A Dynamic Analysis of Educational Attainment, Occupational Choices, and Job Search

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Table 7: Combined Returns to Firm and Occupation-specific Capital Vs. Gains from Job Search

	Professional & Managers	Craftsmen	Operatives & Laborers	Sales & Clerical	Service
Potential cumulative wage increase from firm & occupation-specific capital	42%	27%	10%	13%	34%
Potential wage gains from job search					
25^{th} percentile match to 75^{th}	45%				
5th percentile match to 95^{th}	147%				

NOTES: Gains to firm- and occupation-specific human capital are computed using the human capital level parameter estimates (potential wage increase = exp(firm HC level 3 + occ. HC level 3) − 1). Gains to job search are based on the percentiles of the pecuniary job match value (ψ) distribution.

Table 9: The Impact of Human Capital, Job Matching, and Occupational Matching on Welfare And Wages

Counterfactuals	Total Log-Wages		Total Utility	
	Total	% Change from Baseline	Total	% Change from Baseline
Baseline (estimated model)	265,321	—	210,623	—
1) Eliminate effect of firm- and occupation-specific capital on wages	257,860	–2.8%	205,479	–2.4%
2) Eliminate effect of education on wages	255,317	–3.8%	201,413	–4.4%
3) Workers randomly assigned to firms, never allowed to switch firms	213,844	–19%	138,568	–34%
4) Workers randomly assigned to occupations, never allowed to switch occupations	183,030	–31%	176,478	–16%

NOTES: Computed using samples of 4,000 simulated people. Total wages and utility are the sums of accepted wages and realized one-period utility flows over people and years. See Section 6.2 of the text for a description of the restrictions imposed under each counterfactual.

1. Introduction

- Builds on Keane and Wolpin (1997)
- Richer forms of skill accumulation

Table 1: Description of Aggregated Occupations

Aggregated Occupations	1970 Census Occupation Codes	Example Occupations
Professional, Technical, Managers	001–245	Architects, Economists, Office Managers
Craftsmen	401–580	Carpenters, Electricians, Automobile Mechanics
Operatives & Non-farm Laborers	601–785	Butchers, Truck Drivers, Groundskeepers
Sales & Clerical	260–395	Insurance Agents, Bank Tellers
Service	901–984	Janitors, Dishwashers, Nursing Aides

2. Data

- NLSY79

2.1. *Descriptive Statistics.*

Table 2: Choice Distribution by Age

Age	School	Professional & Managers	Craftsmen	Operatives & Laborers	Sales & Clerical	Service	Unemployed	Total Observations
16	85.7	1.4	2.2	10.9	2.9	7.6	10.4	1,023
17	79.4	2.1	4.0	12.7	7.1	8.5	12.6	963
18	48.3	2.8	6.8	16.9	8.0	8.5	21.4	893
19	38.2	5.6	10.1	17.7	8.8	7.4	20.4	838
20	33.3	8.9	14.3	17.4	7.8	7.4	19.7	798
21	27.6	11.5	16.8	17.6	9.5	6.9	18.0	756
22	16.4	17.5	17.5	18.6	13.9	6.2	16.4	714
23	10.5	22.7	16.6	18.4	14.4	8.4	14.8	675
24	8.3	26.1	20.1	18.6	12.9	7.6	10.5	641
25	4.8	29.2	21.4	16.3	12.7	6.8	12.0	607
26	5.8	32.6	19.7	18.3	11.7	7.1	8.7	589
27	3.4	32.2	21.0	16.9	13.5	5.0	10.5	562
28	5.0	35.8	19.4	15.5	11.2	5.4	10.6	536
29	1.2	33.7	16.7	18.2	10.5	7.2	13.4	516
30	1.0	34.5	19.5	17.9	11.4	6.6	9.4	498
All	24.6	19.8	15.1	16.8	10.4	7.1	13.9	10,609

NOTE: Entries are percentages. Rows need not sum to 100% because school attendance and employment are not mutually exclusive.

Table 3: Summary of Occupational Mobility by Age: NLSY Data (Top Entry) and Simulated Data (Bottom Entry)

Ages	Conditional on Switching Firms, % Switching Occupations	Conditional on Not Switching Firms, % Switching Occupations
16–21	57.64%	29.94%
	54.40%	27.38%
22–25	50.09%	26.85%
	47.14%	23.39%
26–30	40.76%	17.61%
	37.86%	14.83%
All ages	49.78%	24.69%
	46.56%	21.75%

NOTE: Probabilities are computed using all consecutive years of employment observed in the data for each age group. The top entry of each cell is computed using the NLSY data, and the bottom entry is computed using simulated data generated using the estimated structural model.

Table 4: Occupational Transition Matrix: NLSY Data (Top Entry) and Simulated Data (Bottom Entry)

	Professional & Managers	Craftsmen	Operatives & Laborers	Sales & Clerical	Service
Professional & Managers	83.28	4.22	3.00	7.35	2.15
	86.10	2.84	2.48	6.61	1.97
Craftsmen	7.25	75.59	13.05	2.55	1.57
	5.40	77.54	12.15	4.36	.55
Operatives & Laborers	4.74	14.90	68.98	7.66	3.71
	4.73	13.53	71.24	7.52	2.98
Sales & Clerical	20.45	4.60	10.76	61.94	2.25
	17.31	6.01	8.87	65.36	2.45
Service	10.53	7.22	9.32	4.51	68.42
	8.82	7.01	8.05	6.23	69.89

NOTE: The entries in this table are transition probabilities from the occupation in the left column to the occupation in the top row. The top entry of each cell is computed using the NLSY data, and the bottom entry is computed using simulated data generated using the estimated structural model.

3. Economic Model of Career Choices

3.1. *Utility Function.*

- The utility function: choice specific function of endogenous state variables (St), skill endowments and preferences.
- Random utility shocks that vary over time, people, occupations, and firm matches.

- S_t measure educational attainment, firm- and occupation-specific human capital, and the quality of the match between a worker and firm.

- Let s = school, g = GED, and u = unemployed.

- Describing working alternatives requires two indexes.

- eq = "employed in occupation q," where $q = 1, \ldots, 5$ indexes occupations.

- nf = "working at a new firm," and of ="working at an old firm."

- Combinations of these indexes define all the feasible choices available to an individual.

3.1.1. *Choice specific utility flows.*

- The utility flow from choice combination k: the sum of the logarithm of the wage, $w_{it}(k)$,

- Nonpecuniary utility, $H_{it}\ (k)$, that person i receives from choice combination k at time t,

$$U_{it}(k) = w_{it}(k) + H_{it}(k). \tag{1}$$

- The remainder of this section describes the structure of the wage and nonpecuniary utility flows in more detail.

3.1.1a. *Wages.*

- The log wage of worker i employed at firm j in occupation q at time t is

$$w_{it} = w_q(S_{it}) + \mu_i^q + \psi_{ij} + e_{ijt}. \tag{2}$$

- $W_q(S_{it})$ represents the portion of the log wage that is a deterministic function of the work experience and education variables in the state vector.
- The term $\mu(q_i)$: represents the random component of worker i's wages that is common across all firms in occupation q.
- This term allows people to have comparative advantages in their occupation specific skill endowments.
- The permanent worker-firm productivity match is represented by ψ_{ij}.
- True randomness in wages is captured by ε_{ijt}.
- All of the components of the wage (W_{it}) are observed by the worker when a job offer is received.

3.1.1b. *Nonpecuniary utility flows.*

- Nonpecuniary utility flow equation:

$$H_{it}(k) = [h(k, S_{it})] + \left[\phi_i^s 1\{s \in k\} + \phi_i^u 1\{u \in k\} + \sum_{q=1}^{5} \phi_i^q 1\{eq \in k\}\right] + \varepsilon_{ikt}. \quad (3)$$

- The remaining portion of the nonpecuniary utility function contains the nonpecuniary employment and nonemployment utility flows along with the schooling cost function.

- This utility flow equation is specified as

$$h(k, S_{it}) = \left[\sum_{q=1}^{5} \theta_q(S_{it}) 1\{eq \in k\} + \xi_{ij} 1\{emp \in k\}\right] + C^s(S_{it}) 1\{s \in k, emp \notin k\} + C^{sw}(S_{it}) 1\{s \in k, emp \in k\} + b(S_{it}) 1\{u \in k\} + C^g(S_{it}) 1\{g \in k\}. \tag{4}$$

- The term in brackets contains the occupation- and firm-specific nonpecuniary utility flows.
- The occupation specific portion of this flow, $\theta_q(S_{it})$, is a function of the state vector that is allowed to vary over occupations.
- The firm-specific nonpecuniary match value for person i at firm j is represented by ε_{ij}.
- This match value reflects the influence of permanent attributes of employment at each firm that affect the employment utility flow and are not observed by the econometrician.
- The second line of Equation (4) contains the schooling cost function for attending school while not employed $(C_s(S_{it}))$ and employed $(C_{sw}(S_{it}))$.
- The final components of the nonpecuniary utility flow are the deterministic portions of the value of leisure enjoyed while unemployed, $b(s_{it})$, and the cost function for earning a GED, $C_g(S_{it})$.

3.1.2. *Constraints*

- The structural modeling approach requires a detailed specification of the labor market constraints that determine an individual's choice set in each year.
- Earning a GED is dropped from the choice set after high school graduation or GED receipt.
- Finally, unemployment and employment are mutually exclusive choices.
- Given these restrictions, the choice set for individuals who are not employed when they enter period t:

$$D_t^{ne} = \{[d_t(s), d_t(u), d_t(u,g)], [d_t(ei,nf), i = 1, \ldots, 5], [d_t(q,ei,nf), q = s, g,\ i = 1, \ldots, 5]\}. \tag{5}$$

- Next, consider the feasible choices for a person employed in occupation q.
- At the start of period t the individual receives one new job offer from a firm in each of the five occupations and has the option to attend school, earn a GED, or become unemployed.
- In addition, an employed individual always has the option of remaining at his current firm and staying in his current occupation (q).
- Job offers from new occupations at the current firm are received randomly, where workers receive either zero or one such offer per year.
- Let π_j denote the probability that a worker receives an offer to work in occupation j at his current firm, where $j = q$.
- Let π_{nq} be the probability that a worker employed in occupation q does not receive an offer to switch occupations within his current firm.

- The choice set for a worker employed in occupation q who receives an offer to switch to occupation j at his current firm is

$$D_t^e(j) = \{D_t^{ne}, [d_t(eq, of), d_t(s, eq, of), d_t(g, eq, of)], [d_t(ej, of), d_t(s, ej, of), d_t(g, ej, of)]\}. \tag{6}$$

- Let $D_t^e(0)$ denote this 21-element choice set.

3.1.3. *State variables.*

- The endogenous state variables in the vector S_t measure human capital and the quality of the match between the worker and his current employer.

- Let at represent an individual's age.

- Educational attainment is summarized by the number of years of high school and college completed, h_t and C_t, and a dummy variable indicating whether or not a GED has been earned, g_t.

- Work experience is captured by the amount of firm-specific human capital (f_t) and occupation-specific human capital (O_t) in the occupation that the person worked in most recently.

- Let $O_t \in [1,2, \dots, 5]$ indicate the occupation in which a person was most recently employed. Let L_t be a variable that indicates a person's previous choice, where $L_t = 6$ where $L_t = \{1, \dots, 5\}$ refers to working in occupations one through five, $L_t = 6$ indicates attending school full time, and $L_t = 7$ indicates unemployment.

- Assume that firm- and occupation-specific human capital each take on P values, so that the possible values of human capital arranged in ascending order are

$$f_t \in FC = \{f(1), \ldots, f(P)\}$$
$$o_t \in OC = \{o(1), \ldots, o(P)\}.$$

- The skill increase parameters are $\{\lambda_{kf}, \lambda_{ko}, k = 1, \ldots, 5\}$, where the subscripts f and o refer to firm- and occupation-specific capital, and k indexes occupations.

- This method of modeling human capital has the advantage of making it possible to include both firm- and occupation-specific human capital in the state space at a fraction of the cost of keeping track of actual years of experience at a firm or in an occupation, because work experience could range from 0 to 15 years in this model.

3.2. *The Optimization Problem.*

- Individuals maximize the present discounted value of expected lifetime utility from age 16 ($t = 1$) to a known terminal age, $t = T^{**}$.

- The value function for an individual with discount factor δ employed in occupation q is

$$(7) \qquad V_t(eq, l) = U_t(eq, l) + \delta \sum_{k \neq q} \pi_k E Z_t^{ek} + \delta \left[\pi_{nq} E Z_t^{eq} \right], \qquad q = 1, \ldots, 5, \quad l = of, nf.$$

- The $E(Z_t^{ek})$ terms represent the expected value of the best choice in period $t+1$, conditional on receipt of an offer to work in occupation k at the worker's current firm.

- Each term in the sum corresponds to the probability that a job offer to work in a new occupation at the current firm is received (so $k = q$), multiplied by the corresponding expected value of the best option next period.

- The individual elements of the $E(Z_t^{ek})$ terms are the time $t+1$ value functions for each feasible choice,

$$(8)\quad EZ_t^{ek} = E\max\{V_{t+1}(s), V_{t+1}(u), V_{t+1}(u,g), [V_{t+1}(ei,nf), V_{t+1}(m,ei,nf), m=s,g,\ i=1,\ldots,5,], V_{t+1}(eq,of), V_{t+1}(s,eq,of), V_{t+1}(g,eq,of), V_{t+1}(ek,of), V_{t+1}(s,ek,of), V_{t+1}(g,ek,of)\}.$$

- In this case, switching occupations without switching firms is not possible, so the expected value of the best choice at time $t+1$ is

$$(9)\quad EZ_t^{eq} = E\max\{V_{t+1}(s), V_{t+1}(u), V_{t+1}(u,g), [V_{t+1}(ei,nf), V_{t+1}(m,ei,nf), m=s,g,\ i=1,\ldots,5], V_{t+1}(eq,of), V_{t+1}(s,eq,of), V_{t+1}(g,eq,of)\}.$$

- The value function for an individual who is not currently employed is simpler because mobility within a firm is obviously not possible for people who are not employed.

- The value function is

$$V_t(p) = U_t(p) + \delta E Z_t^{su}, \quad p = \{s\}, \{u\}, \{u, g\}. \tag{10}$$

- The corresponding expected value of the maximum term is

$$EZ_t^{su} = E \max \{ V_{t+1}(s), V_{t+1}(u), V_{t+1}(u, g), V_{t+1}(ei, nf), V_{t+1}(m, ei, nf), \ m = s, g, \ i = 1, \ldots, 5 \}, \tag{11}$$

which consists of all feasible combinations of schooling, unemployment, and new job offers.

3.3. *Solving the Career Decision Problem.*

3.3.1. *Distributional assumptions.*

- Assume that firm specific match values and randomness in wages are distributed i.i.d normal: $\xi_{ij} \sim N\left(0, \sigma_{\xi}^{2}\right), \psi_{ij} \sim N\left(0, \sigma_{\psi}^{2}\right)$, and $e_{ijt} \sim N(0, \sigma_{e}^{2})$.

- The firm-specific pecuniary and nonpecuniary match values are part of the state space, so a discrete approximation to these distributions is used when solving the optimization problem.

3.3.2. *Calculating the value functions.*

4. Estimation of The Structural Model

4.1. *Further Model Specification.*

- The deterministic portion of the occupation-specific human capital wage function:

$$
\begin{aligned}
(12) \qquad w_q(S_{it}) = {} & \beta_1^q a_{it} + \beta_2^q a_{it}^2/100 + \beta_3^q h_{it} + \beta_4^q c_{it} + \beta_5^q 1[a_{it} \le 17] \\
& + \beta_6^q 1[a_{it} \ge 18 \cap a_{it} \le 21] + \beta_7^q g_{it} \\
& + \beta_8^q 1[f_{it} = f(1)] + \beta_9^q 1[f_{it} = f(2)] + \beta_{10}^q 1[f_{it} = f(3)] \\
& + \beta_{11}^q 1[o_{it} = o(1)] + \beta_{12}^q 1[o_{it} = o(2)] + \beta_{13}^q 1[o_{it} = o(3)].
\end{aligned}
$$

- Let NF_t be a dummy variable indicating whether or not the individual is in his first year of employment at a firm after being employed at a different firm in the previous period.

- Let hd_t and cd_t represent dummy variables that indicate receipt of a high school or college diploma.

- The nonpecuniary utility flow equation for occupation q is

$$\theta_q(S_{it}) = \alpha_1^q a_{it} + \alpha_2^q a_{it}^2/100 + \alpha_3^q(h_{it} + c_{it}) + \alpha_4^q o_{it} + \alpha_5^q f_{it} + \alpha_6^q hd_{it} + \alpha_7^q cd_{it} + \alpha_8^q g_{it} + \alpha_9^q 1[L_{it} > 5] + \alpha_{10}^q NF_{it} \quad q = 1, \ldots, 5. \tag{13}$$

- The cost function for attending school is

$$(14)\qquad c^S(S_{it}) = \gamma_{s1}a_{it} + \gamma_{s2}a_{it}^2/100 + \gamma_{s3}hd_{it} + \gamma_{s4}cd_{it} + \gamma_{s5}h_{it} + \gamma_{s6}c_{it} + \gamma_{s7}1[L_{it} \neq 6]$$

$$c^{SW}(S_{it}) = \gamma_{sw1}a_{it} + \gamma_{sw2}a_{it}^2/100 + \gamma_{sw3}h_{it} + \gamma_{sw4}c_{it} + \gamma_{s7}1[L_{it} \neq 6] + \gamma_{sw6}(h_{it} \leq 4) + \gamma_{sw7}(h_{it} = 4 \cap c_{it} \leq 4) + \gamma_{sw8}(c_{it} \geq 4).$$

- The final utility flow equation represents the utility derived from earning a GED.
- The deterministic portion of the GED utility flow is

$$(15)\qquad c^g(S_{it}) = \gamma_{g1} + \gamma_{g2}a_{it}.$$

- Within-firm job offer probabilities are specified as multinomial logit, so the probability of receiving a job offer from occupation *j* at the current firm is

(16)
$$\pi_j = \frac{\exp(\rho_j)}{\sum_{k=1}^{5} \exp(\rho_k)}.$$

- Discount factor, δ, is set equal to 0.95 rather than estimated because it can be difficult to estimate the discount factor in dynamic models, even though it is technically identified.

4.2. *The Likelihood Function.*

- Conditional on having an endowment vector of type k, the likelihood contribution for person i is the product of the probability of each outcome observed in the data over the $\widetilde{T}_i$ years that the person remains in the sample,

$$(17) \qquad L_i(\Theta \mid \Phi_i = \Phi_k) = \int \cdots \int \left[\int \int \left(\prod_{t=1}^{\widetilde{T}_i} \Pr[O_{it} \mid \Omega, S_{it}, o_{it}, f_{it}, \Phi_i = \Phi_k) \right) dF(o_i) dF(f_i) \right] dF(\Omega).$$

- The simulated likelihood function for the sample is the product over the N people in the sample of a weighted average of the type-specific simulated likelihoods, where the weights are the type probabilities $(X_m(h_{i1}))$,

$$L^S(\Theta) = \prod_{i=1}^{N} \sum_{m=1}^{M} \chi_m(h_{i1}) L_i^S(\Theta \mid \Phi_i = \Phi_m). \quad (18)$$

5. Structural Parameter Estimates

5.1. *Model Fit.*

Table 5: Wage Distribution: Actual & Simulated Data

Variable	Professional & Managers	Craftsmen	Operatives & Laborers	Sales & Clerical	Service
Mean wage: NLSY data	9.78	9.58	9.37	9.51	9.25
Mean wage: simulated data	9.78	9.59	9.38	9.54	9.33
Wage std dev: NLSY data	.54	.45	.45	.51	.47
Wage std dev: simulated data	.51	.48	.45	.50	.47

NOTE: Simulated wages computed from a sample of 4,000 people. Yearly wages are in logs.

Figure 1: Actual and Simulated Mean Log Wages

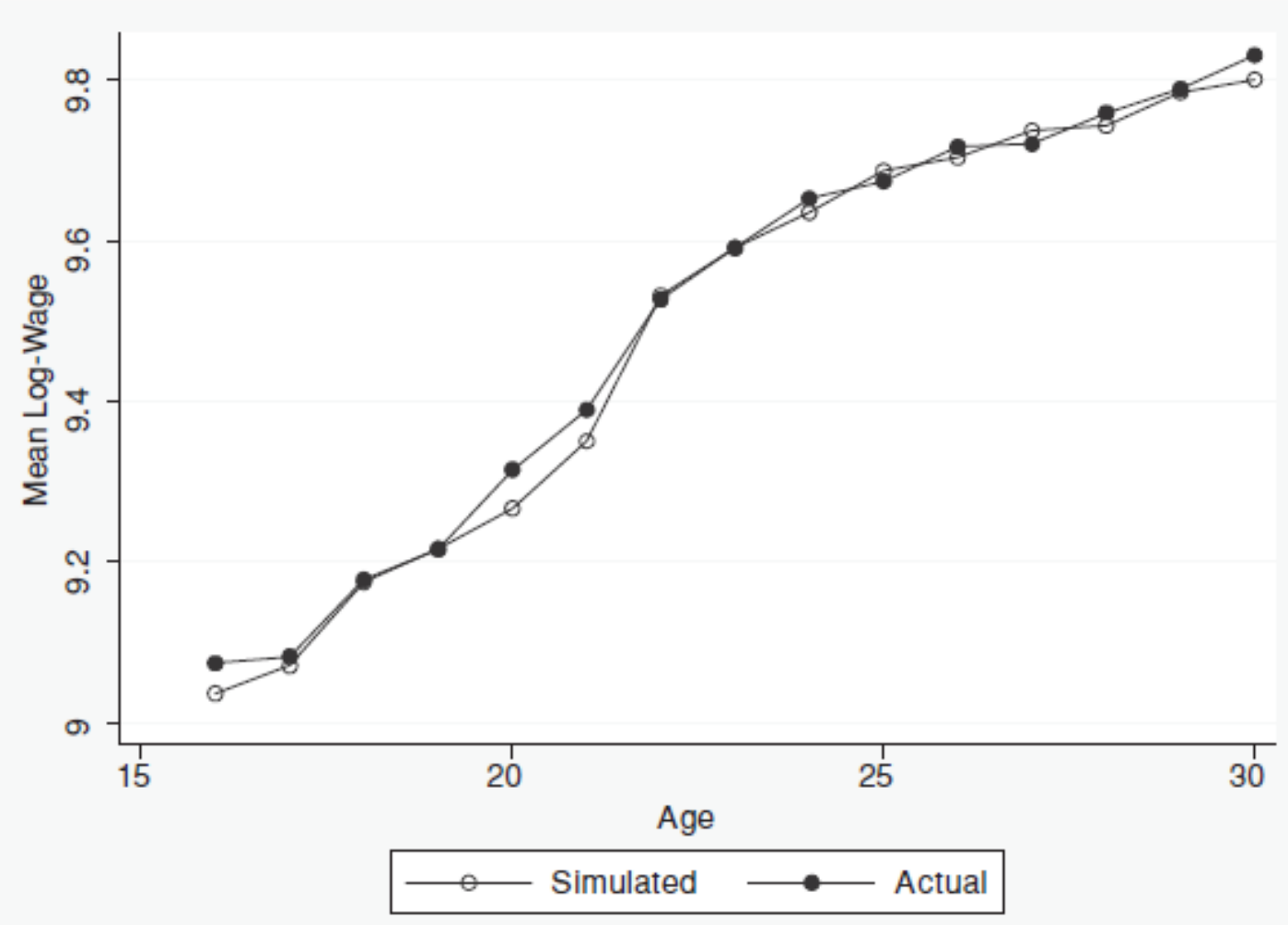
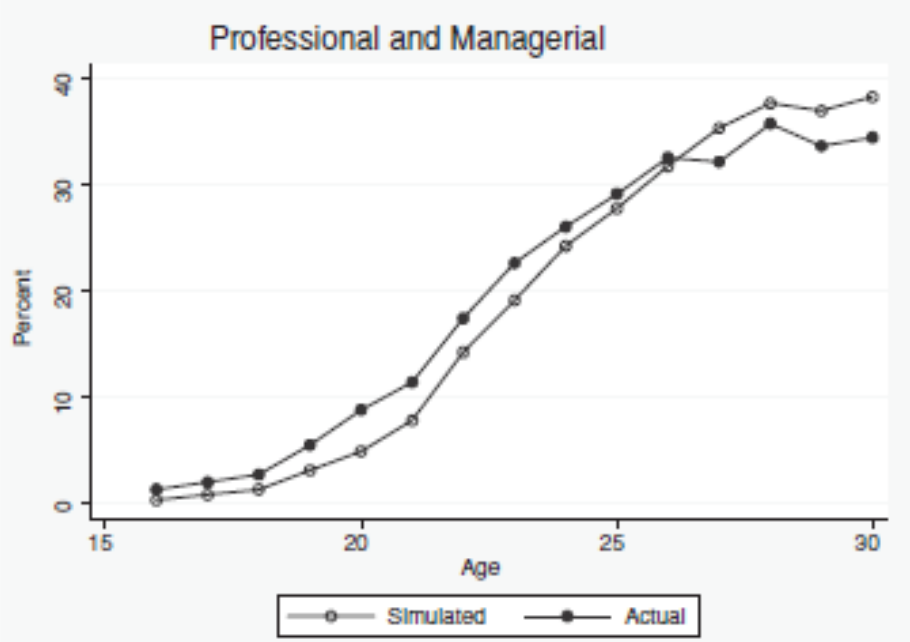
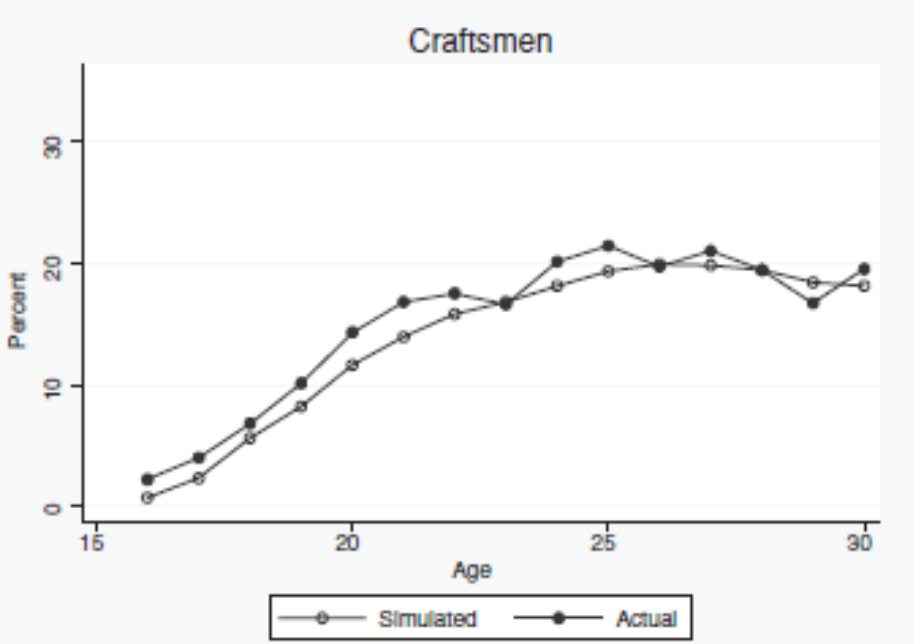


Figure 2: Choice Percentages by Age: Actual and Simulated Data





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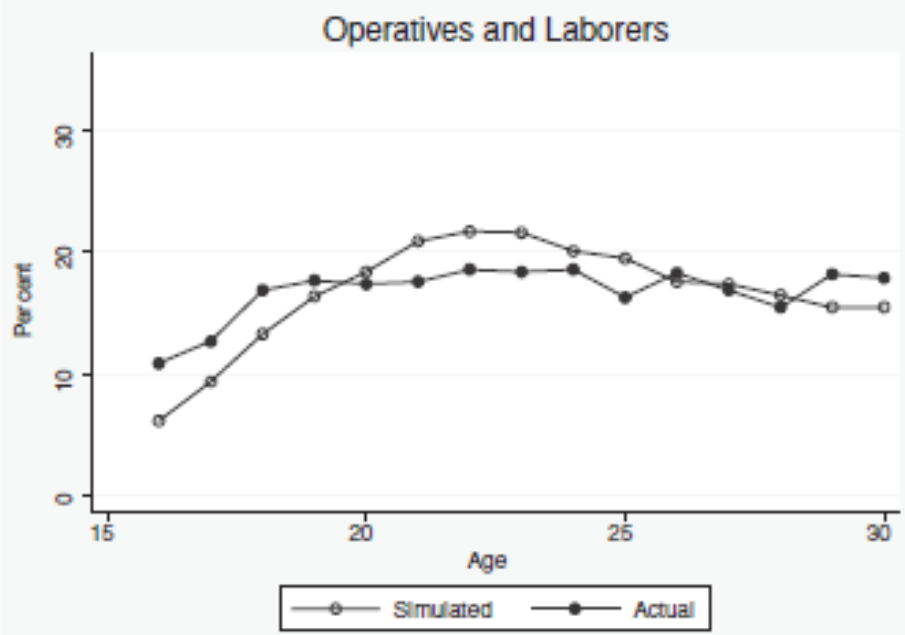

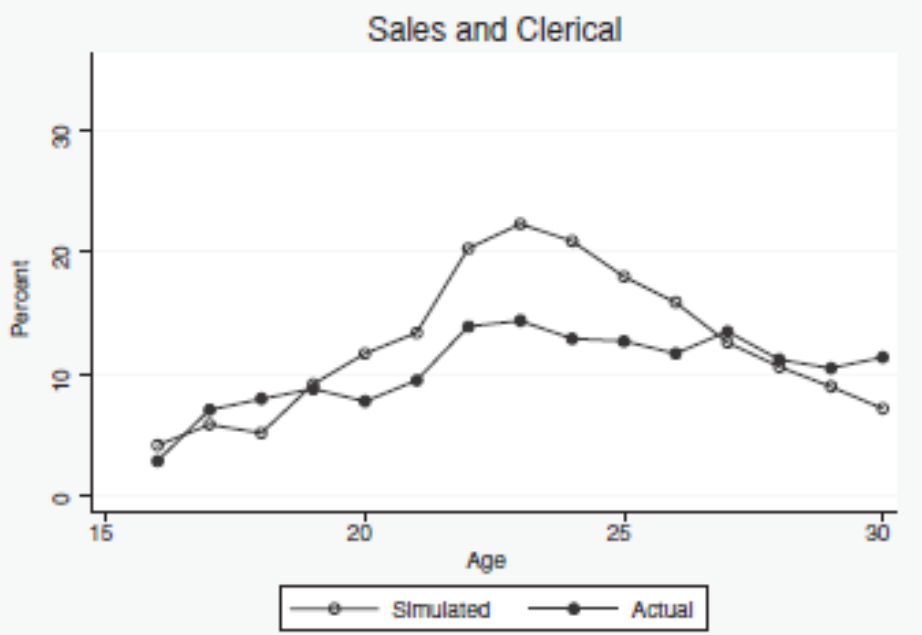

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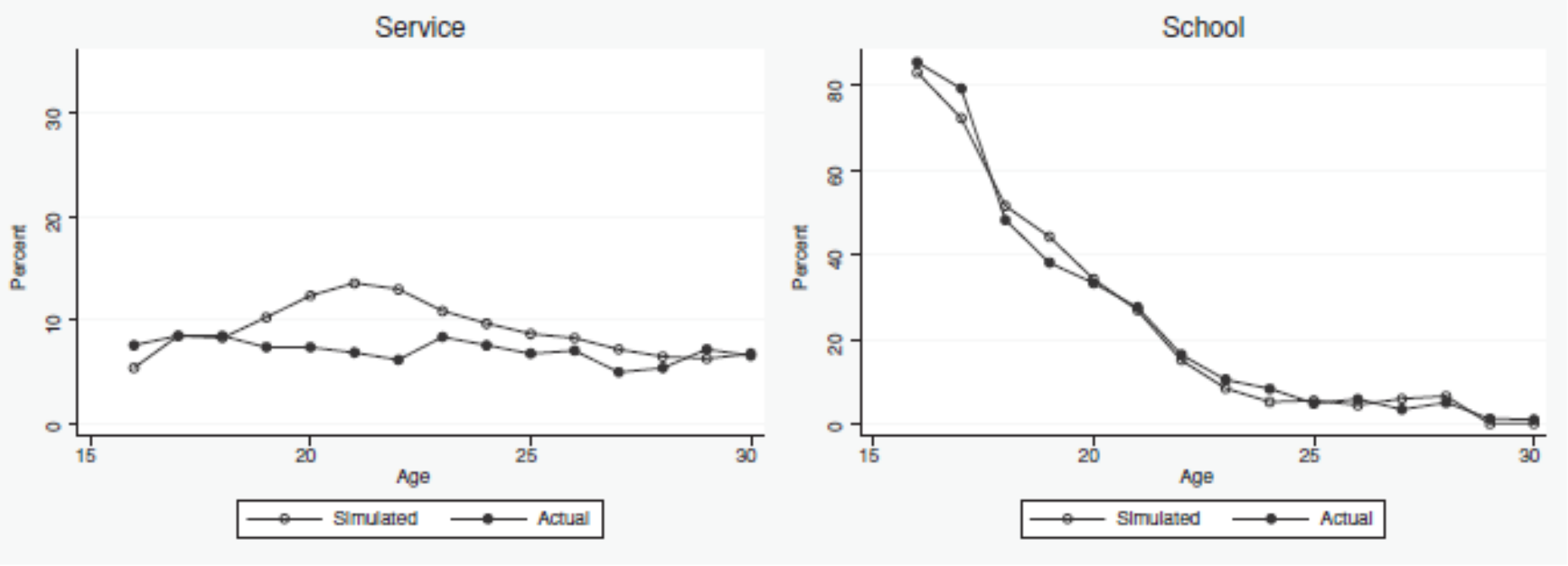

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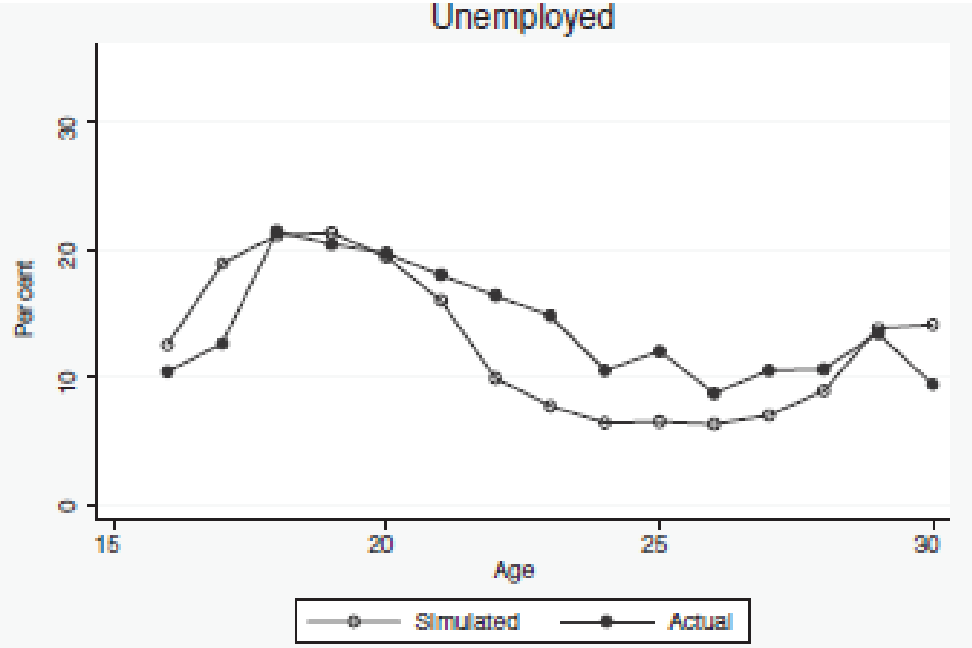

5.2. *The Log Wage Equation: Human Capital and Job Search.*

Table 6: Panel A: Structural Model Estimates

Variable	Occupations				
	Professional & Managers	Craftsmen	Operatives & Laborers	Sales & Clerical	Service
Log wage equation:					
Age (β_1)	−.019	.098	.003	.036	−.010
	(.011)	(.011)	(.008)	(.015)	(.010)
Age^2/100 (β_2)	.085	−.406	.036	−.037	.206
	(.046)	(.050)	(.037)	(.071)	(.051)
Years of high school (β_3)	.048	.014	.056	.029	.021
	(.016)	(.011)	(.009)	(.020)	(.012)
Years of college (β_4)	.092	.047	.032	.072	.103
	(.007)	(.008)	(.008)	(.005)	(.009)
Age $\leq$ 17 (β_5)	−.272	−.069	−.196	−.180	−.032
	(.066)	(.058)	(.033)	(.055)	(.036)
18 $\leq$ Age $\leq$ 21 (β_6)	−.270	−.036	−.162	−.194	−.042
	(.022)	(.019)	(.015)	(.021)	(.018)
GED (β_7)	.021	.001	.056	.021	.011
	(.037)	(.047)	(.042)	(.043)	(.036)
Firm-specific HC: level 1 (β_8)	.000[&]	.000[&]	.000[&]	.000[&]	.000[&]
Firm-specific HC: level 2 (β_9)	.119	.041	.044	.081	.157
	(.012)	(.015)	(.012)	(.014)	(.023)

Table 6: Panel A: Structural Model Estimates

	Occupations				
Variable	Professional & Managers	Craftsmen	Operatives & Laborers	Sales & Clerical	Service
Firm-specific HC: level 3 (β_{10})	.179	.109	.097	.124	.254
	(.011)	(.015)	(.015)	(.020)	(.021)
Occupation-specific HC: level 1 (β_{11})	.000[&]	.000[&]	.000[&]	.000[&]	.000[&]
Occupation-specific HC: level 2 (β_{12})	.024	.092	.000	.000	.046
	(.020)	(.016)	(—)	(—)	(.015)
Occupation-specific HC: level 3 (β_{13})	.172	.130	.000	.000	.046
	(.018)	(.026)	(—)	(—)	(.015)
Probability that firm-specific human capital increases (λ_f)	.999	.999	.999	.999	.999
	(—)	(—)	(—)	(—)	(—)
Probability that occupation-specific human capital increases (λ_f)	.777	.463	.999	.189	.999
	(.061)	(.018)	(—)	(.040)	(—)

Error Standard Deviations	Estimate	Stan. Error
True randomness in wages (σ_ϵ)	.309	0.001
Non-Pecuniary firm match value (σ_ξ)	.000	—
Pecuniary firm match value (σ_ψ)	.276	0.004
Extreme value parameter (τ)	3.29	0.189
Log-likelihood	−15,252	

NOTES: [&] indicates the parameter is fixed at the stated value and not estimated because it is not identified. Standard errors are in parentheses. (—) denotes parameters that were fixed during estimation at the stated value, so standard errors are not reported. Age is measured as true age minus 15.

Table 6: Panel B: Structural Model Estimates

Variable	Type 1	Type 2	Type 3	Type 4
Log-wage intercepts				
Professional & managerial (μ^1)	9.68	9.24	8.97	9.01
	(.057)	(.053)	(.055)	(.061)
Craftsmen (μ^2)	9.11	8.88	8.66	8.73
	(.075)	(.082)	(.075)	(.02)
Operatives & laborers (μ^3)	9.35	9.00	8.99	8.82
	(.051)	(.046)	(.046)	(.049)
Sales & clerical (μ^4)	9.32	8.95	8.87	8.76
	(.110)	(.110)	(.112)	(.113)
Service (μ^5)	9.16	8.84	8.84	8.85
	(.063)	(.068)	(.058)	(.068)
Non-pecuniary intercepts				
Professional & managerial (ϕ^1)	−28.35	−25.34	−27.56	−37.21
	(1.60)	(1.35)	(1.55)	(2.06)
Craftsmen (ϕ^2)	−21.33	−23.82	−21.00	−28.06
	(1.00)	(1.14)	(.95)	(1.31)
Operatives & laborers (ϕ^3)	−16.20	−14.54	−15.53	−20.90
	(.79)	(.79)	(.83)	(1.16)
Sales & clerical (ϕ^4)	−22.86	−19.90	−23.00	−26.97
	(1.01)	(.97)	(1.08)	(1.27)
Service (ϕ^5)	−19.34	−16.42	−18.80	−23.95
	(.85)	(.79)	(.81)	(1.04)
School (ϕ^s)	6.07	16.77	6.85	7.44
	(.63)	(1.30)	(.68)	(.74)
Type probabilities				
Initial schooling > 9 years	.301	.330	.331	.038
	(.025)	(.046)	(.021)	(.002)
Initial schooling ≤ 9 years	.218	.144	.474	.163
	(.016)	(.049)	(.029)	(.010)

NOTE: Standard errors are in parentheses.

Table 6: Panel C: Structural Model Estimates

Variable	Estimate	Variable	Estimate
Discount factor (δ)	.95[&]	Switching costs	
School utility flow		Firm to firm transitions (α_{10})	−2.61
			(0.27)
Age (γ_{s1})	−3.68	School re-entry (γ_{s7})	−2.38
	(.33)		(0.30)
Age^2/100 (γ_{s2})	9.59	New job from non-employment (α_9)	−2.66
	(1.41)		(0.27)
Attending college (γ_{s3})	.66	Costs of working while attending school	
	(.55)		
Attending graduate school (γ_{s4})	−2.26	Work in high school (γ_{sw6})	6.50
	(.69)		(0.62)
Years of high school (γ_{s5})	.56	Work in college (γ_{sw7})	11.55
	(.14)		(0.79)
Years of college (γ_{s6})	.49	Work in graduate school (γ_{sw8})	12.09
	(.12)		(0.94)
School while employed utility flow		Within-firm job offer probabilities	
Age (γ_{sw1})	−5.27	Offer from professional & managerial (π_1)	0.25
	(.31)		(0.01)
Age^2/100 (γ_{sw2})	24.75	Offer from craftsmen (π_2)	0.21
	(1.50)		(0.01)
Years of high school (γ_{sw3})	4.15	Offer from operatives & laborers (π_3)	0.23
	(.29)		(0.01)
Years of college (γ_{sw4})	1.07	Offer from sales & clerical (π_4)	0.23
	(.17)		(0.01)
		Offer from service (π_5)	0.09
			(0.01)

NOTES: Standard errors in parentheses.

Table 6: Panel D: Structural Model Estimates

	Occupations				
Variable	Professional & Managers	Craftsmen	Operatives & Laborers	Sales & Clerical	Service
Employment non-pecuniary utility flows					
Age (α_1)	1.92	2.04	0.86	1.76	0.86
	(.24)	(.19)	(.14)	(.17)	(.14)
Age^2/100 (α_2)	−8.02	−10.10	−4.11	−10.69	−4.03
	(.96)	(1.02)	(.66)	(1.06)	(.72)
Education (α_3)	0.81	−0.65	−0.62	0.26	0.02
	(.13)	(.12)	(.14)	(.16)	(.12)
Occupation-specific HC (α_4)	5.53	3.66	2.53	2.22	2.08
	(.37)	(.305)	(.21)	(.22)	(.22)
Firm-specific HC (α_5)	2.03	2.52	2.08	2.56	2.42
	(.18)	(.22)	(.17)	(.17)	(.23)
High school diploma (α_6)	0.62	2.26	1.75	1.86	0.74
	(.43)	(.41)	(.34)	(.42)	(.34)
College diploma (α_7)	2.49	4.82	4.32	5.15	3.54
	(.33)	(.64)	(.46)	(.58)	(.56)
GED (α_8)	1.43	1.72	2.34	1.73	2.99
	(.56)	(.68)	(.45)	(.48)	(.49)

NOTES: Standard errors in parentheses.

5.3. *Career Choices and Heterogeneity in Skills and Preferences.*

Table 8: Simulated Choice Frequencies by Endowment Type

	Type 1		Type 2		Type 3		Type 4	
Choice percentages at age 21								
Attending school	4.48%		75.54%		6.29%		12.91%	
Unemployed	12.85%		8.84%		13.41%		77.51%	
Professional & managerial	6.72%		12.63%		7.66%		0.00%	
Craftsmen	22.29%		2.64%		20.62%		2.39%	
Operatives & laborers	27.95%		7.35%		30.20%		3.35%	
Sales & clerical	11.79%		19.40%		11.13%		2.39%	
Service	16.86%		11.02%		14.78%		2.87%	
Choice percentages at age 27								
Attending school	.79%		16.15%		1.71%		1.37%	
Unemployed	3.01%		2.00%		3.41%		59.59%	
Professional & managerial	28.48%		56.15%		26.46%		2.74%	
Craftsmen	32.91%		1.23%		27.68%		7.53%	
Operatives & laborers	22.78%		3.08%		28.90%		13.70%	
Sales & clerical	6.49%		28.48%		4.88%		10.27%	
Service	6.33%		8.31%		8.66%		5.48%	
Value Functions & Wages at Age 27	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Value function of optimal choice at age 27	43.66	7.94	70.23	8.92	44.88	7.96	14.04	5.49
Wage at age 27	9.95	.42	9.92	.42	9.45	.40	9.42	.47

NOTES: Based on a simulation of 4,000 people. Average simulated wages are conditional on employment.

6. Counterfactual Experiments

6.2. *The Value of Human Capital, Job Matching, and Occupational Matching.*