Labor Market Power and Human Capital Accumulation

Tristany Armangué-Jubert[1] Jacob T. Hess[2] Tancredi Rapone[3]

May 14, 2025

[1,2,3] UAB and BSE

Background & Motivation

- Imperfect competition in labor markets is a well-known source of aggregate efficiency losses due to static misallocation, e.g. Card (2022).
- Returns to training are declining in worker mobility (e.g. Mahone, 2016; Flinn et al., 2017; Wasmer, 2006; Topel, 1991).

➩ **Q**: How does labor market power affect human capital accumulation through on-the-job training?

Mechanisms

$$
\begin{tikzcd}
 & & L \downarrow \arrow[r] & HC \downarrow \\
 & \text{Search friction} \arrow[ur] \arrow[dr] & & \\
 & & \text{poaching} \downarrow \arrow[r] & HC \uparrow \\
\text{LMP} \arrow[uur] \arrow[ddr] & & & \\
 & & \rho\ (L,z) \downarrow \arrow[r] & HC \downarrow \\
 & \text{Job differentiation} \arrow[ur] \arrow[dr] & & \\
 & & \text{Profits} \uparrow \arrow[r] & HC \uparrow
\end{tikzcd}
$$

What we do

In this paper:

- We investigate the relationship between LMP and human capital accumulation empirically using data from a large government program in the US.
- We build a general equilibrium search model featuring two sided heterogeneity and non-wage amenities.
- (Still in progress) we take the model to the data and find that accounting for dynamic investment decisions reduces/amplifies the effect of LMP on output by xx%.

Outline

In today's presentation:

1. Literature review
2. Data sources
3. Reduced form evidence of a negative correlation between LS elasticity and training
4. Outline of a structural model to quantify the relationship between human capital accumulation and labor market power.
5. Preview of the model's results for an arbitrary parametrization.

Related literature

Our contribution relates to several strands of literature including:

Training and LMP: Le Barbanchon and Marcato (2022), Colombo and Marcato (2022); Jungerman (2024).
Measurement of LMP: Manning (2013); Sokolova and Sorensen (2021); Azar, Marinescu and Steinbaum (2023).
LMP and efficiency losses: Bagga (2023); Berger, Herkenhoff and Mongey (2022); Weber (2015); Amodio, Medina and Morlacco (2022).
Search and Training: Becker (1962); Jovanovic (1979); Burdett and Mortensen (1998); Flinn et al., (2017); Bagga, Mann, Sahin and Violante (2023).

data

Data

Two data sources:

- Survey of Income and Program Participation (SIPP) 2018-2022:
  - Monthly level dataset of 26000 per wave of respondents observed 4 times per year for 4 years.
  - Data on a variety of social-economic indicators including income, sex, education, age, marital status, etc.
- WIOA individual participant record layout 2017-2022:
  - Comprehensive dataset on participants in a government-sponsored labor market training program previously unused in the literature (as far as we know).

Worker Innovation and Opportunity Act

"WIOA is designed to help get Americans into high-quality jobs and careers and help employers hire and retain skilled workers."

- Signed into law in 2014
- Divided into Titles I-V according to program function
- Designed primarily to provide career and training services to workers well as improving match quality between job-seekers and employers.

WIOA at a glance: Total participants (Title I)

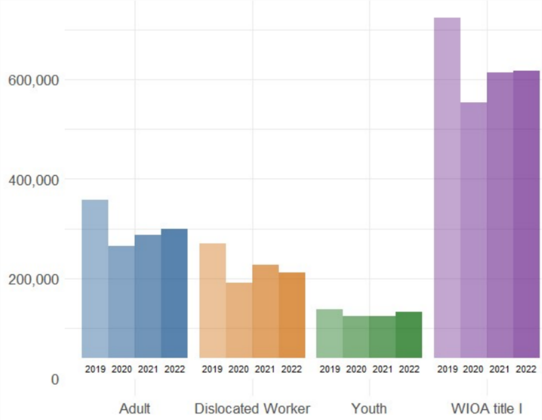


Figure 1: WIOA Title 1 participants 2019-2022. Source: WIOA (2022), "National performance summary".

◂ % trained

empirics

Manning (2003) elasticity of labor supply

Using the SIPP, we estimate a *reduced form* elasticity of labor supply at the labor market (state - 2d-industry) level recovered from the parameters of a linear probability model:

$$1_{i,t} = \alpha + \beta \log(w_{i,t-1}) + \Gamma' X_{i,t} + \epsilon_{i,t} \tag{1}$$

Where $1_{i,t}$ takes value 1 if individual i separates from their employer at month t. $X_{i,t}$ includes sex, marital status, age group, education level and wave fixed effects.

Estimating the elasticity

The labor supply elasticity ε faced by the firm as a combination of the hire and quit elasticities:

$$\epsilon = \mu + (-\beta)$$

Estimating the hire elasticity is not possible without firm-level data, however in general $\mu \propto (-\beta)$.

OJT and the separation elasticity

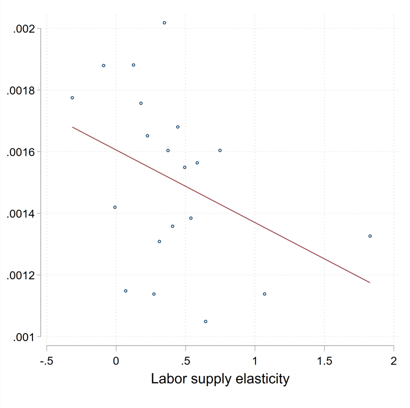


Figure 2: Binscatter plot of on-the-job training against the labor supply elasticity, controlling for state and industry fixed effects. Labor supply elasticity is estimated using SIPP 2018/22 monthly data on separations and wages. Y axis shows the fraction of employed workers receiving training through WIOA.

◂ selection ◂ 1 / n

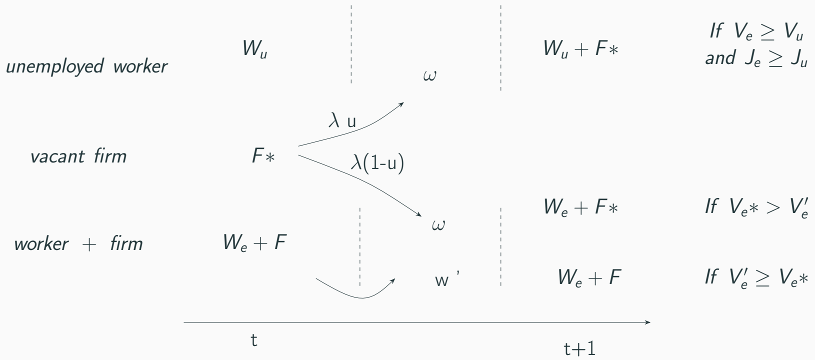
model

Building blocks

Time is discrete. There is a continuum of both workers and firms indexed by $(h, a, z) \in \Omega$:

- Workers:
  - Search randomly on and off the job
  - Accumulate human capital h through training.
- Firms:
  - Are characterized by amenities and productivity (a, z)
  - Employ at most one worker
  - Make training decision over employees
  - Randomly search for workers from other firms and unemployment when vacant
  - Post wage offers each period.

Timing



unemployed worker
W_u
ω
$W_u + F*$
If $V_e \geq V_u$
and $J_e \geq J_u$
λ u
vacant firm
$F*$
λ(1-u)
ω
$W_e + F*$
If $V_e* > V_e'$
worker + firm
$W_e + F$
w '
$W_e + F$
If $V_e' \geq V_e*$
t
t+1

Employed workers

Workers with human capital at gridpoint i have the following continuation value:

$$V^e(h,a,z) = \varepsilon ln(w) + a + \beta\{(1-\delta)\{\lambda u[\rho_s V^e(h',a,z)+ (1-\rho_s)\mathbb{E}_{a,z}[V^e(h',a,z)]] + (1-\lambda u)V^e(h',a,z)\} + \delta V^u\}$$

s.t.

$$h' = \begin{cases} h_i & \text{if } (a',z') \neq (a,z) \ \& \ \mathcal{U}' = 0 \\ h_{i+\theta_e} & \text{if } (a',z') = (a,z) \ \& \ \mathcal{U}' = 0 \\ h_0 & \text{if } \mathcal{U}' = 1 \end{cases}$$

Where a, z are employer's amenities and productivity and ρ_s is the probability that worker h stays at firm (a,z), conditional on receiving an offer. The variable $\mathcal{U} \in \{0,1\}$ captures unemployment status.

Unemployed workers

Workers who are unemployed receive unemployment benefits b. Their continuation value is:

$$V^u = ln(b) + \beta\{\lambda u \mathbb{E}_{a,z}[V^e(h', a, z)] + (1 - \lambda u)V^u\}$$

s.t.

$$h' = h_0$$

Where we assume that $V^u \leq V^e(h_0, a, z) \ \forall \ (h_0, a, z) \in \Omega$ workers prefer working to being unemployed.

Firms

Firms are heterogeneous in productivity z and amenities a. Each firm -j- hires one worker -i- and produces:

$$\pi = [\phi z_j^{\sigma} + (1 - \phi) h_i^{\sigma}]^{\frac{1}{\sigma}} - w \qquad \phi \in (0, 1)$$

Firms choose wages internalizing the probabilities of receiving an outside offer.

Employer problem: Incumbent firm

Employers choose wages and whether to train employees. The problem of an incumbent firm hiring worker on gridpoint i is:

$$J^e(h,w) = \max_{\theta_e \in \{0,1\}, w'} \pi(z,h,w) - \theta_e \tau_e + \beta\{\delta J^u +$$

$$(1-\delta)[\underbrace{\lambda u}_{offer}[\rho_s(w')J^e(h',w') + (1-\rho_s(w'))J^u] +$$

$$\underbrace{(1-\lambda u)}_{no\ offer} J^e(h',w')]\}$$

s.t.

$$h' = h_{i+\theta_e}$$

Employer problem: Vacant firm

The problem of a vacant firm is:

$$J^u = \max_{w'} \beta\{\lambda(1-u)[\rho_e(w')\mathbb{E}_{h'}[J^e(h', w')] + (1-\rho_e(w'))J^u] + \lambda u J^e(h_0)] + (1-\lambda)J^u\}$$

Where ρ_e is the probability of hiring upon contacting a worker from an existing employer.

Separation probability

Employers post spot wages internalizing the separation/recruitment decisions of workers. Let $\omega(z)$ be the maximum wage that a firm with productivity z can offer. Then for an employer (z, a) the probability of retaining their worker h is:

$$\rho_s = \int_{\varepsilon ln(\omega(\underline{z}))+\underline{a}+E(h',\underline{a},\underline{z})}^{\varepsilon ln(w)+a+E(h',a,z)} 1 dU(a, z)$$

Where $E(h, a, z)$ is the continuation value and $U(a, z)$ is the distribution of vacancies over firms.

Recruitment probability

A vacant firm searching for a worker faces the following probability of hiring depending on the wage they offer:

$$\rho_u + \rho_e = u \underbrace{1_{\varepsilon ln(w)+a+E(\underline{h},a,z)>V_u(\underline{h})}}_{\text{hire from u}} +$$

$$(1-u) \underbrace{\int_{\varepsilon ln(\omega(\underline{z}))+\underline{a}+E(h',\underline{a},\underline{z})}^{\varepsilon ln(w)+a+E(\underline{h},a,z)} 1 dG(h,a,z)}_{\text{hire from e}}$$

Where $G(h,a,z)$ and u are, respectively, the distribution of employed worker-firm pairs and the undemployment rate.

Labor Supply

The labor supply function to the vacant and incumbent firms are then respectively:

$$\ell_u = \underbrace{\lambda}_{\text{offer successful}} \left(\underbrace{(1-u)\rho_e}_{\text{hire from e}} + \underbrace{u\rho_u}_{\text{hire from u}}\right) \tag{2}$$

And:

$$\ell_e = \underbrace{\lambda u \rho_s}_{\text{keep worker upon offer}} + \underbrace{(1-\lambda u)}_{\text{no offer}} \tag{3}$$

Elascticity of Labor Supply

Using the Leibniz rule we can differentiate and 2 w.r.t. the wage to obtain the following:

$$\epsilon_e = \frac{\partial \ell_e}{\partial w} \frac{w}{\ell_e} = \frac{\varepsilon \lambda u}{\rho_s \lambda u + (1 - \lambda u)} \tag{4}$$

$$\epsilon_u = \frac{\partial \ell_u}{\partial w} \frac{w}{\ell_u} = \frac{\varepsilon (1 - u)}{(1 - u)\rho_e + u} \tag{5}$$

Where ϵ_e, ϵ_u is the labor supply elasticity to the employer/vacant firm respectively.

◂ w_e ◂ w_u

results

Model Solution

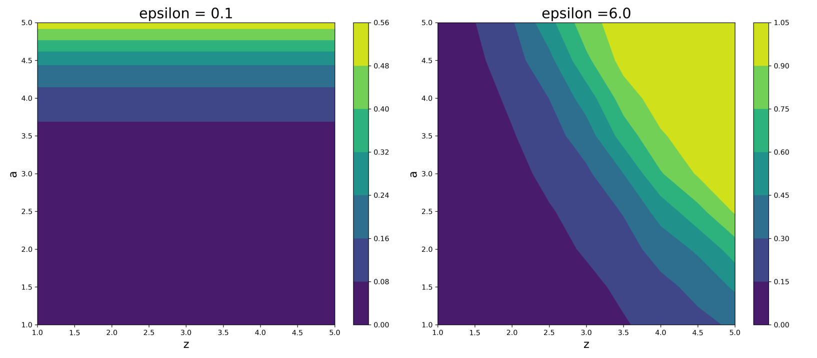
We solve the model with the following parameters:

Parameter	Value
δ	0.05
σ	-1
ϕ	0.6
${\tau_e}^*$	0.15
b	0.1
λ	0.15
β	0.98

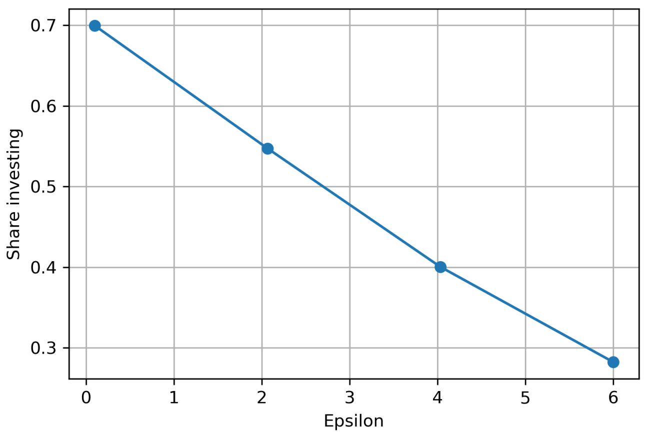
Table 1: Model Parameters

* Expressed as a share of average productivity.

Results: Distribution of Emloyment - ρ_s

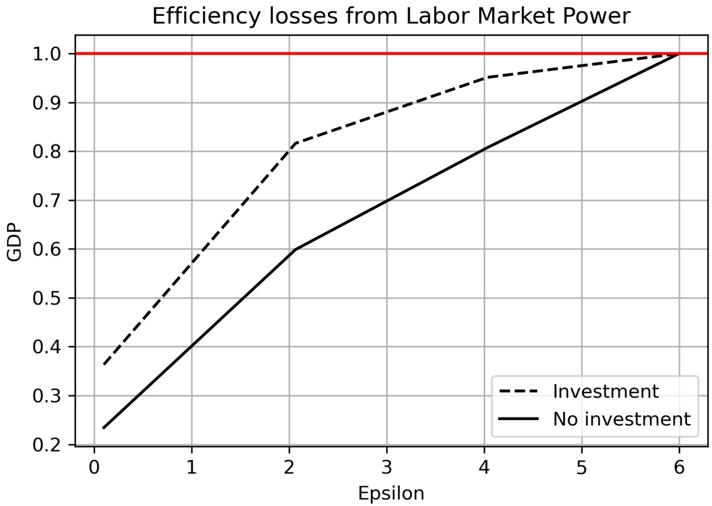


Results: Investment Decision

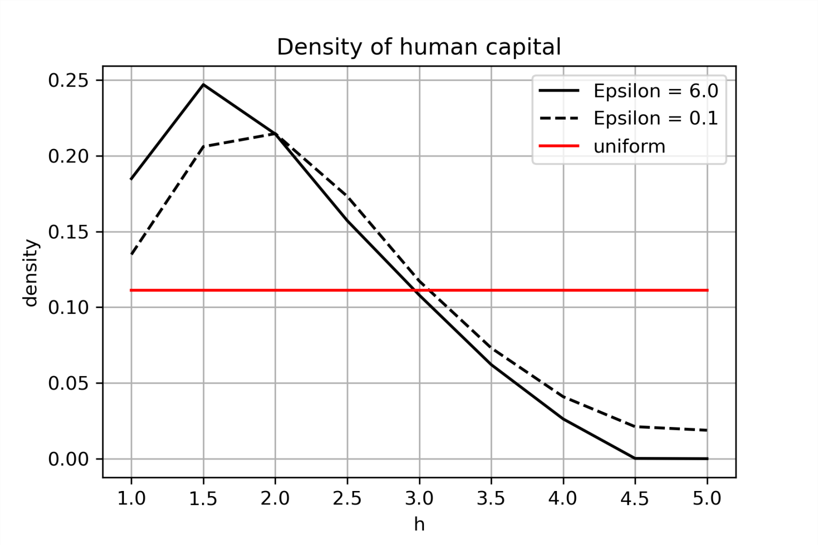


◂ gains ◂ profits, wages and returns

Results: GDP losses



Results: Density of Human Capital



discussion

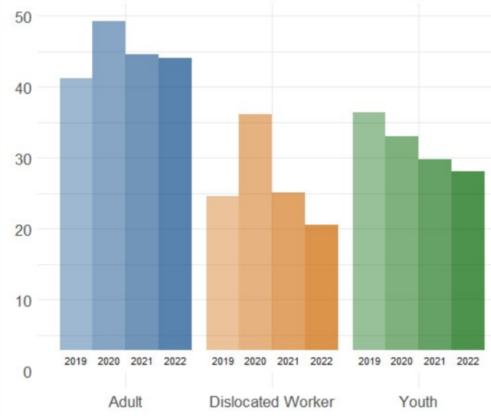
Conclusion and next steps

In summary:

- We document that:
    - Firm sponsored training is declining in the labor supply elasticity
- We propose a search model with endogenous training decisions to analyze the impact of LMP on human capital accumulation
- Next up: calibrate the model at the state-industry-(2d) level using SMM

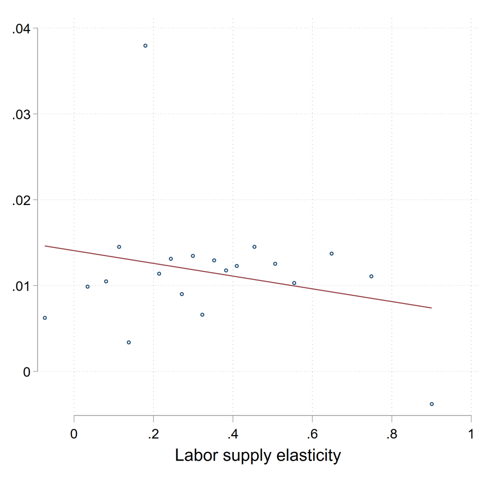
appendix

Fraction Trained



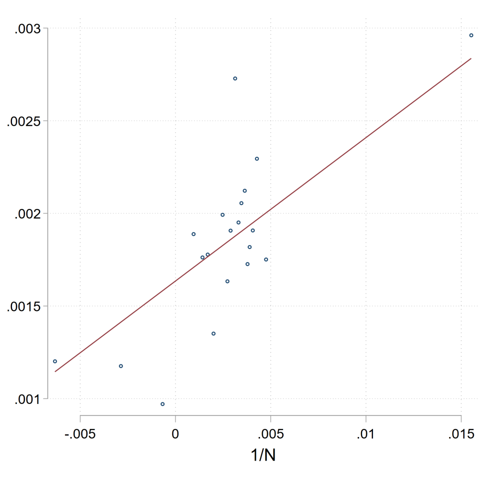
go back

Selection



go back

1 / N



◂ go back

Wage employer firm

Taking the FOC with regards to the w' and solving yields the optimal wage w^* set by the employer firm:

$$w_e^* = [J^e - J^u]\frac{\varepsilon\lambda u}{\rho_s\lambda u + (1-\lambda u)} = [J^e - J^u]\epsilon_e$$

go back

Wage vacant firm

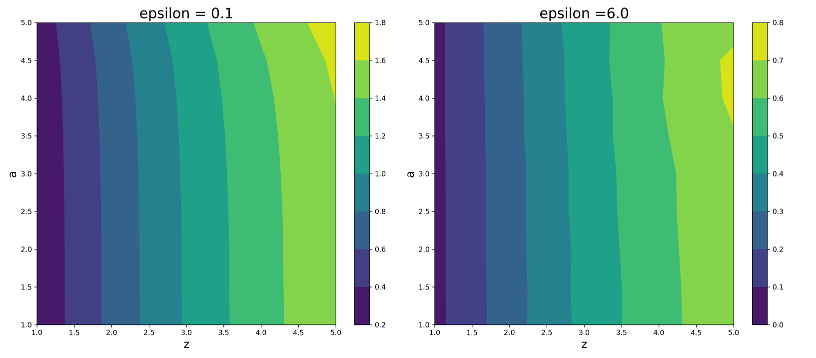
Taking the FOC with regards to the w' and solving yields the optimal wage w^* set by the employer firm:

$$w_u^* = (\hat{J}_e^e - J^u)\frac{(1-u)\varepsilon}{u + (1-u)\rho_e} = (\hat{J}_e^e - J^u)\epsilon_u$$

Where $\bar{J}_e^e$ is the expected continuation value being an employer firm.

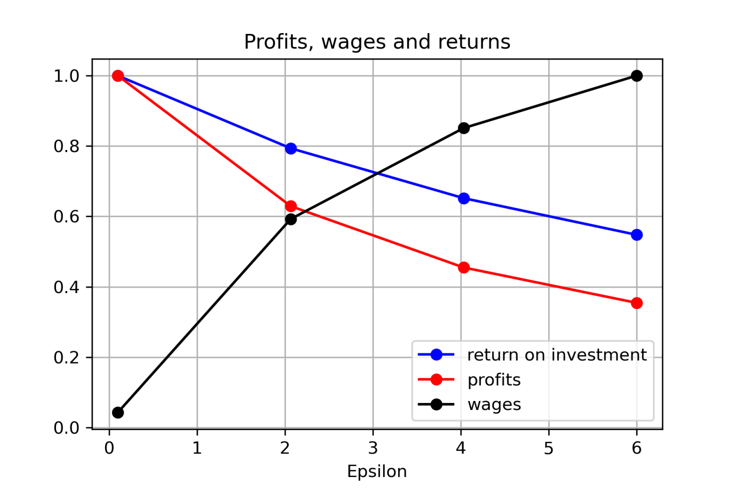
go back

Gains in J^e from investment



back

Profits, wages and return on investment



back