Occupational Switching and Self-Discovery in the Labor Market

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What is it about?

Study the implications for lifetime earnings and mobility of *mismatch* between a worker's skills and her/his occupation

1. Empirically: develop a new measure of mismatch
   - Effect of mismatch on occupational mobility
   - Effect of (current and past) mismatch on wages
2. Structurally: construct a quantitative model to assess the importance of occupational learning for earnings (growth, dispersion, etc.)

Findings:

Empirical analysis suggests that occupational mismatch matters a lot

Computations are still preliminary but suggest this is borne out by the model

I. Empirical analysis

Data and measurement

- Novelty is to combine O*NET with a new source of information: ASVAB scores [ASVAB score: workers' endowment in a set of occupational-relevant skills]

- Data: NLSY79, organized into an annual panel spanning years 1979 to 2010 [careful work in defining employment spells and using consistent classifications]

- Skill portfolios: worker i has skills $\left(s_i^1, \ldots, s_i^J\right)$ and occupation k has requirements $\left(r_k^1, \ldots, r_k^J\right)$; Operationalize mismatch has the distance between $\overrightarrow{s_i}$ and $\overrightarrow{r_k}$

Regression results

	(1)	(2)	(3)	(4)
Cumul mismatch	-0.061**		-0.037	-0.190***
	(0.024)		(0.024)	(0.025)
Mismatch × Occ tenure		-0.017***	-0.018***	-0.014**
		(0.004)	(0.006)	(0.006)
Mismatch		-0.032	-0.010	-0.004
		(0.028)	(0.035)	(0.034)

- Mismatch in the current occupation is non-significant while the interaction with occupational tenure is negative and significant
- Comparison with OLS: mismatch is significant, interaction is $\simeq$ zero
  - Difference with IV is consistent with unobserved match quality
  - Would be interesting to show OLS with your own match-quality variable

Remarks about the empirical analysis

- How to deal with O*NET scores that are differently related <u>in absolute values</u> to ASVAB scores?
- How should we think of occupational tenure when we also measure cumulative mismatch or cumulative match quality?
- Can you use the data to rule out other sources of wage growth?
  Lower wage in the past $\rightarrow$ weak bargaining position $\rightarrow$ lower wage today

II. Quantitative model

Model: key ingredients

Demand side:

- Occupation $\equiv$ a bundle (k_1, k_2) that produces an intermediary good
- Competitive firm aggregates $y(k_1, k_2)$ into the final good
- Can work out the price of input in each occupation i.e. $P(k_1, k_2)$

Supply side:

- Ben-Porath model with uncertainty: investment and learning about skill level A_i:

$$h_{i,t+1} = (1-\delta)h_{i,t} + q_{i,t} \;\; ; \;\; C(q_{i,t}, A_i, \varepsilon_{i,t}) = c(q_{i,t})\, e^{-\left(A_i + \varepsilon_{i,t}\right)} \;\; ; \;\; \widetilde{A}_i = A_i + \varepsilon_{i,t}$$

- Each period, form expectations about A_i using current estimate $\widehat{A}_i$, $i = 1, 2$
- Worker's state at time t:

$$h = (h_1, h_2)\, ; \widehat{A} = \left(\widehat{A}_1, \widehat{A}_2\right) \; ; \; \sigma_A^2$$

Model: learning

- Initial beliefs are normally distributed with precision $\phi_a = {}^1/_{\sigma^2_{A,0}}$
- The noise term is also normally distributed, with precision $\phi_\varepsilon = {}^1/_{\sigma^2_\varepsilon}$

Learning is tractable at the individual level:

- t is a sufficient statistic for cumulative precision of beliefs $\phi_t = \phi_a + t\phi_\varepsilon$ [no need to carry $\sigma^2_{A,t}$ as a state variable]
- Update is a precision-weighted average

$$\widehat{A}' = \frac{\phi_t}{\phi_{t+1}}\widehat{A} + \frac{\phi_\varepsilon}{\phi_{t+1}}\widetilde{A}$$

Learning is tractable when aggregated across agents

- Need to keep track of beliefs in each cohort; Normally distributed around true mean and precision $t\phi_\varepsilon$
- Also straightforward to aggregate across cohorts [simplifies the computation of the time-invariant distribution]

Remarks about the model: learning

Tractability is a nice feature; some remarks about the underlying assumptions:

- Bayesian learning converges quickly; this may go against your story [recall: weight of the most recent observation is $\frac{\phi_\varepsilon}{\phi_{t+1}}$]
- The noice term is multiplicative: the costs of acquiring skills are larger for high-requirements occupations
- Uncertainty is actually beneficial: makes workers accumulate too much human capital, and this eventually raises output and wages

Remarks about the model: relationship to the data

- Mapping between the model and motivating facts on occupational mobility
  - Mismatch is fine, but how to measure occupational tenure in the model?
  - Bayesian learning $\Rightarrow$ mobility falls quickly with age
    Less investment towards the end of the lifecycle $\Rightarrow$ more mobility
- Explain why certain mechanisms are needed to explain the data
  - Complementarity of k_1 and k_2 in production function $y(.)$?
  - Intuition would also help explain how ρ and μ are calibated
- Would be interesting to have skills that differ with respect to uncertainty:
  Predict the price of brain vs. Predict the cost of maintaining brawn

Remarks about the model: what are the next steps?

- This could be a paper about the sources of lifetime earnings inequality
  - Uncertainty during the learning process (σ_ε) vs. Uncertainty before entering the labor market ($\sigma_{A,0}$)
  - [Huggett, Ventura & Yaron [AER '11] find that $\sigma_{A,0}$ matters enormously]
- This could be a paper about changes in the U.S. wage distribution
  - Uncertainty in the model creates a wage premium
    (why would σ_ε have increased over time?)
  - Assess the role of general equilibrium effects for the spread in the wage distribution (compute the output loss from mismatch?)

Concluding remarks

- The paper is interesting for those who work on occupational choices:
  - A new source of data, the ASVAB scores
  - Careful work on linking this to O*NET data
- The quantitative model has the potential to address some substantive issues; looking forward to seeing the future applications of the model