Understanding Sorkin (2018)

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Contents

.1 Pseudo code 2

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.1.1 Define worker and firm types

1. Draw n_k firm types and amenity pairs (Ψ_k, V_k) from a joint normal distribution $\mathcal{N}\left(\begin{pmatrix}0\\0\end{pmatrix}, \begin{pmatrix}\sigma_\Psi^2 & \rho\sigma_\Psi\sigma_V\\ \rho\sigma_V\sigma_\Psi & \sigma_V^2\end{pmatrix}\right)$

2. Draw n_l worker types α_l from a normal distribution with mean zero and variance σ_α^2. (to keep it simple get the values at n_l quantiles)

.1.2 Simulate Panel

$t = 0$: 1 Randomly draw a worker type α_l from the n_l possible worker types.

$t = 0$: 2 We assume that the workers are sorted in period zero. So draw the firm type Ψ_k as follows — Randomly sample Ψ_k from the n_k possible values with a probability of picking the k$^{\text{th}}$ firm type given by $\phi_{\sigma^2}(\Psi_k - \sigma_{\text{sort}}\alpha_l)$. Where $\phi_{\sigma^2}(.)$ is the probability density function of the normal distribution with mean zero and variance σ^2. This implies that if $\sigma_{\text{sort}} > 0$, then on average a higher α_l worker has a higher initial Ψ_k firm. Given that each firm class has a unique amenity level we get the tuple (α_l, Ψ_k, V_k) for each individual in the period zero.

$t = 1$: In the next period following things can happen to the worker —

(a) Worker doesn't dies (which happens with probability $1-\gamma$) and the worker doesn't gets an outside offer (which occurs with probability $1-\lambda$). In this case worker stays at the same firm, the total probability of this happening is $(1-\gamma)(1-\lambda)$.

(b) The worker doesn't dies and gets an outside job offer. This event occurs with probability $\lambda(1-\gamma)$. In this case

- The worker moves to the new firm with probability $\frac{e^{V_{k'}}}{e^{V_k}+e^{V_{k'}}}$.
- Stays at the same firm with probability $\frac{e^{V_k}}{e^{V_k}+e^{V_{k'}}}$.

(c) The worker dies. This occurs with probability γ and in this case the match is replaced by a new worker-firm pair as in $t = 0$.

$t = 2$ to 10: Repeat the previous step.

Some comments

If there no probability of death then the sorting in the firms would decay out. By bringing in fresh matches we ensure that the sorting stays at a positive level.

.1.3 Estimation

Equation (6) in Sorkin (2018) shows that if the workers choose the firms as argued in the paper then the observed flows and firm amenities are related as follows

$$\frac{\sum_{k'\in\{1,2..n_k\}} M^o_{kk'} e^{V_{k'}}}{\sum_{k'\in\{1,2..n_k\}} M^0_{k'k}} = e^{V_k} \tag{.1.1}$$

where $M^o_{kk'}$ is the flow of workers moving from k' to k and vice versa. This is nothing but the Market Access!!! This is a recursive system. Writing this in matrix notation

$$(\mathbf{S}^o)^{-1}\mathbf{M}^o e^{\mathbf{V}} = e^{\mathbf{V}} \tag{.1.2}$$

$e^{\mathbf{V}}$ is just the eigen vector of the transformation $(\mathbf{S}^o)^{-1}\mathbf{M}^o$ with an eigen value equal to 1. We can solve this iteratively.

If this shows me bias here then this is directly applicable to the paper with Jonathan. There is a straightforward extension here too — right now each period the worker gets a random draw and then decides whether to move or not. But we can directly bring in the Eaton-Kortum machinery allow the individual to search over all firms. Infact, I can do that in this exercise by just modifying the random draw step.

Bibliography

Sorkin, Isaac. 2018. “Ranking firms using revealed preference.” *The quarterly journal of economics*, 133(3): 1331–1393.