

Anatomy of Lifetime Earnings Inequality

Heterogeneity in Job Ladder Risk vs Human Capital

Fatih Karahan

New York Fed

Serdar Ozkan

U of Toronto

Jae Song

SSA

AEA 2020

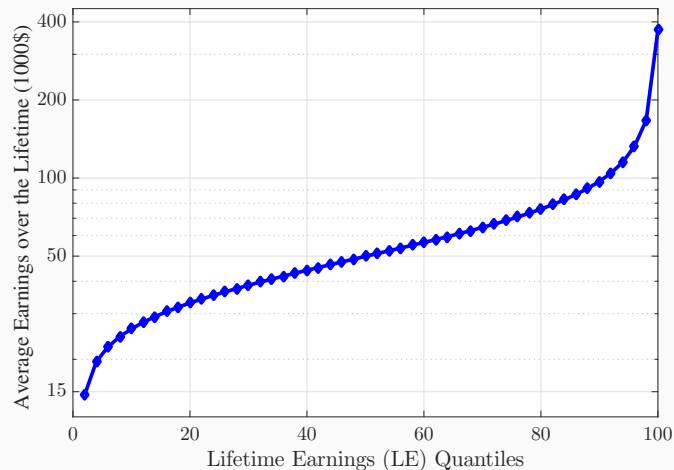
January 5, 2020

Motivation: Lifetime Earnings Inequality

1. Large differences in lifetime earnings (wage/salary income) of males (LE)

- **LE**: Total **labor income** between age 25 and 55.
- Rank into 50 equally sized **LE** quantiles.

Motivation: Lifetime Earnings Inequality



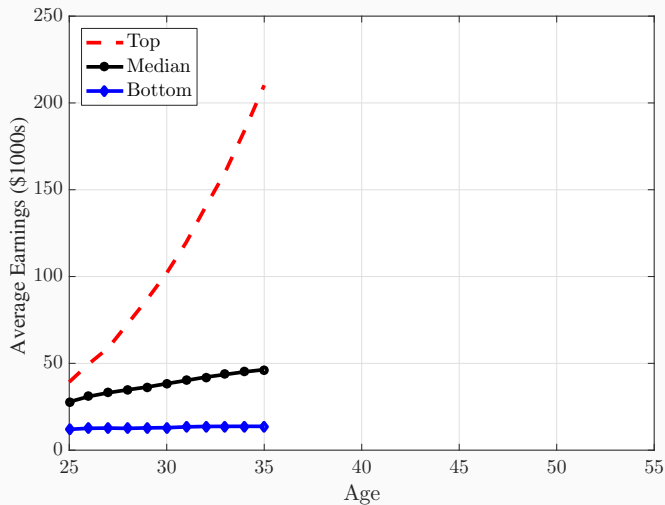
Pareto shape

	$S(0.1)/S(1)$	$S(1)/S(10)$
LE	0.29	0.29
Age 25	0.24	0.23
Age 40	0.31	0.30
Age 55	0.38	0.37

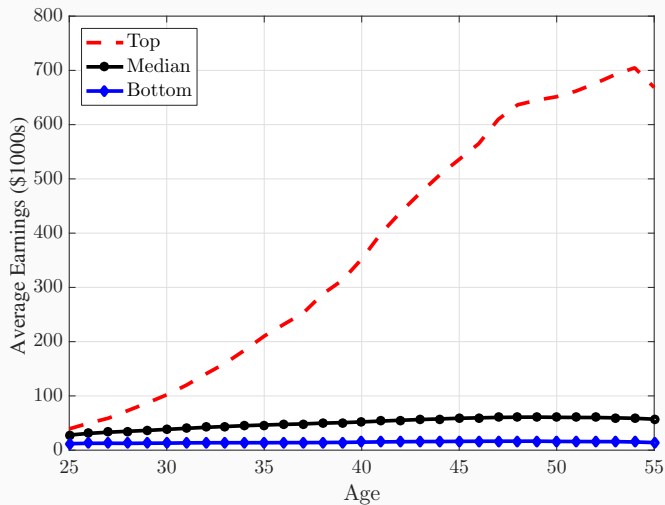
Motivation: Lifetime Earnings Inequality

1. Large differences in lifetime earnings (wage/salary income) of males (LE)
2. Differences start early in life, but growth heterogeneity is key for lifetime.

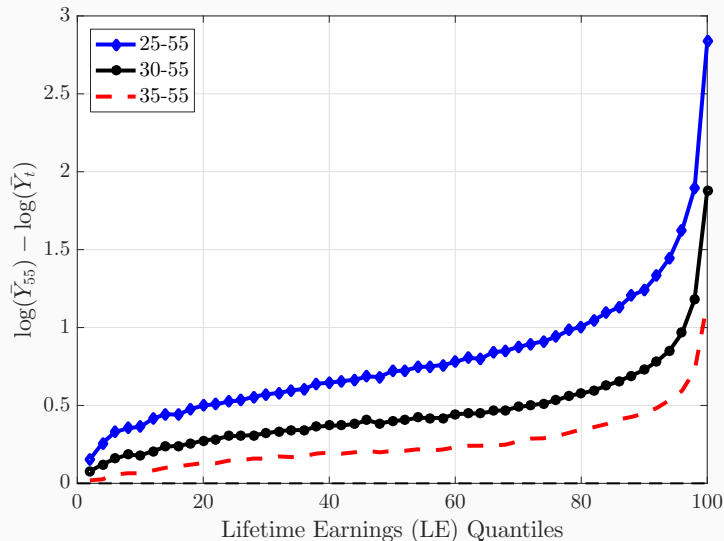
Motivation: Lifetime Earnings Inequality



Motivation: Lifetime Earnings Inequality



Motivation: Lifetime Earnings Inequality



Large differences in earnings growth over the lifetime (LE)

- Top $\simeq 2000\%$
- Median $\simeq 200\%$
- Bottom $\simeq 10\%$

Motivation: Lifetime Earnings Inequality

1. Large differences in lifetime earnings (wage/salary income) of males (LE)

Possible Explanations of Earnings Growth Differences

- Ability to learn on the job (Huggett, Ventura, Yaron 2011 AER)?
 - differences in returns to experience

Possible Explanations of Earnings Growth Differences

- Ability to learn on the job (Huggett, Ventura, Yaron 2011 AER)?
 - differences in returns to experience
- Job ladder (Topel and Ward 1992, Bagger et. al. 2014 AER)? Do high-LE workers:
 - make more job-to-job transitions?
 - make larger jumps when they switch?
 - face lower unemployment risk and fall of the ladder (the slippery slope—Jarosch 2015)?

Possible Explanations of Earnings Growth Differences

- Ability to learn on the job (Huggett, Ventura, Yaron 2011 AER)?
 - differences in returns to experience
- Job ladder (Topel and Ward 1992, Bagger et. al. 2014 AER)? Do high-LE workers:
 - make more job-to-job transitions?
 - make larger jumps when they switch?
 - face lower unemployment risk and fall of the ladder (the slippery slope—Jarosch 2015)?
- Unexplained ex-post productivity shocks?

1. New facts on the career paths of different LEs.
 - Transition rates: Incidence of unemployment, job switches, etc.
 - Earnings growth for job stayers and switchers

1. New facts on the career paths of different LEs.
 - Transition rates: Incidence of unemployment, job switches, etc.
 - Earnings growth for job stayers and switchers
2. Develop and estimate a job ladder model featuring worker-heterogeneity in:
 - returns to experience (ability to accumulate human capital),
 - job ladder risk: unemployment risk, job finding rate, and contact rate.

1. New facts on the career paths of different LEs.
 - Transition rates: Incidence of unemployment, job switches, etc.
 - Earnings growth for job stayers and switchers
2. Develop and estimate a job ladder model featuring worker-heterogeneity in:
 - returns to experience (ability to accumulate human capital),
 - job ladder risk: unemployment risk, job finding rate, and contact rate.
3. Decompose LE inequality into different components.

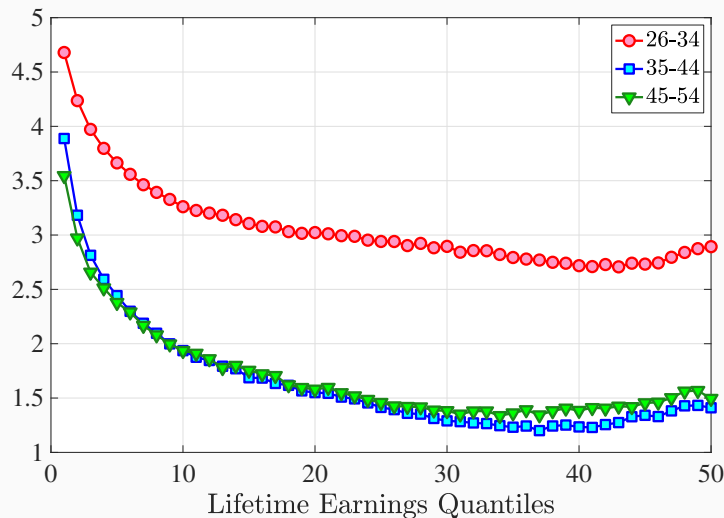
Today

1. Facts
2. Job Ladder Model
3. Estimation
4. Conclusion

Facts

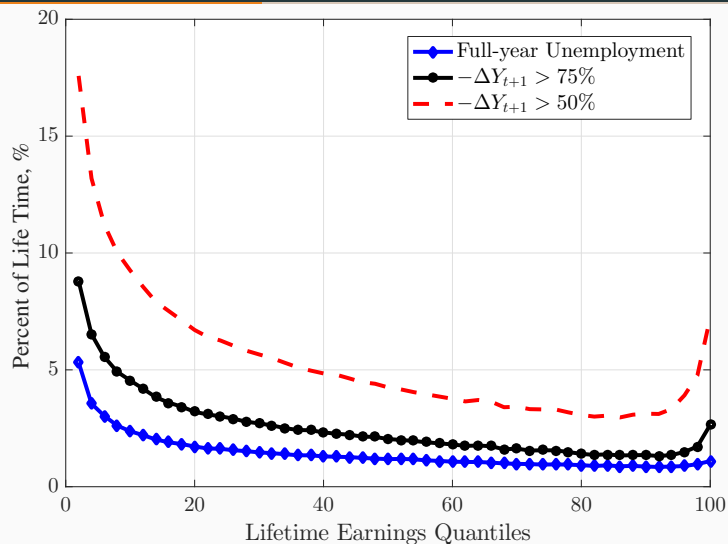
- We draw our sample from SSA: **all individuals in the US** with a SSN.
- Labor income data from W-2 forms for wage/salary workers.
- Employees are linked to their employers via EINs.
- Sample period covers 36 years between 1978 to 2013 for 1953–1960 cohorts.
- Drawback: Annual data.
 - It is typical that a worker has more than one EIN in a year.
 - Complicates the identification of job changes.
 - Cannot distinguish between E-U-E vs. E-E or U vs. N.

Number of Employers Over the Career



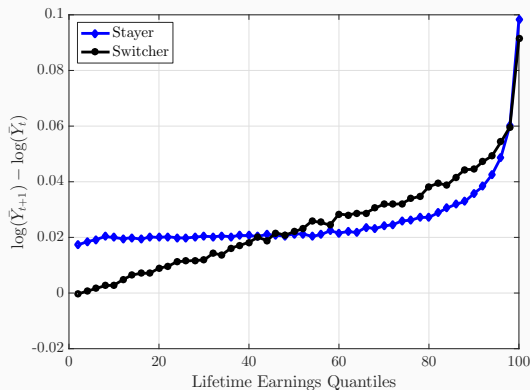
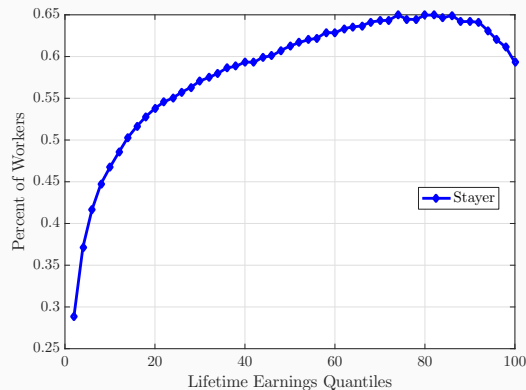
- Twice more #employers at the **bottom** than above **median**
- **Bottom** LE less likely to settle into stable jobs.
- **Bottom** LE: higher unemployment risk.

Incidence of Unemployment



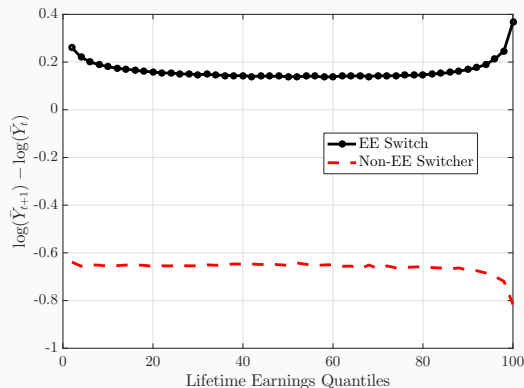
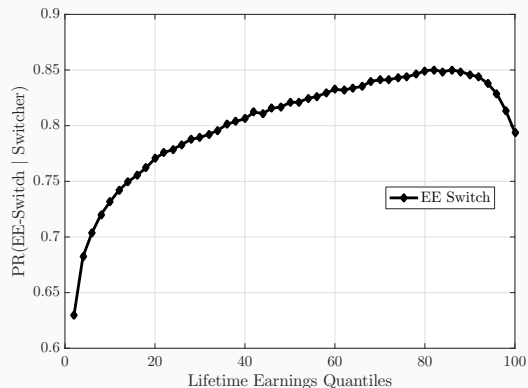
- More long-term unemployment at the bottom.
- Same holds in SIPP

Job Stayers vs. Switchers



- Higher-LE are more likely to **stay**.
- Pronounced heterogeneity among **switchers** (below 75th LE percentile).

E vs. U Switchers



- Small differences among E and U (except top groups).
- Heterogeneity is mainly due to composition: Higher LEs are more likely to be E.

Heterogeneity in lifetime income growth is due to:

- **Bottom** vs **median** LE: differences in **switcher** income growth.
 - Large heterogeneity in switcher growth and
 - More likely to be switchers.
- **Median** vs **top** LE: differences in **stayer** income growth.
 - Large heterogeneity in stayer income growth and
 - More likely to stay.

Job Ladder Model

- A **life-cycle** job ladder model with **two-sided heterogeneity** à la Bagger, Postel-Vinay and Robin (2014) that features:
 - on the job search and employer competition (à la Bertrand)
 - **Perpetual youth** (Blanchard-Yaari)
 - risk averse workers (log per-period utility)
- Allow for lots of worker heterogeneity:
 - unemployment risk,
 - job finding rate, the contact rate for employed workers,
 - returns to experience,
- **Recalls** for unemployed workers (à la Fujita and Moscarini 2016).

- Once in a match, produce a single divisible good sold in a competitive market.
- Workers draw firm productivity from $p_t^j \sim \text{Pareto}(\psi_F, \varsigma_F)$.
 - experimented with other distributions.
- The log-output per period of a match, $y_t^{ij} = p_t^j + h_t^i$

Worker productivity is given by

$$h_t^i = \alpha_i + \beta_i t + \gamma t^2 + \epsilon_{i,t}$$

- Ex-ante heterogeneity in permanent productivity α_i and returns to experience β_i .
 - t actual experience
 - $\alpha_i \sim \mathcal{N}(\mu_\alpha, \sigma_\alpha^2)$, $\beta_i \sim \text{Pareto}(\psi_W, \varsigma_W)$.
 - α_i and β_i are correlated.
- AR(1) idiosyncratic shocks, $\epsilon_{i,t} = \rho \epsilon_{i,t-1} + \varepsilon_{i,t}$
 - with probability π , $\varepsilon_{it} \sim \mathcal{N}(0, \sigma_\varepsilon^2)$ and with probability $1 - \pi$, $\varepsilon_{it} = 0$.

Every period:

- a match terminates exogenously with probability δ^i .
- an unemployed worker meets a firm with prob. λ_0^i .
- an employed worker meets a firm with prob. λ_1^i .
- Probabilities are modeled as a function of α_i and vary by age.

Estimation

Estimation Methodology

- Estimate using Simulated Method of Moments.
 - Create an employer-employee panel mimicking the SSA sample.

- Estimate using Simulated Method of Moments.
 - Create an employer-employee panel mimicking the SSA sample.

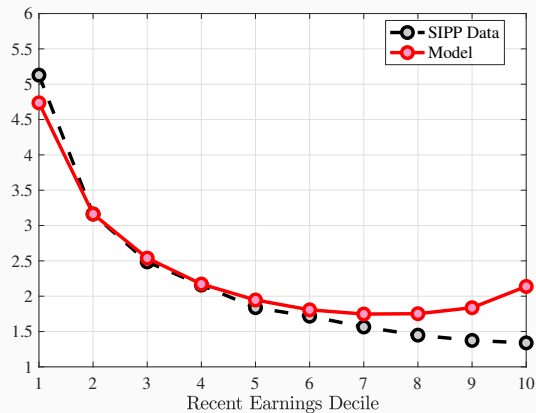
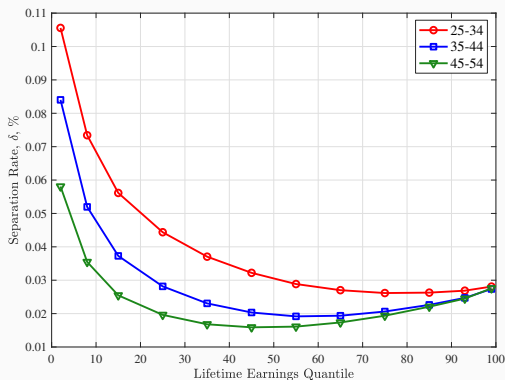
Targeted moments:

1. Higher-order moments of 1-year earnings growth.
 - by LE and age, for stayers and switchers, separately.
 - Switcher growth to identify the firm distribution (Barlevy 2008).
2. Share of stayers (nonstayers) by LE and age
3. Average income growth of stayers and nonstayers by LE and age.

Estimation

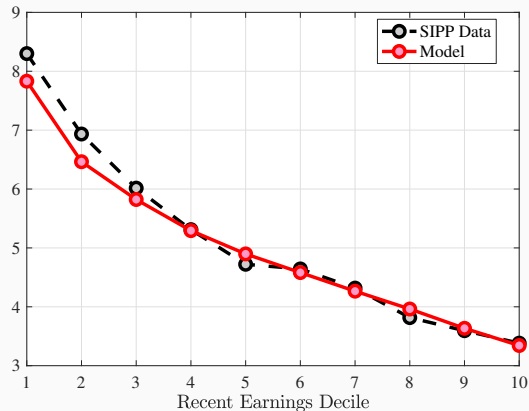
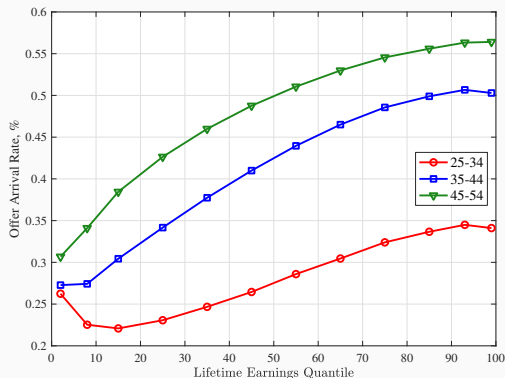
Parameter Estimates

Heterogeneity in Unemployment Risk



- Large heterogeneity in EU by income and age, overall consistent with the data.

Heterogeneity in the Contact Rate

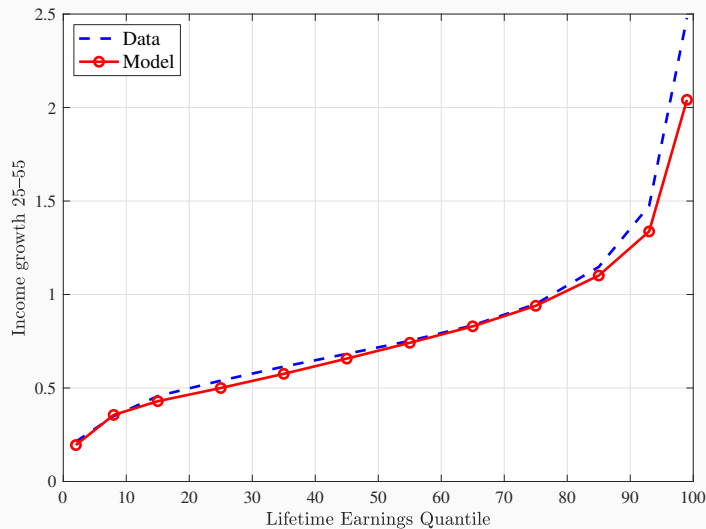


- λ_1 is increasing by LE, whereas EE is declining (matches the SIPP).
- Higher offer arrival rate by income in the NY Fed SCE data.

Estimation

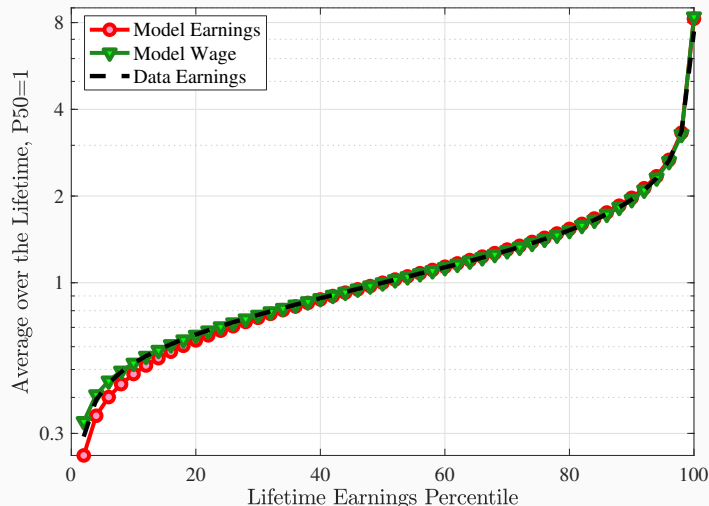
Decomposition of Lifetime Earnings

Earnings Growth Between 25 and 55



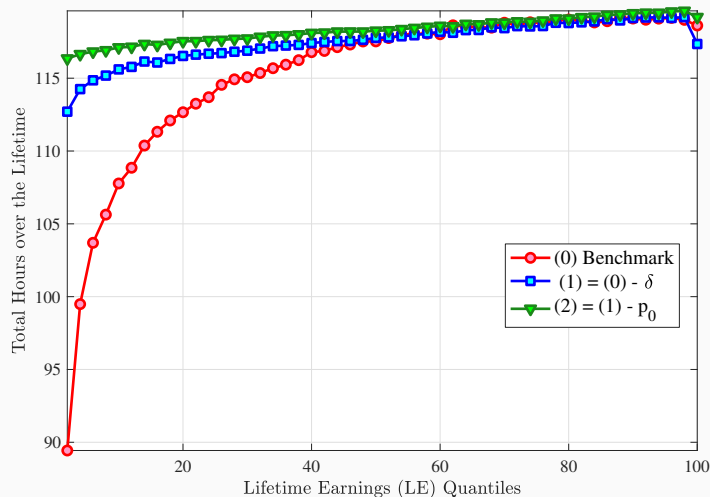
- The model captures earnings growth throughout the LE distribution.

Lifetime Earnings and Wages



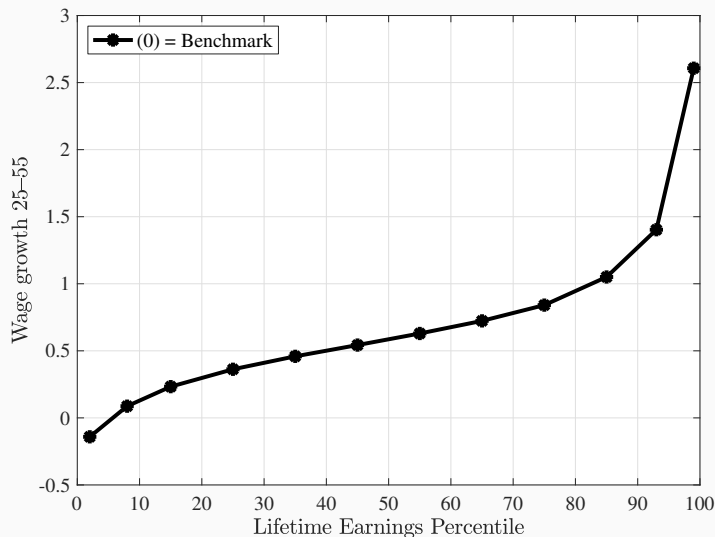
- matches lifetime earnings inequality.
- most inequality due to wages.
- except at the bottom: lifetime employment is lower.

Lifetime Employment



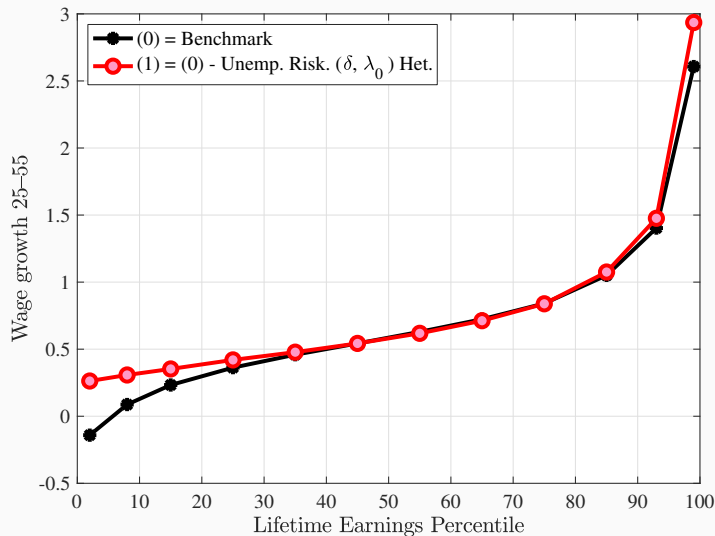
- 25% lower employment at the bottom.
- mostly due to higher unemployment risk and (somewhat) lower job finding rate.
- Little role to ex-post luck.

Decomposing Differences in Wage Growth



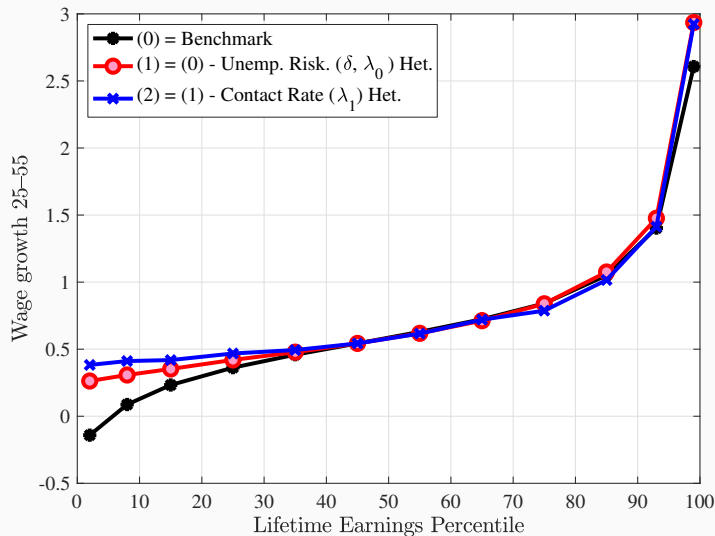
- We shut down each heterogeneity one after another, until we eliminate all differences.
- We keep the rankings of workers the same (i.e., not sorting again under new parameters).

Decomposing Differences in Wage Growth



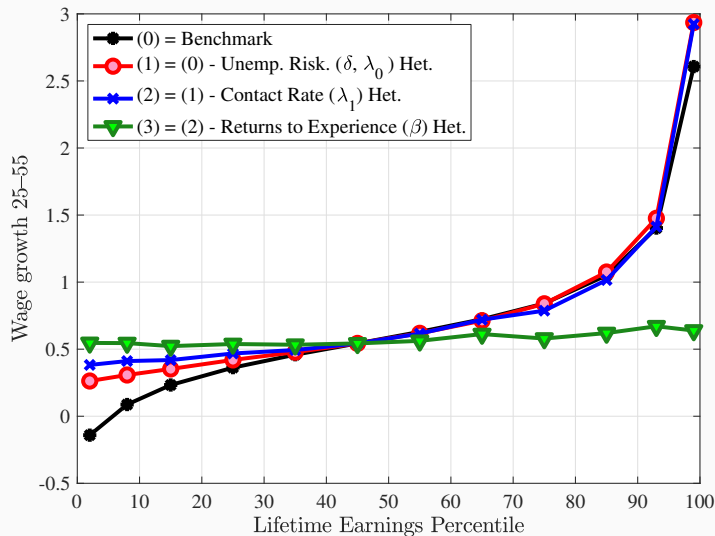
- Suppose all workers face the same unemployment risk, δ as the $\alpha = 0$.
- Large effect at bottom.
- Also significant effect at the top.

Decomposing Differences in Wage Growth



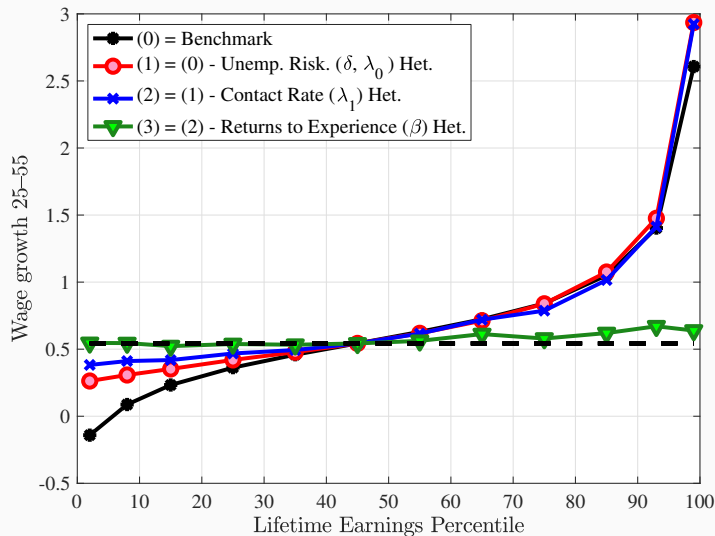
- Suppose now all workers also face the job finding rate.
- Significant effect at the bottom.

Decomposing Differences in Wage Growth



- Suppose now all workers also face the same returns to experience.
- Huge effect above the median.
- Sizable effect at the bottom.

Decomposing Differences in Wage Growth



- The rest due to ex-post productivity and job ladder shocks.
- Luck plays a very limited role.

Conclusion

Conclusions

- We studied the reasons behind the vast heterogeneity in lifetime earnings.
- “Careers” vs. “jobs”: 2 different mechanisms for different parts of the LE:
 - Below median LE: mainly heterogeneity in job ladder risk.
 - Above median LE: mostly heterogeneity in returns to experience.
- Ex-ante vs. ex-post debate: Ex-ante differences are more important than we think.

Appendix

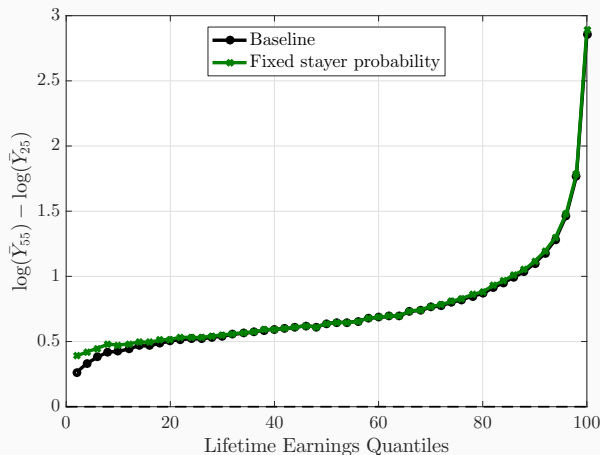
Appendix

Decomposition from the Data

A simple decomposition of earnings growth

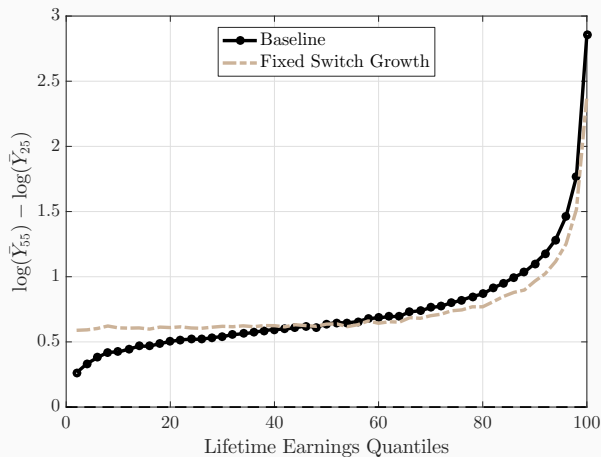
- Differences in lifetime income growth can be due to heterogeneity in:
 1. Probability of being a stayer,
 2. Switcher income growth,
 3. Stayer income growth.
- Shut down heterogeneity one at a time by assigning the level corresponding to median LE workers
- Compute the resulting income growth profile.

Stayer Probability Heterogeneity



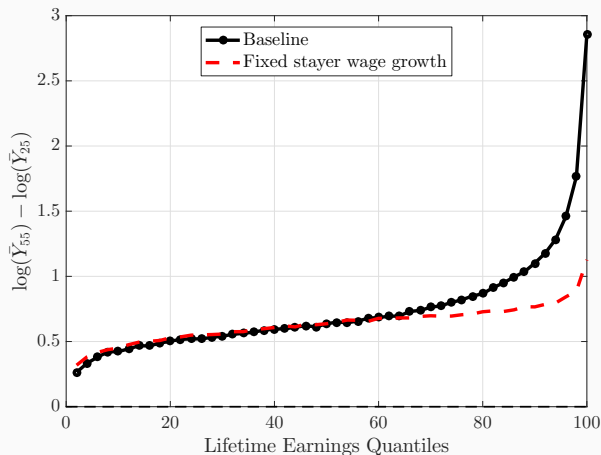
- Heterogeneity in stayer probability plays a very small role.
 - Above median no heterogeneity in stayer probability.
 - Below median stay and switch growth are similar.

Switcher Income Growth Heterogeneity



- Heterogeneity in switcher income growth is important below median, less so above median.

Stayer Income Growth Heterogeneity



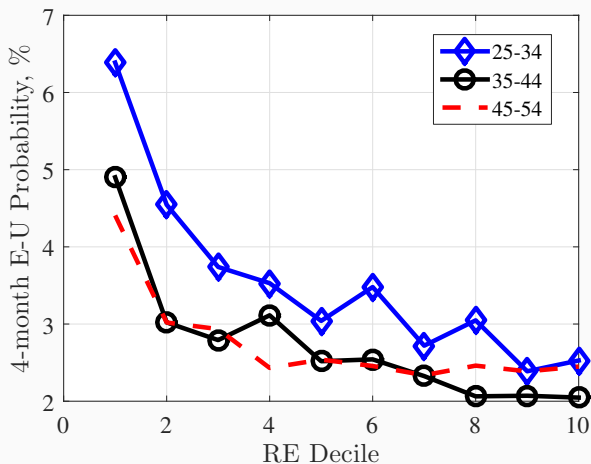
- Heterogeneity in stayer income growth is the main determinant of above median.
- Little heterogeneity in stayer income growth below median.

Appendix

Evidence From SIPP

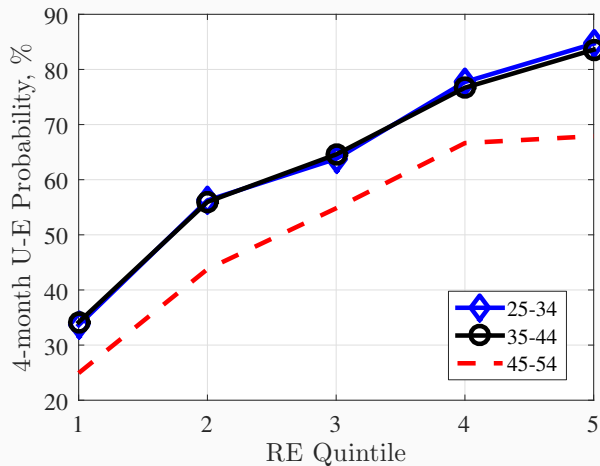
- SSA does not allow us to distinguish between E-U-E, vs. E-E as well as E-N vs. E-U.
- SIPP allows computation of flow probabilities.
- Cannot compute lifetime earnings. Rank people by past income (over 2 years instead).
- Rankings within age groups.

4-Month E-U Probabilities



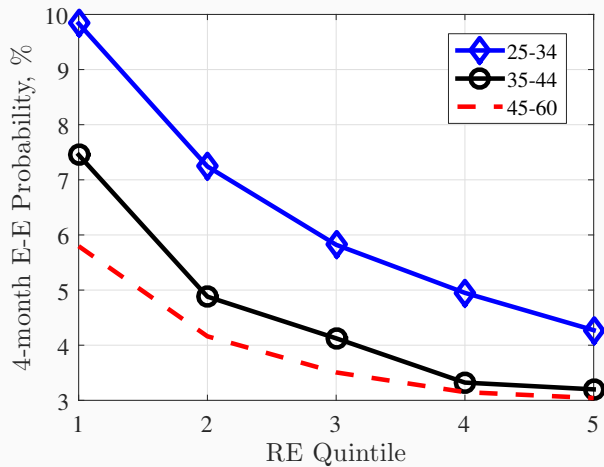
- Unemployment risk is lower for people with higher wages.

4-Month U-E Probabilities



- Job finding rates are higher at the top of the income distribution.

4-Month E-E Probabilities

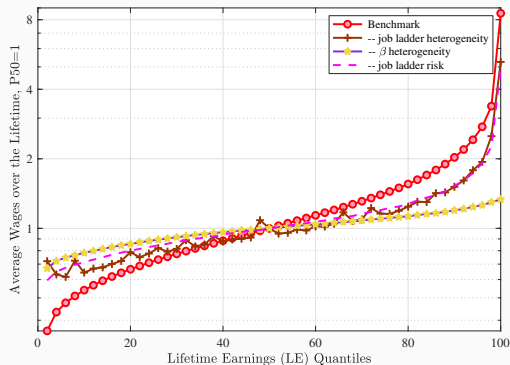


- Job-to-job switches are more common at the bottom.

Appendix

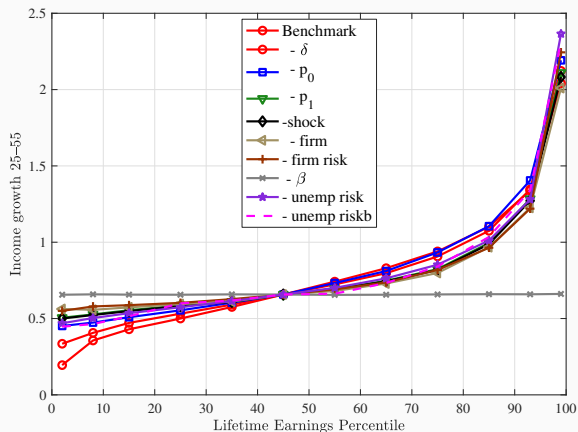
Model Decomposition

Decomposition of Lifetime Wages



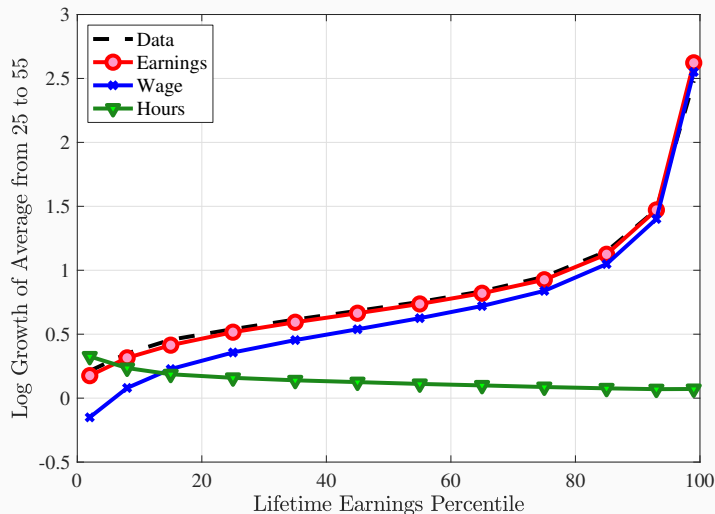
- Heterogeneity in job ladder risk and its ex-post idiosyncratic risk as well as alpha heterogeneity are important below median.
- Beta heterogeneity explains most of the income growth heterogeneity above median.

Decomposition of Earnings Growth



- Job ladder heterogeneity/risk is important below median.
- Beta heterogeneity explains most of the income growth heterogeneity above median.

Decomposition of Earnings Growth



- Over the life cycle hours grow as workers settle into stable jobs (especially bottom LE).
- Wage growth is lower than earnings growth.