_c$

  - In equilibrium $m(\theta)w_c = n(\theta)w(\theta)$, where $m(\theta)$ is the amount that show up, $n(\theta)$ is the amount that is used.

Firm Problem

given w

$$\max_{K,L} \theta p f(K,L)^{\gamma} - wL - rK$$

subject to

$$\tilde{\pi}(w,\theta) = \theta p f(\tilde{K}(w), \tilde{L}(w))^{\gamma} - w\tilde{L}(w) - r\tilde{K}(w) - \phi \geq 0$$

Where $\tilde{L}(w,\theta)$ solves the unconstrained problem. So labor demand is

$$\begin{aligned} L^*(w,\theta) &= \tilde{L}(w,\theta), \text{ if } \tilde{\pi}(w,\theta) = 0 \\ &= 0 \text{ if } \tilde{\pi}(w,\theta) < 0. \end{aligned}$$

Union Problem

- Given θ, and $m(\theta)$, solve

$$\begin{aligned} & \max L^*(w,\theta)w, \\ \text{subject to } L^*(w,\theta) &\leq m(\theta) \\ w &\leq w_c + \xi \end{aligned}$$

- Since labor demand inelastic, go to corner where either

$$\begin{aligned} w &= w_c + \xi \\ \pi^*(w,\theta) &= 0 \end{aligned}$$

- Let $w^{**}(\theta)$ be solution to the union problem. Strictly increasing in θ until hits $w_c + \xi$.

- Let $n^{**}(\theta) = L^*(w^{**}(\theta), \theta)$.

- Equilibrium with directed search implies

$$\frac{m^{**}(\theta)}{n^{**}(\theta)} w^{**}(\theta) = w_c$$

Main Point

- Show $q^{**}(\theta)$ increasing in θ

- Since $w^{**}(\theta)$ increasing in θ get firm size wage premium

- Also obviously get capital intensity increases (but with no grabbing, capital intensity is independent of firm size

Extensions

- Instead of just substituting away through capital, pick different kinds of goods

- Intermediates y_1, y_2 and $q = \min\{y_1, y_2\}$

- Production technology, $\alpha_1 < \alpha_2$

$$y_i = f_i(K, L) = (\alpha_i K^\rho + (1 - \alpha_i) L^\rho)^{\frac{1}{\rho}}$$

$$\begin{aligned} q_1 &= g_1(y_1, y_2, \theta) = \theta y_1 (y_1 + y_2)^{-(1-\gamma)} \\ q_2 &= g_1(y_1, y_2, \theta) = \theta y_2 (y_1 + y_2)^{-(1-\gamma)} \end{aligned}$$

- Specialist: just do task 1 or task 2

- Intermediation. Make $y = y_1 = y_2$ of both goods.

- Intermediation cost of τ per unit transfer

- With $\xi = 0$, when $\tau > 0$ all firms are vertically integrated

- $\xi > 0$ $\tau > 0$?
  - (if $\tau = \infty$), just what we already did. Escape labor by K
  - τ now escape by changing what you do.
  -

Recent Vertical Disintegration Events

- NWA using contracters for cleaning rather than own employees
  - Holdup problem? Yes: when get in the door will hold things up
- Ford and GM spinning off parts divisions
  - Clear the things I am talking about above are first order
- Professional Employee Organizations?