Cyclical Earnings, Career and Employment Transitions

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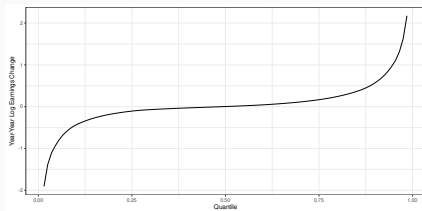
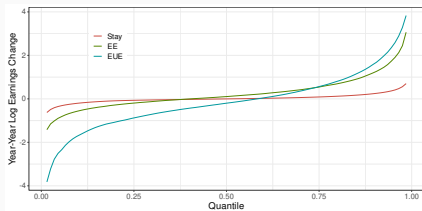Bank of Italy
October 2022

Introduction

Motivation: Earnings risk and labour market churning

- Labour markets are characterised by a large amount of churning (EUE, EE transitions).

- Churning is accompanied by large positive and negative earnings changes.
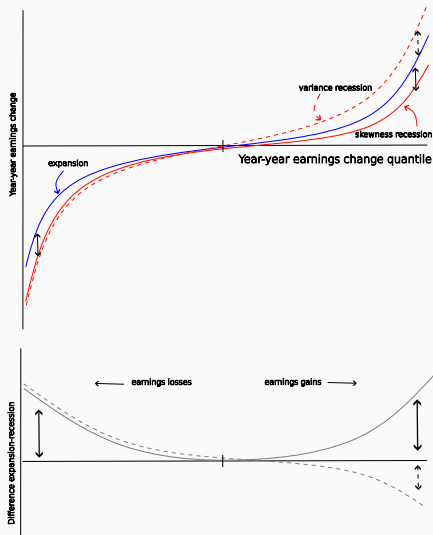

(a) Earnings growth - CDF

(b) Conditional earnings growth - CDF

Source: SIPP, 1990-2013. Change in individual residual log earnings including zeros from unemployment

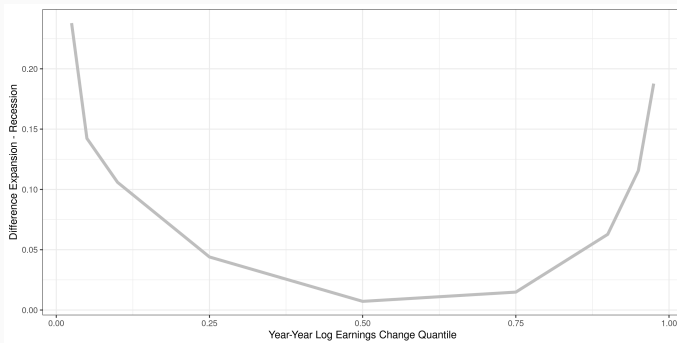- Large earnings risk as workers move along or back to the job ladder through employer changes.

(a) Cyclical changes in the CDF - schematic

Motivation: Earnings changes vary over the business cycle

- Differences between the expansion and recessions earnings growth CDFs

(a) Cyclical changes in the CDF - difference

Source: SIPP, 1990-2013. At each quantile we subtract expansion - recession earnings growth

- Procyclical skewness is a key property (Guvenen et al. 2013).
- Higher downside earnings risk in recessions and higher upside earnings risk in expansions.

Importance of occupation mobility

This paper

- Earnings growth distribution with only employer mobility $\rightarrow$ misses a much more important source of earnings risk: occupation mobility.

- This has implications for how we think about the sources of earnings risk arising through churning and the cost of business cycles.

Empirical analysis - SIPP (1990 - 2013)

- Among employer movers there is an increasing relationship between the size of the earnings change (positive or negative) and the probability of an occupational switch.

- The procyclical skewness of the earnings growth distribution arises from those *EUE* and *EE* changes that also involve an occupational switch.

- Moving to "better" or "worse" occupations do not seem to explain cyclical change $\rightarrow$ idiosyncratic occupation-worker risk.

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This paper: Importance of occupation mobility

Model

- Multi-sector business cycle job ladder model where a job has two dimensions: (i) Occupation - what type of work is done; (ii) Employer - where the work is done.

- Structural decomposition of the earnings growth distribution. Is the occupation or the employer component the most important? Does this arises from

  - "Flows" $\rightarrow$ transitions that workers make are cyclical.
  - "Returns" $\rightarrow$ earnings conditional on these transitions can change.

- Implications for sullying and cleansing effects across distribution.

Structural estimation

- Occupation component of a job matter more than the employer component.

- Returns to occ. mobility explain most of the cyclical change in earnings. Flows matter to explain the very top and bottom tails.

- Without occupations $\rightarrow$ trade-off between workers flows and earning growth distribution.

- Low-paid workers suffer disproportionally more from sullying as they cannot improve on idiosyncratic occupation component.

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Related literature:

Earnings risk

- Solon et al. (1994), Storesletten et al. (2004), [...], Guvenen et al. (2014), Guvenen et al. (2021), Haltiwanger et al. (2018), Harmenberg (2018), Kurmann and McEntarfer (2018), Halvorsen et al. (2020), Busch et al. (2021), Busch and Ludwig (2020).

Job ladder models

- Burdett (1978), Jolivet et al. (2006), [...], Lise (2012), Bagger et al. (2014), Burdett et al. (2020), Jarosh (2021), Hubmer (2018), Karahan et al. (2020), Harmenberg (2021), and Kramer (2022).

Occupational/sectoral mobility

- Neal (1999), [...], Kambourov and Manovskii (2009), Alvarez and Shimer (2011), Groes et al. (2014), Dvorkin (2014), Wiczer (2015), Chodorow-Reich and Wieland (2020), Carrillo-Tudela and Visschers (2021), Philosoph (2022), Huckfeldt (2021) and Braxton and Taska (2022).

Earnings Growth Distributions

SIPP data 1990-2013

EE and *EUE* transitions

- *EE* $\rightarrow$ employer changes without an intervening full month of unemployment.
- *EUE* $\rightarrow$ consider mix unemployed and non-participation episodes within a spell.

Occupation transitions

- Task-based categories: NR Cog, R. Cog, NR Manual, R. Manual.
- "Employer/occupational stayer" $\rightarrow$ no changed in either of these dimensions in the previous or in the posterior year relative to this wave (about 75% of observations).
- Potential issues with occupation mobility of employer movers, but this appears small. ▶ Graphs

Annual real earnings

- Deflate earnings $\rightarrow$ residual after controlling for a quadratic on potential experience.
- Annual earnings $\rightarrow$ summing monthly earnings, including zeros for unemployment periods (inverse hyperbolic sine differences for *U* spells of more than a year).
- Potential issues with measurement error (see Gottschalk, 2005, Hudomiet, 2015, Kurmann and McEntarfer, 2018, Busch et al., 2021).

Occupational mobility in the tails

(a) All workers

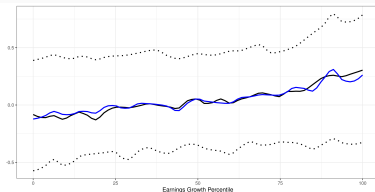(b) Employer movers

(c) EE movers

(d) EUE movers
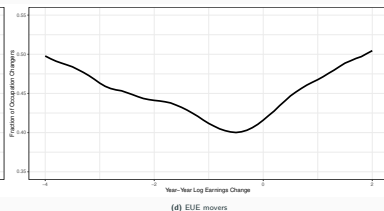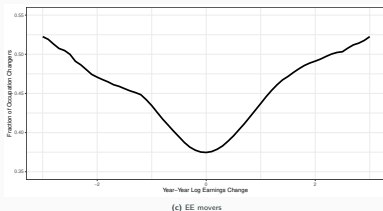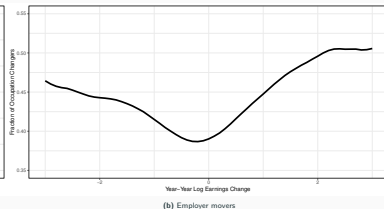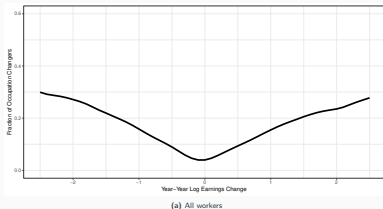
- Large earnings changes come with a larger probability of an occupational change.
- Occupation movers contribute about 50% of the overall variance of the earnings growth distribution due to their impact on the tails.
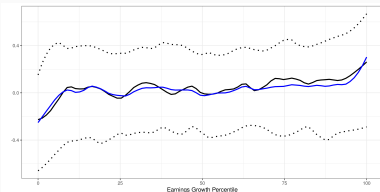
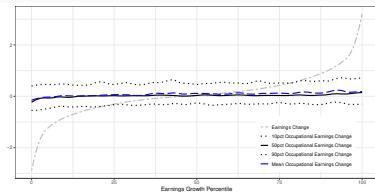# Do earnings reflect movements to better/worse occupations?
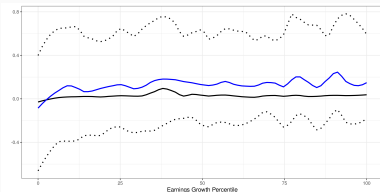
(a) Employer movers: EE
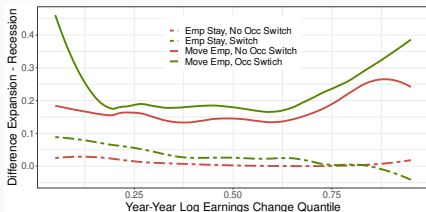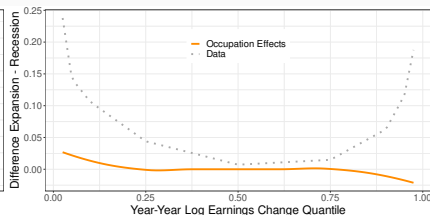
(b) Employer movers: EUE

(c) Employer stayers

(d) All

- Estimate occupation fixed effects ⇒ relate changes in these fixed effects to earnings changes among occupation movers (*EE*, *EUE* and employer stayers).
- Occupation effects differ little across earnings gainers and losers
- Interpretation: mostly workers climb an *idiosyncratic* occupation ladder

Cyclical Earnings Growth Distribution

Occupation switchers have a more cyclical Earnings Growth Distribution

(a) Occ/Emp movers and stayers

(b) Role of occupation-wide effects

- Procyclical skewness seems to arise from occupation/employer movers.
- The linear decomposition of Halvorsen et al. (2020) finds that 60% of the cyclical skewness arises from occ/emp movers.
- Occupation effects have little cyclicality $\Rightarrow$ worker idiosyncratic occupation earnings risk.

Cyclical Earnings Growth Distribution

Cyclical Earnings Growth Distribution by Occ/Emp Switching: *EE* **and** *EUE*
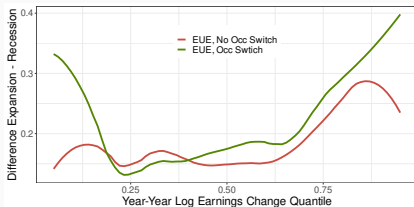
(a) Employer movers: occupational movers
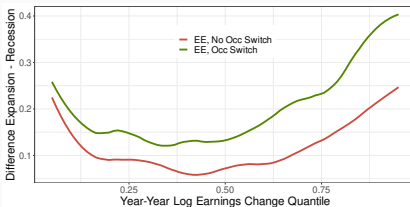
(b) Employer movers: occupational stayers

- The procyclical skewness arises form both *EUE* and *EE* occupation movers.

- *EE* occupation stayers contribute to the higher earnings growth in expansions.

▶ Hourly Wages

Model

Environment - One-sided job search model

Markets and agents

- A set of occupations (islands) $o = 1, \ldots O$.

- Lifetime utility maximising, risk neutral workers $\rightarrow U$ or E.

- Workers decide whether to (i) accept employment, (ii) quit into unemployment, (iii) change occupations, (iv) which occupations to search in.

Productivities and payments

- A_t is the aggregate productivity and $p_{o,t}$ an occupation-wide productivity.

- Idiosyncratic worker-occupation match z_t and worker-firm match ϵ_t prod.

- Occupation-specific human capital x_t^s, accumulated stochastically.

- Firm-specific human capital μ_t^s, accumulated stochastically.

- (Log) Earnings are assumed to be equal to total productivity

$$\log y_t = A_t + p_{o,t} + x_t^s + z_t + \mu_t^s + \epsilon_t$$

- Home production output of an unemployed worker: b

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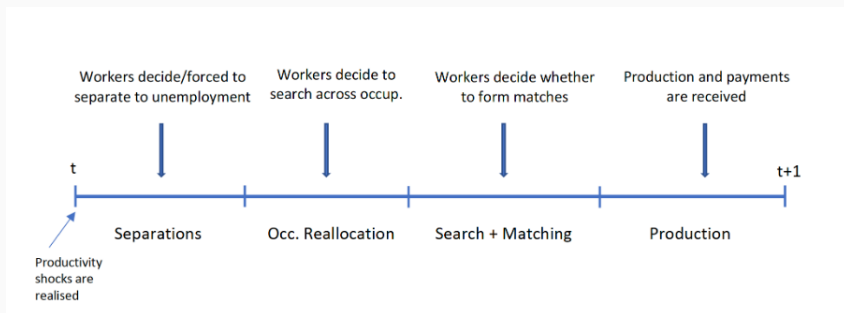
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Search within occupations - employer reallocation

Match breakup

- Separation shocks, some depend on A_t
    - Godfather shocks γ, have to accept a move to another firm $\rightarrow$ involuntary mobility.
    - Exogenous job separation shock $\delta^\epsilon(A_t)$, but also endogenous employer separations.
    - Exogenous occupation separation shock $\delta^z(A_t)$, but also endogenous occupation separations.

Meetings: unemployed and employed

- When a worker and a firm meet $\rightarrow \epsilon$ from $\Gamma_A(.)$ - captures that quality of new matches change with the cycle (see Moscarini, 2001)

- Meeting rates are exogenous and depend on aggregate productivity and employment status: $\lambda_u(A_t)$, $\lambda_e(A_t)$.

Search across occupations - net and gross mobility

- **Gain:** re-start the z process by drawing the initial z from $F_A(.)$

- **Cost:** losing any accumulated human capital.

Imperfect directed search

- A worker can only receive at most one z. With probability $\alpha(s_{\tilde{o}}^i, o)$ a worker leaving o receives the z from $\tilde{o}$, where $s_{\tilde{o}}^i$ is the search intensity this worker puts in $\tilde{o}$ given $i = U, E$.

- Probability of receiving a z for a worker leaving o is $\sum_{\tilde{o} \in O^-} \alpha(s_{\tilde{o}}^i, o) \leq 1$.

- Choose s across o to maximise the probability of receiving an offer taking into account differences in p_o.

- Assuming $\alpha^i(s_{\tilde{o}}) = \alpha_0 e^{\alpha_{\tilde{o}} \alpha_1^i} s_{\tilde{o}}^{1-\alpha_1^i}$ yields optimal search intensity

$$s_{\tilde{o}}^* = \frac{e^{\alpha_{\tilde{o}} + \frac{1}{\alpha_1^i} \log\left(\Phi^i(\tilde{\Omega}_1)\right)}}{\sum_{\tilde{o} \in O^-} e^{\alpha_{\tilde{o}} + \frac{1}{\alpha_1^i} \log\left(\Phi^i(\tilde{\Omega}_1)\right)}},$$

where α_1^i tells us about how directed is search across occupations.

Earnings and job ladder

Earnings change over the cycle

- Mobility shocks $\rightarrow \delta^\epsilon(A)$, $\delta^z(A)$, $\lambda_u(A)$, $\lambda_e(A)$

- Returns to mobility $\rightarrow F_A(.)$, $\Gamma_A(.)$

- Workers employer/occupation reallocation decisions. ▸ Value Functions

Two components of a job: occupations and employers

- Reallocation through unemployment, w/ and w/out occ switches

- Direct job-to-job, w/ and w/out occ switches.

- We treat occupation mobility as an "experience" good and employer mobility as an "inspection" good.

Question:

- Which component is more important in explaining the cyclicality of the earnings growth distribution?

- Through which channel: cyclical returns or mobility shocks?

Structural Estimation

Parameterization

- Aggregate productivity: Markov chain, $A \in \{0(bad), 1(good)\}$

- Occupation-wide productivity: $p_{o,t+1} = \tilde{p}_o + \rho_p p_{o,t} + \upsilon_{o,t+1}$, where $o = NRC$, RC, NRM, RM.

- Occupation specific human capital: two states $x_1, x_2 \to \chi_2$ increase. No depreciation.

- No accumulation of firm specific human capital - Kambourov and Manovskii (2008).

- $E[z_{t+1}|z_t] = (1 - \rho_z)z_t + \rho_z \upsilon_{z,t+1}$, where $\upsilon_z \sim \tilde{F}(.)$ following a Weibull.

- ϵ is constant and $\tilde{G} \to$ Gaussian distribution with exponential tails.

- Cyclical changes in "quality" of new jobs, weigh bad-times distributions with linear cdf $T(.)$:

  - $F = \mathbb{I}_A \tilde{F}(z) + (1 - \mathbb{I}_A)[\omega_z \tilde{F}(z) + (1 - \omega_z)T(z_A)]$
  - $\Gamma = \mathbb{I}_A \tilde{\Gamma}(\epsilon) + (1 - \mathbb{I}_A)[\omega_\epsilon \tilde{\Gamma}(\epsilon) + (1 - \omega_\epsilon)T(\epsilon_A)]$

- Mobility shocks $\to \delta_\epsilon \in \{\delta_\epsilon(A)\}$, $\delta_z \in \{\delta_z(A)\}$ and $\lambda_X \in \{\lambda_X(A)\}$

Estimation strategy

- The model has a large number of parameters we need to estimate. Pre-set 5 parameters, then follow a two-step procedure:
    - Inner loop: 8 directly calibrated parameters $\rightarrow$ values match *exactly* the targeted moments.
   - Outer loop: 24 parameters estimated using Simulated Method of Moments.

Identification

- Average and cyclical shifts of *EE*, *EU*, *UE* rates $\rightarrow$ Mobility shocks.

- Average and cyclical shift of occupational mobility rates for *EE*, *EUE* and stayers $\rightarrow$ Mobility shocks & $\alpha(.)$.

- Flows conditional on occupation identity $\rightarrow$ $\alpha(.)$.

- Cross-sectional earnings growth distribution, conditional on $\{EE, EUE, ES\} \times \{\text{Occ sw, no occ sw}\} \rightarrow$ productivity processes & job loss shocks.

- Cyclical shift of the earnings growth distribution $\rightarrow$ cyclicality of F and Γ.

Simulated method of moments

Moment	Model	Data	Moment	Model	Data
Employer Switching					
EE transition rate	0.0296	0.0340	EE rate - expansion/recession ratio	1.1600	1.1846
		(0.0003)			(0.0469)
UE transition rate	0.3492	0.3947	UE rate - expansion/recession ratio	1.0874	1.0876
		(0.0025)			(0.0244)
EU transition rate	0.0236	0.0223	EU rate - expansion/recession ratio	0.7437	0.7460
		(0.0002)			(0.0333)
Occupation Switching					
Prob (Occ. change — EE)	0.3107	0.2685	Prob (Occ. change — EE) - exp/rec ratio	1.1068	1.1068
		(0.0037)			(0.0196)
Prob (Occ. change — EUE)	0.2867	0.2892	Prob (Occ. change — EUE) - exp/rec ratio	1.0670	1.0709
		(0.0034)			(0.0132)
U duration - Occ. movers/stayers ratio	1.2280	1.2709	Prob (Occ. change — Stayer)	0.0101	0.0107
		(0.0215)			(0.0002)
Variance (Occ. change — EE switch)	0.0293	0.0223	Variance (Occ. change — EUE switch)	0.0235	0.0218
		(0.0008)			(0.0012)
flow to NRC	0.1849	0.1851	flow to RC	0.3395	0.3432
flow to NRM	0.2209	0.2201	flow to RM	0.2547	0.2516
Productivities					
NRC wage fixed effect	1.000	1.000	RC wage fixed effect	0.767	0.767
NRM wage fixed effect	0.608	0.608	RM wage fixed effect	0.803	0.803

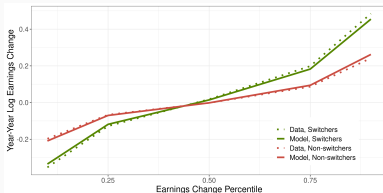*Note: Bootstrapped standard errors in parenthesis for the moments used in the outer loop.*
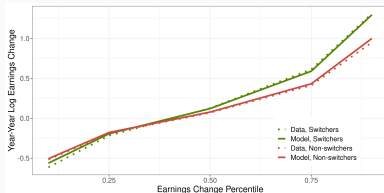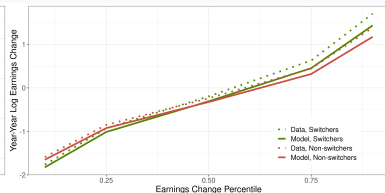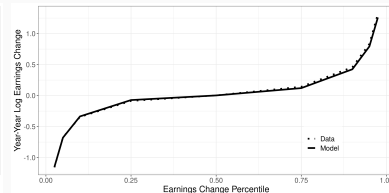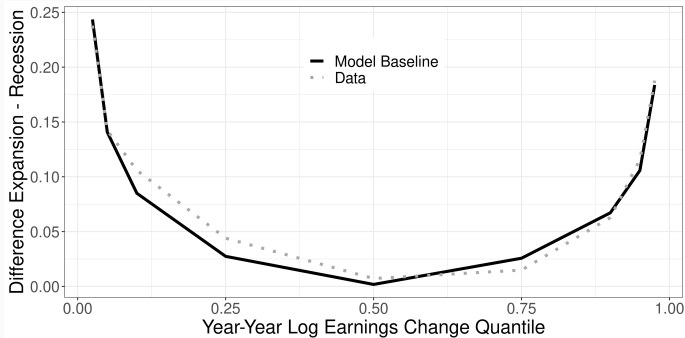
(a) EE movers

(b) EUE movers

(c) Emp stayers

(d) Combined

Cyclical shift of the Earnings Growth Distribution - Targeted

- The model reproduces the procylical skewness of the earnings growth distribution very well.

## Estimated parameter values ▸ Table

Search across occupations

- Measure of directness based on search effort $(\max s_{\tilde{o}} - 1/3)/(1 - 1/3) \Rightarrow$ 22% across workers.

- The employed direct their search more than unemployed workers.

- In recessions the unemployed increase their directness while the employed decrease it.

F and Γ distributions ▸ Graphs

- Worse match productivities with new employers and occupations in recessions.

- σ_z twice as high as σ_ϵ (equal mean) $\rightarrow$ increased earnings risk among occupational movers.

- Re-draws of ϵ are about four times more likely than re-draws of $z \rightarrow$ movements along Γ far more likely than along F.

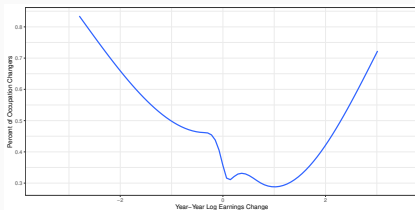- In recessions workers are four times more likely to fall from F than Γ.
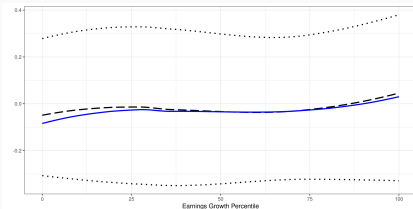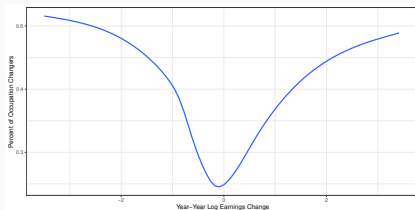
(a) Occupation Average Earnings: EE
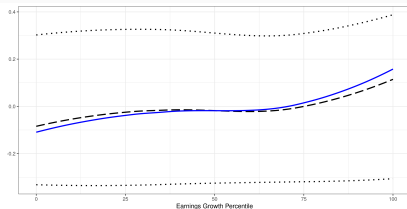
(b) Occupation Average Earnings: EUE

(c) Earnings Growth Dist. EE movers


(d) Earnings Growth Dist. EUE movers
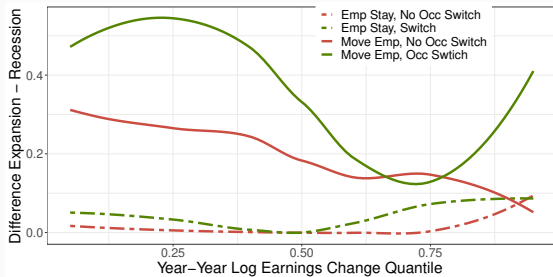
The model reproduces

- Those with larger earnings losses or gains have a higher probability of an occupational change.

- Distribution of occupation-effect changes are similar across the percentiles of the earnings change distribution.

- The procyclical skewness of the earnings growth distribution arises from occ/emp movers.

Decomposition: Flows vs Returns

# The contribution of the change in mobility shocks

- Mobility shocks are fixed at their expansion levels, but returns vary over the cycle.
- How much of cyclical change in the earnings growth distribution are we missing?
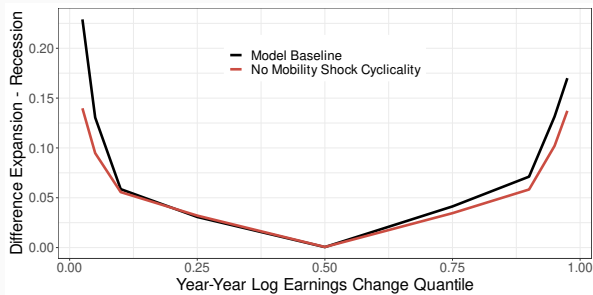
- Cyclical changes in the returns to mobility explain most of the difference between expansion and recessions in earnings change.
- Absent cyclical changes in the mobility shocks, muted tails:
    - Left tail → Increased job loss risk, particularly with force occupational mobility.
    - Right tail → Increased job opportunities for employed workers, particularly occupational mobility.

Which returns matter more? Occupation or Employer

- Suppose either $F(.)$ or $\Gamma(.)$ are fixed at their expansion levels, but let mobility shocks vary over the cycle.

- How much of cyclical change in the earnings growth distribution are we missing?
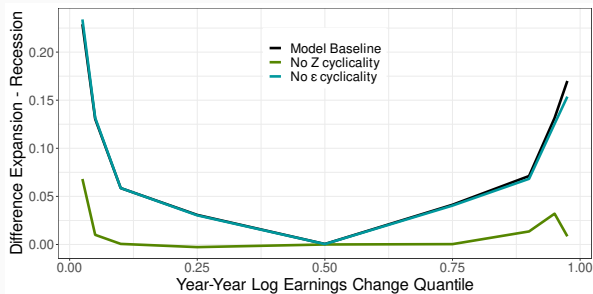
- Worker-occupation match productivity $\rightarrow$ explain more than half of the cyclicality in the tails and interquartile range.

- Worker-firm match productivity $\rightarrow$ only contributes to the increase of large earnings gains in expansions.

No Occupation Mobility

No occupation mobility

- Would we lose insights if we fold the occupational and employer dimension of a job into one?

- Re-estimate the model by shutting down occupational mobility using the same targets as above (not pertaining to occ mobility).

Targeted moments in the estimation, without occupations

| Moment	Model	Data	Moment	Model	Data
EE transition rate	0.034	0.034	EE rate - expansion/recession ratio	1.173	1.185
		(0.0003)			(0.0469)
UE transition rate	0.371	0.395	UE rate - expansion/recession ratio	1.078	1.088
		(0.0025)			(0.0244)
EU transition rate	0.023	0.022	EU rate - expansion/recession ratio	0.710	0.746
		(0.0002)			(0.0333)

Note: Bootstrapped standard errors in parenthesis.

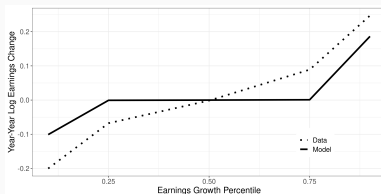- The model fits the average and cyclical ratio of the transitions rates very well.
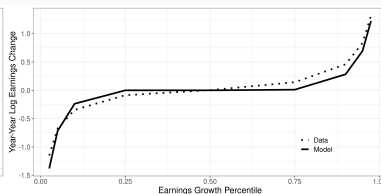
Earnings Growth Distribution - Targeted
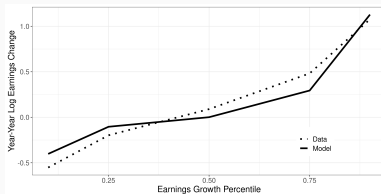
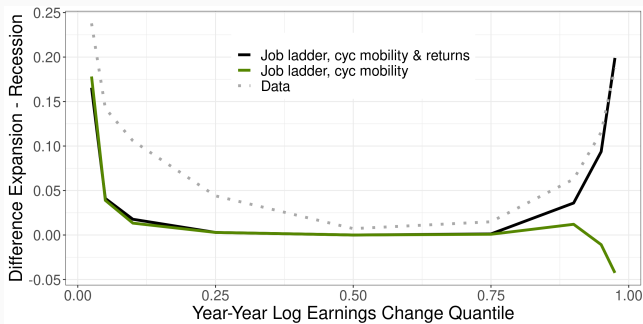(a) *EE employer movers*
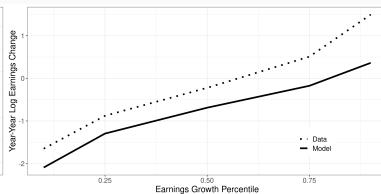
(b) *EUE employer movers*

(c) *Employer stayers*

(d) *Estimated Γ distribution*

- The model matches the cross-sectional earnings growth distribution well (see Hubmer, 2018, Karahan et al. 2020).
- However, it misses on the conditional CDFs, specially for *EUE* movers and employer stayers.
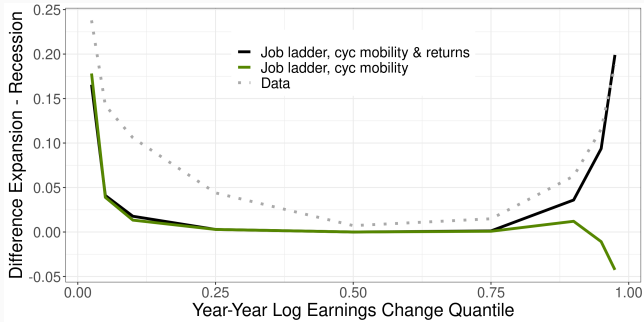
Cyclical changes in the Earnings Growth Distribution - Targeted

Key takeaways

- With no cyclical changes in returns, $\Gamma(.) \rightarrow$ counter-cyclical variance.

- With cyclical returns and mobility shocks $\rightarrow$ far from the data, specially below the median.

- This job ladder model implies cyclical mobility shocks are the main driving force behind the cyclical changes in earnings growth.

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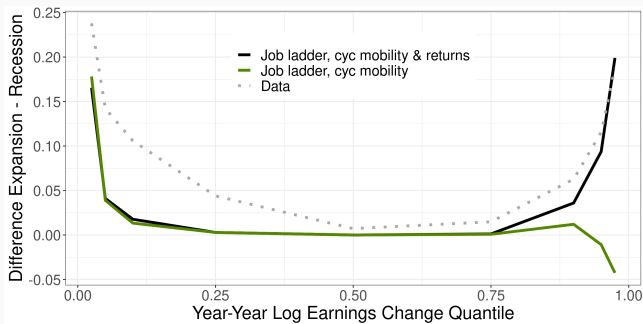
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Tension between earnings and transition rates

No cyclical returns

- Longer unemployment spells in recessions imply that earnings increase from a lower base (than expansions) and generate larger earnings growth.

- More opportunities to make *EE* transitions imply larger earnings growth in expansions.

Cyclical returns

- To generate larger earnings losses during recessions:

  - steeper ϵ ladder, which comes into tension with the matched earnings changes associated with *EE* flows.
  - counterfactually long unemployment durations, which comes into tension with the matched cyclicality of *UE* flows.

- Occupational mobility creates an additional source of risk $\rightarrow$ occ movers suffer much larger earnings losses in recessions.

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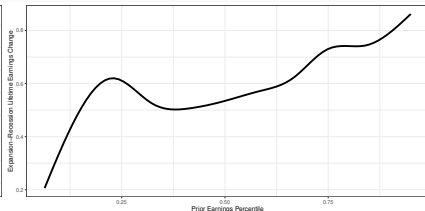
Sullying and Cleansing Effects

Differential effects across workers

- Workers might suffer differently from climb or falling from the job ladder during expansions and recessions.

- Compare average past earnings to average post earnings after an *EE* or *EUE* transition separately for expansions and recessions.
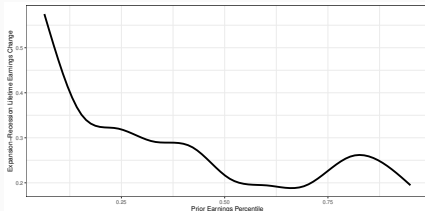
(a) Change in earnings after an *EE* transition

(b) Change in earnings after an *EUE* transition
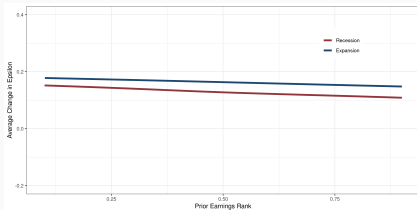
- Low-paid workers suffer disproportionally more from the sullying effects of recessions than do high-paid workers.

- High-paid workers who suffer disproportionally more in recessions from an *EUE* transition than low-paid workers

Recessions prevent climbing in the z ladder

- Recessions reduce disproportionally low-paid workers' opportunities to improve their z productivities.

- Low-paid (typically low z) workers are more willing to switch occupations than higher paid (typically higher z) workers $\Rightarrow$ they are also more sensitive to cyclical changes in the returns to mobility and the mobility shocks.
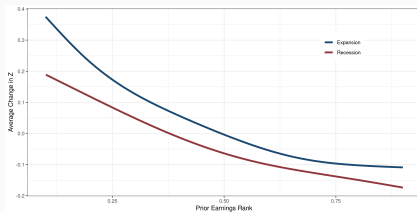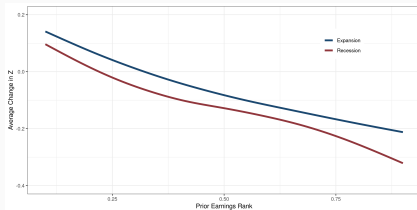

(a) Average EE changes in z

(b) Average EE changes in ϵ

Recessions increase falling in the z ladder

- Recessions affect disproportionally more high-paid workers after an occupational mobility.

- High-paid (typically high z) workers are less likely to change occupations voluntarily, the are more sensitive to a higher prevalence the δ_z (obsolescence) shock and a higher likelihood of drawing a lower value of z during recessions.

(a) Average EUE changes in z
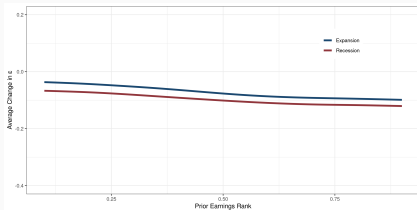
(b) Average EUE changes in ϵ

Conclusion

Conclusion

Data patterns

- Occupation mobility account for large earnings changes in the cross-section and over the business cycle.

- It appears behind the procyclical skewness of the (annual) earnings growth distribution.

- Occupation mobility due to idiosyncratic reasons seem to be more important than occupation-wide differences in explaining the data patterns.

Model and estimation

- Cyclical changes in the returns to occupational mobility explain most of the cyclical changes in the earnings growth distribution.

- Cyclical changes in the mobility shocks associated with occupational mobility explain cyclical changes at the very bottom and top tails.

- Together changes in returns and mobility shocks imply that high-pay (low-pay) workers suffer more in recessions after an *EE* (*EUE*) transition.

Conclusion

No occupation mobility

- A model without occupational mobility and only the ϵ ladder does not appear to match the cyclical changes in the earnings growth distribution.

- Tension between matching the average and cyclical *EE* and *EUE* flows with matching the cyclical earnings growth distribution.

- This model suggest emphasising policies that aim to bring back individuals to work quickly instead of re-training to improve the quality of re-employment jobs.

Thank You

Appendix

Overall occupational mobility
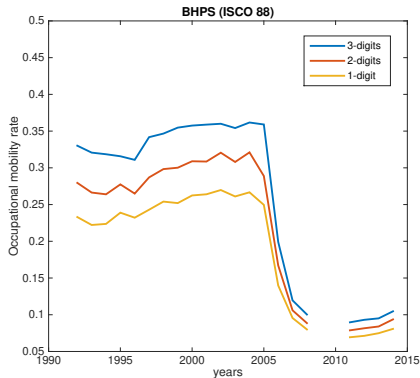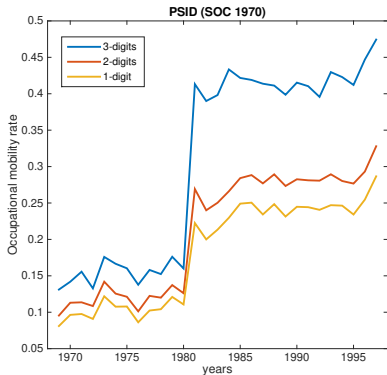
- Kambourov and Manovskii (2008) among other have argued that occupational mobility rates are inflated by measurement error.
- Break dummy is large and statistically significant when estimating a probit or LPM.

Occ. mobility conditional on employer mobility
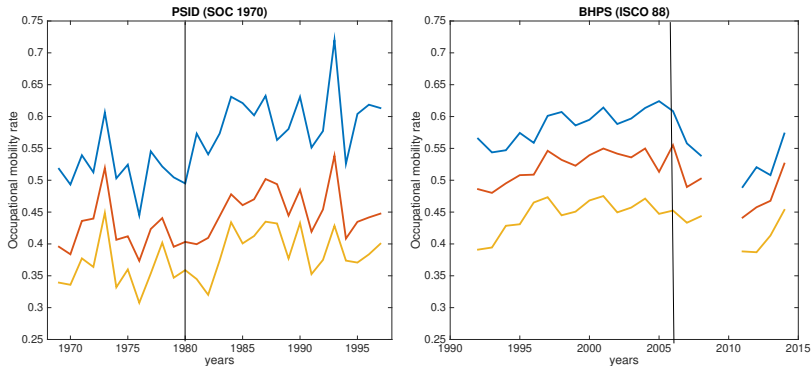
- However measurement error does not seem to matter when conditioning on employer change, particularly for the 2 and 1 digits aggregations.
- Break dummy is close to zero and not statistically significant when estimating a probit or LPM.
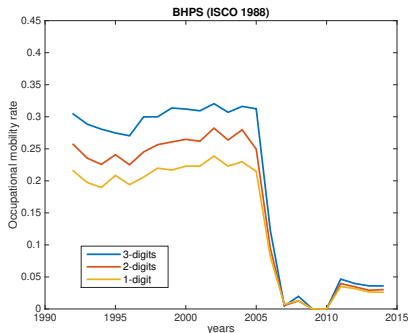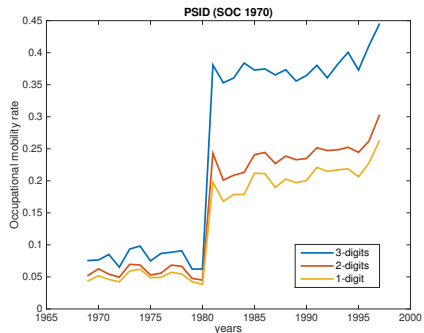
- Measurement error affects **within employer** occupational mobility.
- Break dummy is large and statistically significant when estimating a probit or LPM.

Back

Wage growth distribution over the cycle and the importance of occupational movers

(a) Difference between the expansion and recession cdf of wage changes

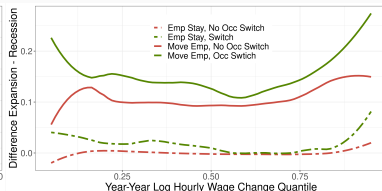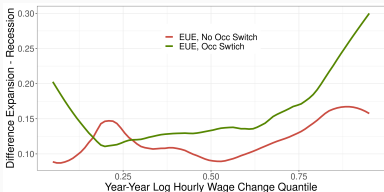(b) Occupation and employer mobility

(c) EUE employer movers
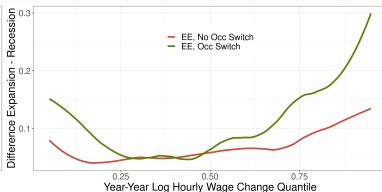
(d) EE employer movers

Unemployed workers (x, z, o, Ω)

The value function of an unemployed worker characterised by the tuple (x, z, o) solves the Bellman equation

$$
\begin{aligned}
W^U(x, z, o, \Omega) = \\
b + \beta \mathbb{E}_{x', z', \Omega'} \bigg[(1 - \delta_z(A')) \max \Big\{ R^U(x', z', o, \Omega'), \Big[(1 - \lambda_U(A')) W^U(x', z', o, \Omega') \\
+ \lambda_U(A') \int_{\underline{\epsilon}}^{\overline{\epsilon}} \max \Big\{ W^E(\tilde{\epsilon}, x', z', o, \Omega'), W^U(x', z', o, \Omega') \Big\} d\Gamma(\tilde{\epsilon}, A') \Big] \Big\} \\
+ \delta_z(A') R^U(x', \underline{z}^R, o, \Omega') \bigg],
\end{aligned}
$$

where

- Ω aggregate states
- R^U is the continuation value if the worker chooses to reallocate,
- $\underline{z}^R$ an 'awful' z that trigger reallocation with probability 1.

Continuation value of reallocation from unemployment

- Occupational mobility allows for a re-draw of z (at most one per period) - loss of accumulated human capital
- Imperfectly directed search
- The unemployed worker allocates search effort across occupations $s_{\tilde{o}}^U$ to maximise

$R^U(x, z, o, \Omega) =$

$max_{\mathcal{S}^U} \sum_{\tilde{o} \in O^-} \alpha^U(s_{\tilde{o}}^U) \int_{\underline{z}}^{\overline{z}} \left[\lambda_U^c(A) \int_{\underline{\epsilon}}^{\overline{\epsilon}} \max \left\{ W^E(\tilde{\epsilon}, x_1, \tilde{z}, \tilde{o}, \Omega), W^U(x_1, \tilde{z}, \tilde{o}, \Omega) \right\} d\Gamma(\tilde{\epsilon}, A) \right.$

$\left. + \left(1 - \lambda_U^c(A)\right) W^U(x_1, \tilde{z}, \tilde{o}, \Omega) \right] dF(\tilde{z}, A) + \left(1 - \sum_{\tilde{o} \in O^-} \alpha^U(s_{\tilde{o}}^U)\right) W^U(x, z, o, \Omega),$

subject to $\sum_{\tilde{o} \in O^-} s_{\tilde{o}}^U = 1$ and $\alpha(.)$ is an increasing and concave function. ▸ Back

Employed workers (ϵ, z, x^s, o)

Separate into non-employment or not

$$W^E(\epsilon, x, z, o, \Omega) =$$

$$y(.) + \beta\mathbb{E}\Big[\delta_z(A')R^U(x', \underline{z}^R, o, \Omega') + \delta_\epsilon(A')W^U(x', z', o, \Omega') +$$

$$(1 - \delta_z(A') - \delta_\epsilon(A')) \max \Big\{ W^U(x', z', o, \Omega'), \max \Big\{ R^E(\epsilon', x', z', o, \Omega'), \hat{W}^E(\epsilon', x', z', o, \Omega') \Big\} \Big\} \Big].$$

- $R^E(.)$ continuation when choosing to search in other occupations
- $\hat{W}^E(.)$ when staying in the occupation, but with job-to-job possibilities
- note the endogenous separation decision

$$\hat{W}^E(\epsilon, x, z, o, \Omega) = \int_{\underline{\epsilon}}^{\overline{\epsilon}} \gamma\lambda_E(A) \max \Big\{ W^E(\tilde{\epsilon}, x, z, o, \Omega), W^E(\epsilon, x, z, o, \Omega) \Big\} d\Gamma(\tilde{\epsilon}, A)$$

$$+ \int_{\underline{\epsilon}}^{\overline{\epsilon}} (1 - \gamma)\lambda_E(A) \max \Big\{ W^E(\tilde{\epsilon}, x, z, o, \Omega), W^U(x, z, o, \Omega) \Big\} d\Gamma(\tilde{\epsilon}, A)$$

$$+ (1 - \lambda_E(A))W^E(\epsilon, x, z, o, \Omega),$$

Continuation value of reallocation from unemployment

$$R^E(\epsilon, x, z, o, \Omega) =$$

$$\max_{\mathcal{S}^E} \sum_{\tilde{o} \in O^-} \alpha^E(s_{\tilde{o}}^E) \left(\int_{\underline{z}}^{\bar{z}} \left[\int_{\underline{\epsilon}}^{\bar{\epsilon}} \left(\gamma \lambda_E^c(A) \max \left\{ W^E(\tilde{\epsilon}, x_1, \tilde{z}, \tilde{o}, \Omega), W^E(\epsilon, x_1, \tilde{z}, \tilde{o}, \Omega) \right\} \right. \right. \right.$$

$$(1 - \gamma) \lambda_E^c(A) \max \left\{ W^E(\tilde{\epsilon}, x_1, \tilde{z}, \tilde{o}, \Omega), W^U(x_1, \tilde{z}, \tilde{o}, \Omega) \right\} \right) d\Gamma(\tilde{\epsilon}, A)$$

$$(1 - \lambda_E^c) W^E(\epsilon, x_1, \tilde{z}, \tilde{o}, \Omega) \right] dF(\tilde{z}, A) \left. \right) + \left(1 - \sum_{\tilde{o} \in O^-} \alpha^E(s_{\tilde{o}}^E) \right) W^E(\epsilon, x, z, o, \Omega),$$

- some discussion points here
- ... EE with large wage losses
- ... do not decouple occupation of 'search focus' from occupation of work
- ... symmetry with the unemployed problem (how much to weigh it?)

Estimated parameter values

Job offer arrival			Employer-match productivities			Occupation-match productivities		
λ_0^U	0.8701	λ_0^E	0.0935	δ_0^e	0.0025	lt_ϵ	3.4350	δ_0^z	0.0084	ν_z	7.7603
	(0.0002)		(5.33E-05)		(4.25E-06)		(0.0010)		(4.25E-06)		(0.0019)
λ_1^U	0.7051	λ_1^E	0.1854	δ_1^e	0.0002	rt_ϵ	1.4356	δ_1^z	0.0030	σ_z	6.593
	(0.0002)		(7.44E-05)		(2.38E-06)		(0.0007)		(4.23E-06)		(0.0013)
$\lambda_0^{c,U}$	0.1669	$\lambda_0^{c,E}$	0.0171	η	0.2763	ω_ϵ	0.9952	ρ_z	0.0070	ω_z	0.7573
	(0.0002)		(5.33E-05)		(0.0002)		(0.0001)		(1.95E-05)		(0.0002)
$\lambda_1^{c,U}$	0.5746	$\lambda_1^{c,E}$	0.1716	σ_ϵ	0.0347	ϵ_A	-0.3076			z_A	-0.7180
	(0.0002)		(7.44E-05)		(2.11E-05)		(0.0004)				(0.0004)

| Search direction across occupations			Occupation-wide productivities			Payments		
α_0	0.0403	α_{NRC}	-0.4696	ρ_p	0.6168	$\tilde{p}_{NRC}$	0 (normalize)	γ_w	0.0949
	(4.20E-05)				(0.0001)				(2.11E-05)
α_1^U	0.1398	α_{RC}	0.5541	σ_p	0.0016	$\tilde{p}_{RC}$	-0.2658		
	(0.0002)				(5.22E-06)				
α_1^E	0.2990	α_{NRM}	-0.1796			$\tilde{p}_{NRM}$	-0.4976		
	(0.0002)								
		α_{RM}	-0.0844			$\tilde{p}_{RM}$	-0.2189		

Note: Standard errors in parenthesis only correspond to the outer loop parameters. See Appendix C for details.

▸ Back

Cyclical Shift Fundamental Distributions
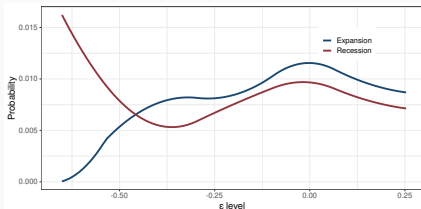
(a) Γ worker-firm match productivity ε
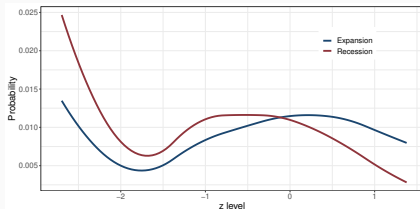
(b) F worker-occupation match productivity z

▸ Back