model primitives

n workers (S)

K firms (B), perfect competition

L middlemen (m), ~~perfect competition~~ local monopolists

τ: retention rate : $0 \le \tau \le 1$

β: discount factor : $0 \le \beta \le 1$

discrete time $t = 1, 2, \dots \infty$

- workers are of identical productivity & reservation utility
  - $E_i(W_i)$ differ due to information asymmetry

objective functions

workers:

$$\max \; U\Big(F_i - \sum_{i=1}^{t} \tau^t \beta^t (W_i - r)\Big) \; ; \; U(\cdot)' > 0, \; U(\cdot)'' < 0$$

- F_i is agency fee
- r is reservation utility
- denote $W_i = w_i - r$

employers (aggregated)

$$\max_{S} \; \pi_t^B(S) = f(S) - W \cdot S - (1-\tau)\, a \cdot S_{t-1}$$

- a is agency fee

middlemen (aggregated)

$$\max_{F_i} \; \pi_t^m(S) = (F_i + a)(1-\tau) S_{t-1}$$

fee determination & worker recruitment

(i) $F_i = U\Big(\sum_{i=1}^{t} \tau^t \beta^t E_i(W_i)\Big)$, where $G(w_i)$ is cdf of $E_i(W_i)$

- middlemen recruits $(1-\tau) S_{t-1}$ workers s.t.

$$(1-\tau) S_{t-1} = \int_{E_i(W_i)}^{\infty} G(x)$$

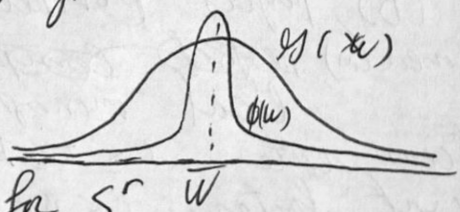
(ii) wage lottery:

- $H_i(W)$ is cdf of wages
- worker accepts if $W_i > 0$
- where $E(W) = \int_{r}^{\frac{\partial f}{\partial S}} W \cdot dH(w)$

returning Worker differences

Denote workers who have already be hired S^r

- $\phi_i(W)$ is cdf of $E(W_i)$ for S^r
  - $\phi_i(W_i) \leq G(W_i)$



- productivity is higher for S^r
  - $\frac{\partial f}{\partial S^r} > \frac{\partial f}{\partial S^{\neg r}}$

model dynamics

$t=0$

- employers at eq. $\Pi_i^B(S) = 0$
- middlemen & workers inactive

$t=1$

- employers lose $(1-\tau)S_0$ workers
  - request $(1-\tau)S_0$ from M
- middlemen finds $(1-\tau)S_0$ workers
  - set F_i from most profitable $(1-\tau)S_0$
- $(1-\tau)S_0$ re-enter unemployed labor pool.

$t=2$

- employers lose $(1-\tau)S_1$ workers
  - request $(1-\tau)S_1$ workers from M
- M finds $(1-\tau)S_1$ workers
  - set F_i from most profitable $(1-\tau)S_1$
- $(1-\tau)S_1$ re-enter unemployed pool

⋮

$t=n$

repeat $t=2$.