Job Stability, Earnings Dynamics, and Life Cycle Savings

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Working paper by Moritz Kuhn and Gašper Ploj (2020)

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Motivation

- *Empirical fact observed by Hall (1982):*
  - Labor markets are characterized by large heterogeneity in job stability
    1. Some workers have stable lifetime jobs
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- *The natural question that arises:*
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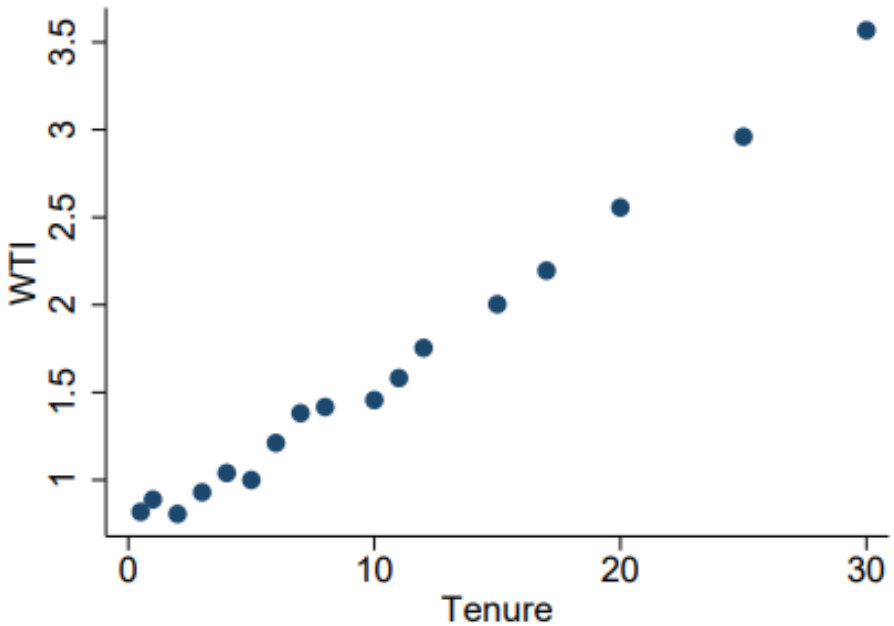
- *Goal of Kuhn and Ploj (2020):*
  - *At the individual level:* explore life-cycle consequences of early-career heterogeneity in job stability
  - *For the macroeconomy:* explore the welfare consequences of changes in job stability in the context of declining U.S. labor market dynamism (Molloy et al., 2016)

Empirical Evidence

1. Job stability and wealth accumulation

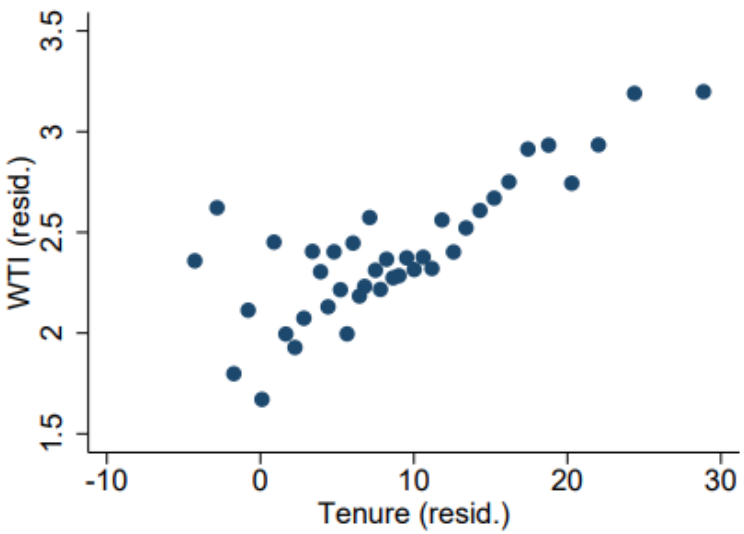
Empirical Evidence from the Survey of Consumer Finances (SCF): Systematic relationship between job stability (tenure) and accumulated wealth:



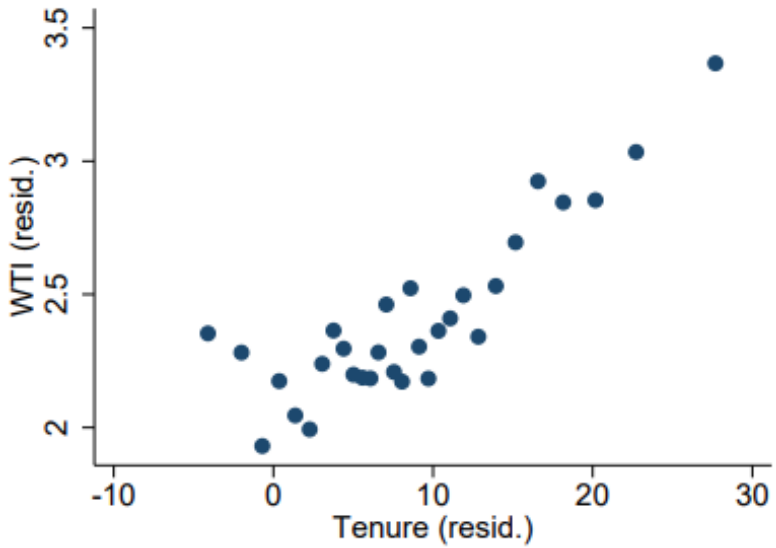
- Controlling for wealth, **households with more stable jobs accumulate more wealth**
- Life-cycle savings are an important driver of this correlation

1. Job stability and wealth accumulation

Strong positive relationship between wealth-to-income ratio and job stability even after controlling for age:

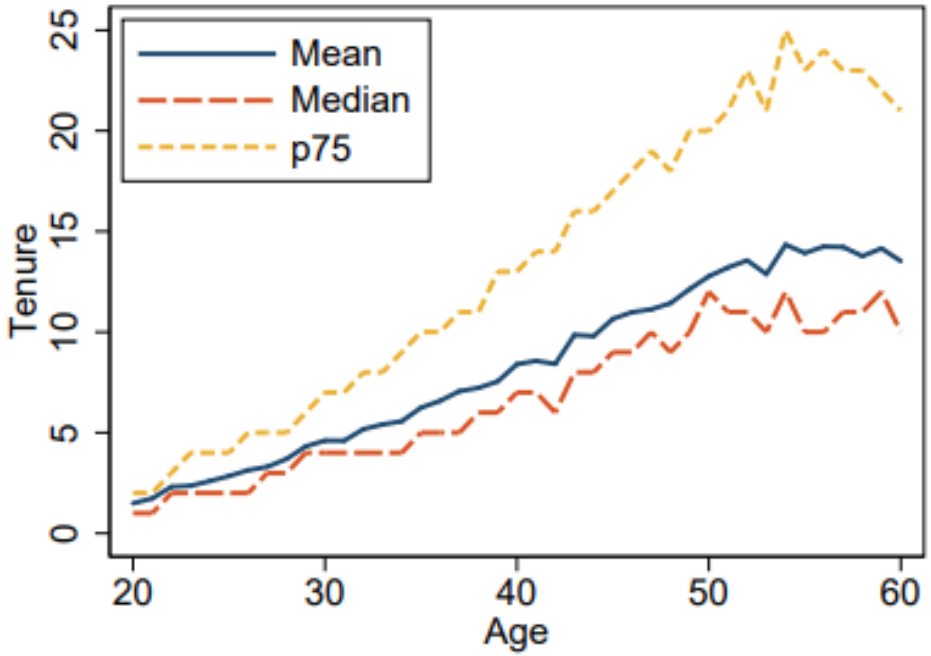


Strong positive relationship is robust also after controlling for age, education, occupation, industry:



2. Heterogeneity in job stability

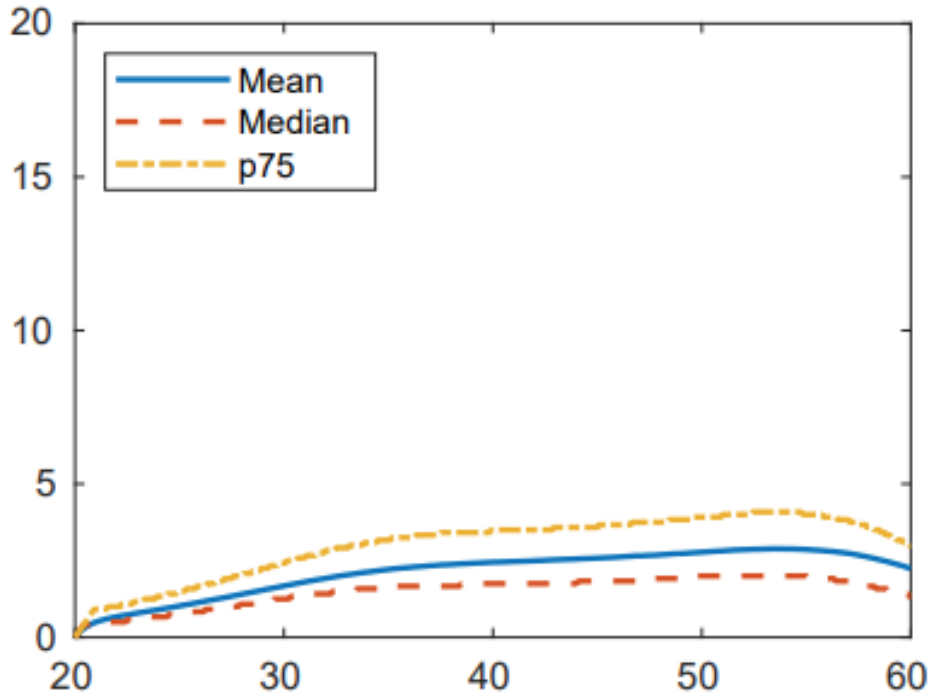
The tenure by age of American workers shows that, on average, jobs are very stable:



- Increasing dispersion of job tenure over the life cycle
- At age 40: mean tenure is 8 years and median tenure is 6 years

2. Heterogeneity in job stability

However, looking at the "representative worker" reveals that mean tenure is only 3 years at age 40 and much slower than what is observed in the data:



$\Rightarrow$ This is evidence for a **large heterogeneity in job stability**

2. Heterogeneity in job stability

- To quantify the **extent of heterogeneity in jobs stability** in the data, they propose a measure of employment inequality
  - Using this measure, they find employment inequality to be increasing with age, and
  - During the middle of working life, the average job in the data lasts 3x longer than expected in the absence of heterogeneity
- Regarding the **sources of job-stability heterogeneity**, they provide empirical and Monte Carlo evidence that point to employer differences as the important source of such heterogeneity

Theory

Idea of the model to study heterogeneity in job stability

The (Partial Equilibrium) Model is a combination of a **life-cycle labor search model with human capital investment** and a **consumption-saving model with incomplete financial markets**

- **In the labor market**, workers search on and off the job and **jobs differ w.r.t. wages w and separation rates** λ
- Endogenous **Human capital investment** opportunities exist only for employed workers who can exert effort to invest
- **The consumption-saving part of the model** is standard: agents face incomplete financial markets where they can save in a risk-free asset subject to a no-borrowing constraint
- Agents have precautionary savings motive due to the life-cycle variation in incomes and incomplete financial markets. Further, job offer rates and interest rates are taken as given.

The Model

- Risk-averse agents maximize expected lifetime utility: they derive utility from consumption and disutility from effort required to accumulate human capital
- Each employed worker supplies one unit of labor (labor supply at the intensive margin is inelastic)
- **A worker's life cycle has 3 phases:**
  1. **Working Phase:** workers start their life in the working phase that lasts for T^W periods
  2. **Transition Phase:** at the end of the working phase, they move to the transition phase, which is stochastic and lasts for T^T
  3. **Retirement Phase:** at the end of the transition phase, workers move to the retirement phase that lasts for T^R periods
- The model is solved using backward induction and grid search for the consumption-saving and effort choice decisions

1. Working Phase: Assumptions

- **Workers' period bc**: $a_{j+1} + c_j = (1 + r)a_j + y(w_j, h_j, \varepsilon)$
  - a worker holds assets (a) and a stock of human capital (h)
  - r = risk-free rate on the economy's single risk-free asset
  - w_j = wage at worker's age j
  - y = current period labor income incl. transfers
  - worker is either employed (e) or unemployed (n): $\varepsilon \in \{e, n\}$
- **If the worker is employed**:
  - her income in the current period: $y(w_j, h_j, e) = w_j \cdot h_j$
  - her job is characterized by the wage and separation rate: (w,λ) $\rightarrow$ w and λ are discretized to grids $\{w_k\}_{k=1}^{K}$ and $\{\lambda_l\}_{l=1}^{L}$, where $w_k < w_{k+1} \forall k$ and $\lambda_l < \lambda_{l+1} \forall l$
- **If the worker is unemployed**:
  - she initially receives transfer income proportional to her last employment income: $y(w_j, h_j, n) = b \cdot w_j \cdot h_j$, where b = replacement rate
    $\rightarrow$ these benefits decline each period if the agent remains unemployed $\rightarrow$ declining benefits are captured by lowering the last wage on the grid from w_k to $max\{w_{k-1}, w_1\}$

1. Working Phase: each period is split into 4 stages

1. **Separation stage:**
   - *with probability* λ: employed worker separates from job (i.e. becomes unemployed) and moves to the *production stage*
   - *with* $(1-\lambda)$: employed worker moves to *investment stage*
2. **Investment stage:**
   - *employed* worker decides if she wants to exert effort $t \in [0,1]$ for human capital investment $\rightarrow$ disutility from effort enters the utility additively separable as quadratic cost κt^2
   - *unemployed* agents can't accumulate human capital
3. **Production stage:**
   - *employed* agents receive earnings: $w_j \cdot h_j$
   - *unemployed* agents receive benefits proportional to earnings on their last job
4. **Search stage:**
   - *employed* agents (e) receive job offers with probability $\pi_e \rightarrow$ decides to either accept (e') or reject the job offer (e)
   - *unemployed* agents (n) receive job offers with probability $\pi_n \rightarrow$ decides to either accept (e) or reject the job offer (n)

1. Working Phase: Assumptions

- Law of motion for human capital if effort $t > 0$:
  - Human capital investment is risky: reaches level $h_{j+1} = h^+$ with probability $p_H(t, j)$ and level $h_{j+1} = h_j$ with $(1 - p_H(t, j))$
  - Human capital levels are discrete and members of an ordered set with smallest element h^{min} and largest h^{max}
  - h^- = immediate processor and h^+ = immediate successor of h
  - This structure of the human capital process endogenizes the human capital accumulation decision

- The consumption-saving decision is standard:
  - agent chooses next periods' asset level given current state and facing a borrowing constraint that prevents neg. asset holdings
  - agents make *savings decisions at the production stage* before knowing the outcome of the search stage

1. Working Phase: Recursive decision problem

The *state* of an agent: age j, employment state ε, current asset holdings a, current or last wage w, separation probability λ if employed, and level of human capital h

1. **Separation stage:**
   $V_e^{sep}(a, w, \lambda, h, j) = \lambda V_n^P(a, w, h, j) + (1 - \lambda) V_e^I(a, w, \lambda, h, j)$ (i.e. value fct. at period start)
   $V_n^{sep} = V_n^P$ (i.e. nothing happens for an unemployed agent)
2. **Investment stage:**
   $V_e^I(a, w, \lambda, h, j) = \max_{t \in [0,1]} -\kappa t^2 + p_H(t, j) V_e^P(a, w, \lambda, h^+, j) + (1 - p_H(t, j)) V_e^P(a, w, \lambda, h, j)$
   (i.e. an employed worker makes her human capital investment decision, whereas the realization of the stochastic human capital accumulation happens at the beginning of the production stage)
3. **Production stage:**
   $V_e^P(a, w, \lambda, h, j) = \max_{c, a' \geq 0} u(c) + \beta \left(\pi_e V_e^S(a', w, \lambda, h, j) + (1 - \pi_e) V_e^{Sep}(a', w, \lambda, h, j+1) \right)$ s.t.
   $c = (1 + r)a + y(w, h, e) - a'$
   $V_n^P(a, w, \lambda, h, j) = \max_{c, a' \geq 0} u(c) + \beta \left(\pi_n V_n^S(a', w, h, j) + (1 - \pi_n) V_n^{Sep}(a', w^-, h, j+1) \right)$ s.t.
   $c = (1 + r)a + y(w, h, n) - a'$
   i.e. declining benefits captured by transition from w to w^-, where w^- is next lower wage level
4. **Search stage:**

$$V_e^S(a', w, \lambda, h, j) = \sum_{N_w}^{s=1} \sum_{k=1}^{N_\lambda} max \left\{ \underbrace{V_e(a', w, \lambda, h, j+1)}_{\text{staying in current job}}, \underbrace{V_e(a', w_s, \lambda_k, h, j+1)}_{\text{accepting outside offer}} \right\} f(w_s, \lambda_k)$$

i.e. the value fct. captures the acceptance-rejection for outside job offers and the expectations over job offers. The distribution over job offer is $f(w, \lambda)$.

$$V_n^S(a', w, h, j) = \sum_{N_w}^{s=1} \sum_{k=1}^{N_\lambda} max \left\{ \underbrace{V_n(a', w^-, h, j+1)}_{\text{staying unemployed}}, \underbrace{V_e(a', w_s, \lambda_k, h, j+1)}_{\text{accepting job offer}} \right\} f(w_s, \lambda_k)$$

2. Transition Phase

- The *working phase* and the *transition phase* differ only in the possible continuation states
  - A worker in the working phase ages deterministically and transits at the end of prime-age working life to the transition phase (workers can't transit backwards)
  - A worker in the transition phase either remains there or transits to the retirement phase $\rightarrow$ transiting from transition phase to retirement phase is stochastic and happens with probability ψ

3. Retirement Phase

- Upon reaching the retirement phase, workers leave the labor market and receive social security benefits:

$$y(w_j, h_j, n) = s\bar{w}_j h_j$$

  - $s \in (0,1)$ = replacement rate of old-age social security system
  - $\bar{w}_j$ = economy-wide average wage
  - h_j = stock of human capital prior to retirement

- Agents do not face any labor market (i.e. income) risk during retirement and solve a deterministic, finite-horizon consumption-saving problem $\rightarrow$ Bellman Equation:

$$V_r(a, w, h, j_r) = \max_{a' \geq 0} u[(1+r)a + y(w, h, n) - a'] + \beta V_r(a', w, h, j_r + 1)$$

- At the end of the retirement phase, everyone dies. In this case, utility is normalized to zero. And as we abstract from a bequest motive, all agents will have zero assets at the end.

Bringing the Model to the Data

Quantitative Exercise

- Model parameters are estimated to jointly match life-cycle labor dynamics, earnings growth, and wealth-to-income ratios for the U.S. economy
- The model also matches untargeted empirical facts on consumption inequality, earnings dynamics, earnings losses following job displacement, the distribution of earnings growth, wealth dynamics in *Panel Study of Income Dynamics* data, and the joint distribution of income and wealth in the *Survey of Consumer Finances* data
- Most importantly, the **model matches the empirically documented relationship between job stability (i.e. employed tenure) and wealth accumulation** so that we can interpret this empirical correlation through the lens of the model

Findings

Consequences of heterogeneity in job stability

- Since the model is jointly consistent with life-cycle earnings, consumption, and wealth dynamics, it can be used to explore:
  1. the consequences of heterogeneity in job stability at the *individual* level
  2. the consequences of heterogeneity in job stability at the *macroeconomic* level

Note that:

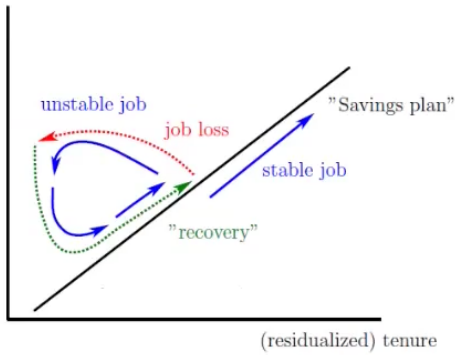
- *Unstable job:* a job with a high separation rate λ that you put at the 75th percentile of the age-specific separation rate distribution
- *Stable job:* jobs at the 25th percentile of the age-specific separation rate distribution

Job stability at the *individual* level

Consumption-saving decision

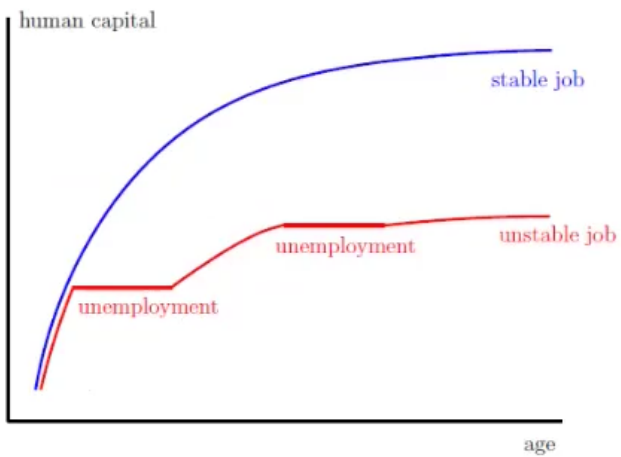
Intuition of how the model translates heterogeneity in job stability in consumption-saving dynamics:

- **Unstable job:**
  - accumulation of precautionary savings (separation very likely)
  - decumulation of assets during unemployment
  - new accumulation of precautionary savings
  - "Sisyphos Cycle" of wealth accumulation (i.e. workers with bad start to labor market build up and run down their buffer stock of wealth while cycling in and out of employment)
- **Stable job:**
  - accumulation of life-cycle savings (separation very unlikely)
  - no decumulation due to unemployment
  - smoothing of life-cycle consumption
  - "Modigliani savers" (i.e. start stable working life allows life-cycle consumption smoothing from the start)



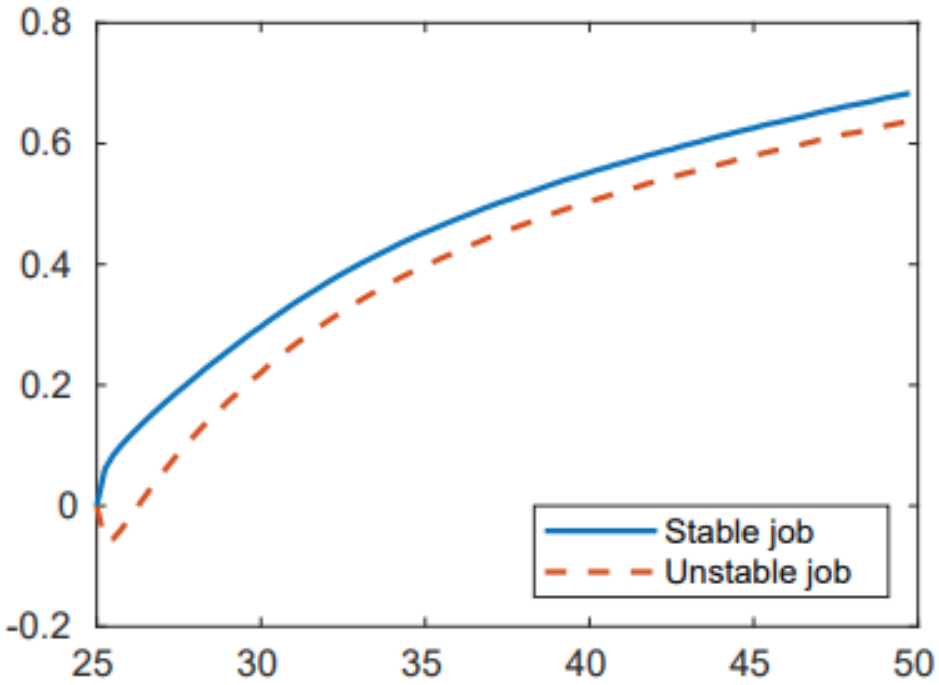
Earnings dynamics

- **Unstable job:**
  - unemployment prevents human capital accumulation
  - persistent job instability
  - less earnings growth over the life cycle
  - "Dead-end job" (i.e. low income today, fewer career opportunities and little perspectives, high risk of job loss)
- **Stable job:**
  - constant human capital accumulation
  - low unemployment risk
  - high earnings growth over the life cycle
  - "Lifetime job" (i.e. workers invest in their career, enjoy growing incomes, face little risk of job loss)



Heterogeneity in job stability and income dynamics

Let's compare the income of two identical workers in our model that differ only in initial job stability: stable job vs. unstable job:



$\Rightarrow$ Unstable job at age 25 leads to 5% lower income (c.f. graph) and consumption (not shown) 25 years later $\rightarrow$ initial differences in job stability translate into persistent life-cycle effects!

Job stability at the *macro* level

Decline in labor market dynamism (i.e. mobility)

- Data shows:
  1. A secular decline in separation and job-to-job mobility in the US labor market
  2. However, median tenure remained constant over time
- With their model, they match these two facts to analyze the consequences of the decline in U.S. labor market dynamism
  1. The lower separation rates (i.e. shift toward more stable jobs) are good for workers because they lead to higher human capital investment
  2. But lower job-to-job mobility reduces the wage-ladder dynamics $\rightarrow$ lower wage growth
- Overall:
  - For labor market entrants (i.e. young American workers), the job stability effect dominates resulting in a welfare gain of 1.6% for them. Key reason: higher earnings growth (almost 3% more at the end of working life)
  - Higher job stability increases human capital investment and makes wage ladder stable $\rightarrow$ higher life-cycle wage growth

Conclusion

Conclusions

- Empirically large heterogeneity in job stability
- Systematic positive empirical relationship between job stability (i.e. employed tenure) and wealth accumulation
- Bad start to the labor market (i.e. unstable job at age 25) leaves permanent scars on income, consumption, and wealth
- Job-stability heterogeneity perpetuates short-run search frictions and leaves long lasting scars on workers careers
- Declining labor market dynamism (i.e. a less dynamic labor market) led to welfare gain of young American workers (i.e. labor market entrants)