Labor Market Frictions, Human Capital Accumulation, and Consumption Inequality

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Introduction

What is the relative contribution of shocks to human capital accumulation and the stochastic job ladder in determining the uncertainty workers face in the labor market?
The moment is then averaged over individuals and the relevant asymptotic theory for inference is on knowing the order of the MA process. If the order of the MA process is one in the levels, then parameters of the MA process. Indeed, in the absence of a permanent shock the moment in (17) where

\[ \var(\log(c))_{\text{smoothed}} \]

The lognormality assumption implies that the skewness of earnings shocks is zero.

\[ \text{source: Guvenen, Karahan, Ozkan and Song (2015)} \]
Related Literature

- **Statistical models of income processes**
  Lillard and Willis (1978); Lillard and Weiss (1979); MaCurdy (1982); Abowd and Card (1989); Topel and Ward (1992); Gottschalk and Moffit (1995); Baker and Solon (2003); Meghir and Pistaferri (2004); Guvenen (2007); Altonji, Smith and Vidangos (2013); Guvenen, Karahan, Ozkan and Song (2015); Arellano, Blundell and Bonhomme (2015).

- **Choices, information and risk**
  Deaton and Paxson (1994); Blundell and Preston (1998); Krueger and Perri (2004); Storesletten, Telmer, and Yaron (2004); Cunha, Heckman and Navarro (2005); Blundell, Pistaferri and Preston (2008); Kaplan and Violante (2010); Lise (2013); Guvenen and Smith (2013) ...

- **Job-search, learning and human capital accumulation**
  Rubinstein and Weiss (2006); Yamaguchi (2010); Burdett, Carrillo-Tudela and Coles (2011); Bowlus and Liu (2013); Bagger, Fontaine, Postel-Vinay and Robin (2014); Lise and Postel-Vinay (2015)
Model Ingredients

Equilibrium random search model of the labour market

- Time is continuous, workers are risk averse, discount the future at rate $\rho$, and exit the market at rate $\xi$
- Workers search for jobs when unemployed and for better jobs when employed
- Firms recruit new workers and counter outside offers to retain their existing workers

Worker and firm heterogeneity

- Differences in ability/productivity
- Human capital accumulation depends on worker and firm type

Incomplete markets (Aiyagari-Beweley-Huggett)

- No complete set of state-contingent claims
- Single riskless asset to transfer resources over time
Technology

A match between a worker of type $h_t$ and a firm or type $y$ produces

$$f(h_t, y) = h_0 h_{1t} y$$

The worker supplies human capital $h_t = \{h_0, h_{1t}\}$
- fixed worker type $h_0$
- time-variant human capital $h_{1t}$

The firm is characterized by the fixed productivity type $y$

Home production takes the form

$$b(h_t) = h_0 h_{1t} b$$
Human Capital Accumulation

The time varying component \( h_{1t} \) follows a diffusion process:

\[
\frac{dh_{1t}}{h_{1t}} = \mu(h_0, y) dt + \sigma dB_t,
\]

\[
\mu(h_0, y) = \mu_0 + \mu_1 \log h_0 + \mu_2 \log y
\]

Human capital accumulation

- The drift rate depends on the current match.
- It is assumed to be non-decreasing in the firm-type.

Idiosyncratic productivity- and health shocks

- Deviations form the deterministic path are captured by the Brownian motion \( B_t \) with diffusion parameter \( \sigma \)
Meetings and Transitions

- Search is random and sequential.
- Both employed and unemployed workers are contacted by a firm at type dependent contact rate

\[ \lambda(h_0) = \exp(\lambda_0 + \lambda_1 \log h_0) \]

and receive offers from the sampling distribution

\[ \Gamma(y) \quad y \in [\underline{y}, \overline{y}] \]

the decision to accept or reject the offer is endogenous

- A worker becomes unemployed at type dependent separation rate

\[ \delta(h_0) = \exp(\delta_0 + \delta_1 \log h_0) \]

and leaves the labor market at rate

\[ \xi \]
Wages

The wage is assumed to be a piece-rate $0 < \theta \leq 1$ of match output:

$$w_t = h_0 h_{1t} y \theta_t$$

$$\log w_t = \log h_0 + \log y + \log h_{1t} + \log \theta_t$$
Wages

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Firms compete based on current output:

Suppose a worker currently matched with firm $y$ is contacted by a firm of type $y'$:

- if $y' > y$ the worker moves to firm $y'$ and the piece rate there starts at
  $$\theta' = \frac{y}{y'}$$

- if $y \geq y'$ the worker stays at $y$ and the piece rate is updated to
  $$\theta = \max \left\{ \theta, \frac{y'}{y} \right\}$$
Worker Values

Worker with assets $a$, human capital $(h_0, h_1)$, matched to firm $y$, at piece-rate $\theta$:

$$\left[ \rho + \lambda(h_0) + \delta(h_0) + \xi \right] W(a, h_0, h_1, y, \theta)$$

$$= \max_{a \geq c \geq 0} u(c) + \frac{\partial}{\partial a} W(a, h_0, h_1, y, \theta)[ra + \theta h_0 h_1 y - c]$$

$$+ \mu(h_0, y) h_1 \frac{\partial}{\partial h_1} W(a, h_0, h_1, y, \theta) + \frac{\sigma^2}{2} h_1^2 \frac{\partial^2}{\partial h_1^2} W(a, h_0, h_1, y, \theta)$$

$$+ \lambda(h_0) \int \max \left\{ W(a, h_0, h_1, y', y/y'),
\right.$$  

$$W(a, h_0, h_1, y, \max\{\theta, y'/y\}) \right\} d\Gamma(y')$$

$$+ \delta(h_0) W(a, h_0, h_1, b, 1) + \xi R(a, h_0, h_1)$$
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$$+ \lambda(h_0) \int \max\left\{ W(a, h_0, h_1, y', y/y'), W(a, h_0, h_1, y, \max\{\theta, y'/y\})\right\} d\Gamma(y')$$

$$+ \delta(h_0) \int W(a, h_0, \alpha h_1, b, 1) d\Lambda(\alpha) + \xi R(a, h_0, h_1)$$
Data

- Linked Employer-Employee data from Germany spanning the years 1975-2010
  - 2% random sample consisting of 212,380 male workers who started their career during the sample
  - worker id, firm id, wages, worker flows,...

- Income and Expenditure Survey (EVS)
  - Repeated cross-section carried out every 5 years starting from 1978
Identification

- Worker types $h_0$ are identified from their first wage.
- Firms are ranked and binned into types based on the share of workers they hire from other firms; The sampling distribution is identified from job types accepted out of unemployment.
- $\delta(h_0)$ and $\lambda(h_0)$ are identified by separation rates and unemployment rates, conditional on $h_0$.
- Human capital accumulation (type dependent mean and variance) is identified using three job spells using the difference in starting wages between spell 2 and 3. (If spell 1 and 2 are at the same firm type it is especially helpful).
Estimated Distribution of Worker Types and Firm Types

Graber & Lise (UCL)  Search, Human Capital & Consumption
Parameter Estimates (preliminary)

<table>
<thead>
<tr>
<th>low-skilled</th>
<th>high-skilled</th>
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<tbody>
<tr>
<td><strong>Contact rates:</strong> $\lambda(h_0) = \exp(\lambda_0 + \lambda_1 \log h_0)$</td>
<td></td>
</tr>
<tr>
<td>$\lambda_0$</td>
<td>$-2.632$</td>
</tr>
<tr>
<td>$\lambda_1$</td>
<td>$-0.0910$</td>
</tr>
</tbody>
</table>

| **Destruction rates:** $\delta(h_0) = \exp(\delta_0 + \delta_1 \log h_0)$ |
| $\delta_0$ | $-3.585$ | $-4.912$ |
| $\delta_1$ | $0.1316$ | $-0.345$ |

| **Human capital, drift:** $\mu(h_0, y) = \mu_0 + \mu_1 \log h_0 + \mu_2 \log y$ |
| $\mu_0$ | $0.000$ | $0.000$ |
| $\mu_1$ | $-0.003$ | $-0.0034$ |
| $\mu_2$ | $0.001$ | $0.0025$ |

| **Human capital, variance of shocks:** $\sigma^2$ |
| $\sigma^2$ | $0.0174$ | $0.02007$ |
Linear increase in earnings and consumption variance

var(log(c))

var(log(y))

experience

0 10 20 30 40

Graber & Lise (UCL)  Search, Human Capital & Consumption
Negative skewness of $\Delta w_{t+1}$, decreasing in $w_t$
Excess Kurtosis of $\Delta w_{t+1}$, increasing in $w_t$
Negative skewness of $\Delta w_{t+1}$, decreasing with experience(?)
Excess Kurtosis of $\Delta w_{t+1}$, increasing with experience(?)
Rising variance is almost all due to shocks to human capital

Graber & Lise (UCL)  
Search, Human Capital & Consumption  
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Skewness and Kurtosis almost all due to job ladder

![Graphs showing skewness and kurtosis](image)
Conclusion

- Persistent shocks account for the rising variance of log earnings and consumption
- The job ladder accounts qualitatively for the patterns of the skewness and kurtosis of conditional year-over-year wage changes
- Our preliminary results do not produce the quantitative patterns of the skewness and kurtosis using loss of search capital alone
- We conjecture loss of human capital at job loss will beef up the quantitative effects
Linked Employer-Employee Data: SIAB 7510 & BHP

Employment Spells

- reported with exact start- and end-dates
- spells can end for a number of reasons: changes in the wage paid, changing employer, switching to part-time,...

Wages and Hours

- Wages are provided by firms and are very accurate due to the threat of legal sanctions for misreporting.
- Hours are not reported, but information on full-time, long and short part-time work.
- The reported wages are average daily wages for each spell.
- **Drawback**: Top-coding at the social security contribution limit.

Worker Flows

- worker-flows at the establishment level from the Establishment History Panel (BHP)
Sample Restrictions

Sample of labour market entrants between 1975-2010:
- males based in West-Germany
- age restrictions upon entry
- divided into three mutually exclusive skill groups

Based on the employment spell data, we generate a panel data set at monthly frequency.
- spells that last for less than one month are dropped.
- unemployment is proxied by non-employment
Income and Expenditure Survey (EVS)

- Federal Statistical Office (Destatis)

- Repeated cross-section carried out every 5 years starting from 1978.

- Detailed household and consumption data.

- Information on earnings and income.

- Large representative sample of around 60,000 households.