Time-Varying Risk Premia and Heterogenous Labor Market Dynamics

M. Meeuwis   D. Papanikolaou   J. Rothbaum   L. Schmidt

Census Acknowledgment

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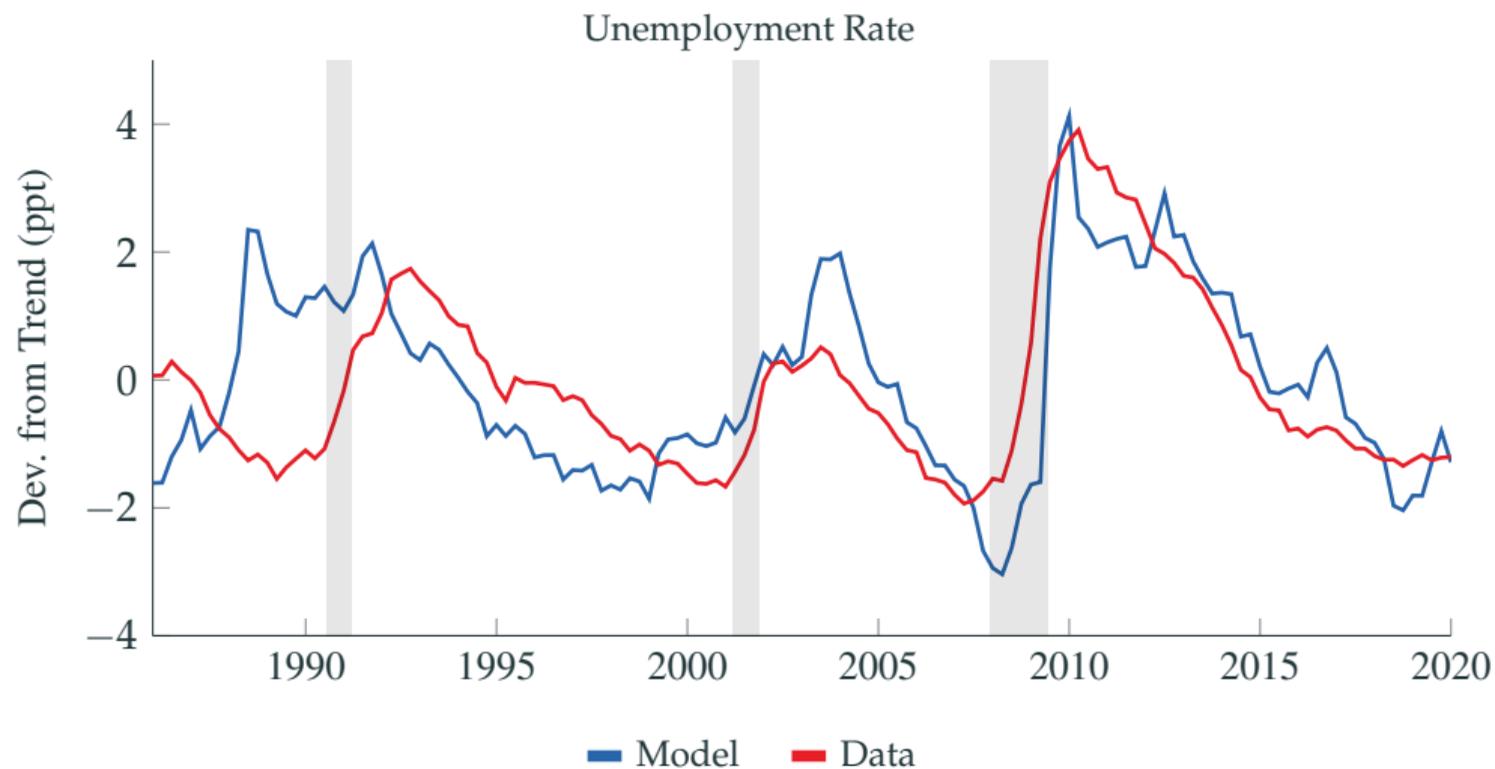
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This paper: Job destruction drives heterogeneous earnings dynamics.

Preview of Results: Model vs Data

Unemployment Rate

Outline

Worker Earnings: New Facts

Model

Calibration and Model Fit

Testable Predictions

Data & Worker Earnings Measures

Administrative data: 20% random sample of all workers from the LEHD matched to Compustat firms, 1990 - 2020

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Main outcome variable: growth in cumulative age-adjusted labor earnings:

$$g_{i,t:t+h} \equiv w_{i,t+1,t+h} - w_{i,t-2,t},$$

where

$$w_{i,\tau_1,\tau_2} \equiv \log\left(\frac{\sum_{\tau=\tau_1}^{\tau_2} \text{real wage earnings}_{i,\tau}}{\sum_{\tau=\tau_1}^{\tau_2} D(\text{age}_{i,\tau})}\right).$$

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Heterogeneity: Examine workers separately as a function of their prior income level (ranked relative to other workers in same firm)

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Model: Shocks to the stochastic discount factor (market price of risk)

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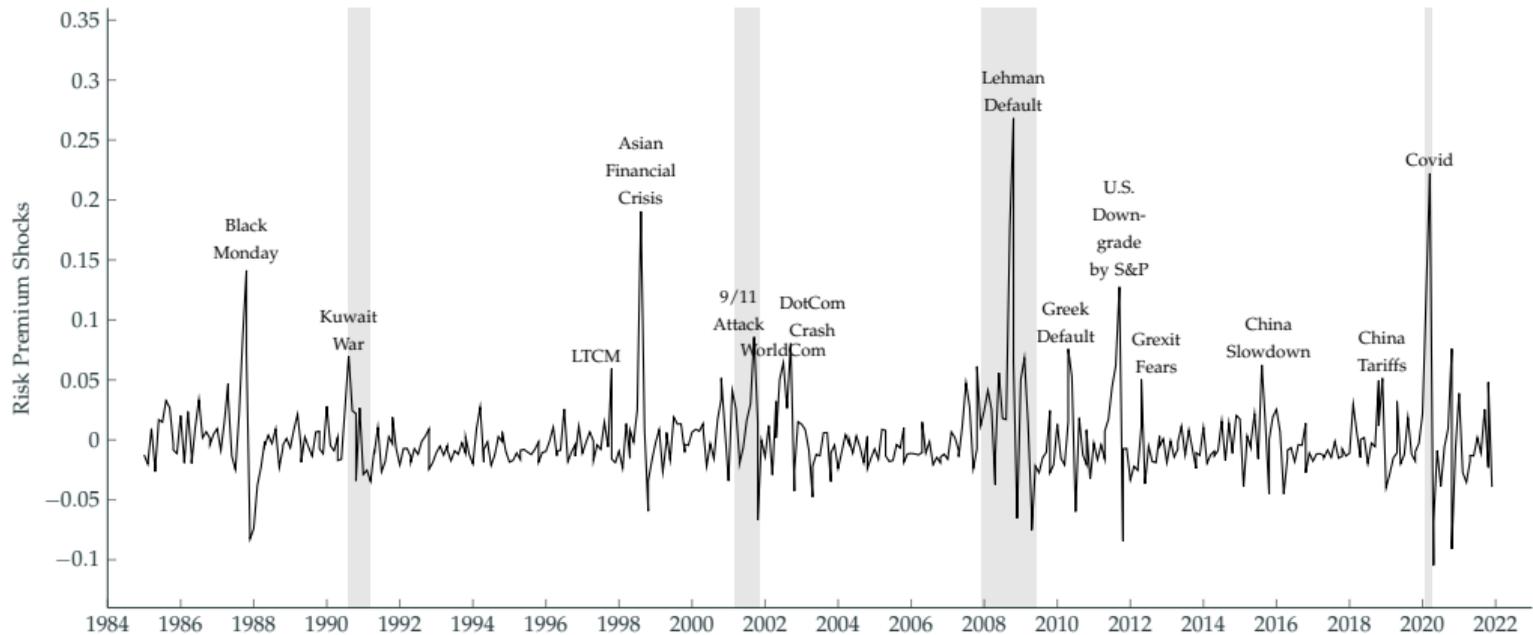
Data: Empirical proxies for fluctuations in risk / risk aversion

First principal component based on AR(1) residuals of 9 series from the literature that capture variation in risk, risk appetite, or risk premia

▸ Details

Risk Premium Proxies Over Time

Financial shocks are countercyclical (correlation with output growth is -40%)

▶ Risk premium index predicts future stock returns

Worker Earnings Exposure: Financial vs Productivity Shocks

Specification:

$$g_{i,t:t+h} = \beta \varepsilon_{t+1}^{rp} + \gamma \varepsilon_{f,t+1}^{tfp} + c' Z_{i,t} + \eta_{i,t+h}$$

ε_{t+1}^{rp}: aggregate risk premium shock

$\varepsilon_{f,t+1}^{tfp}$: firm productivity.

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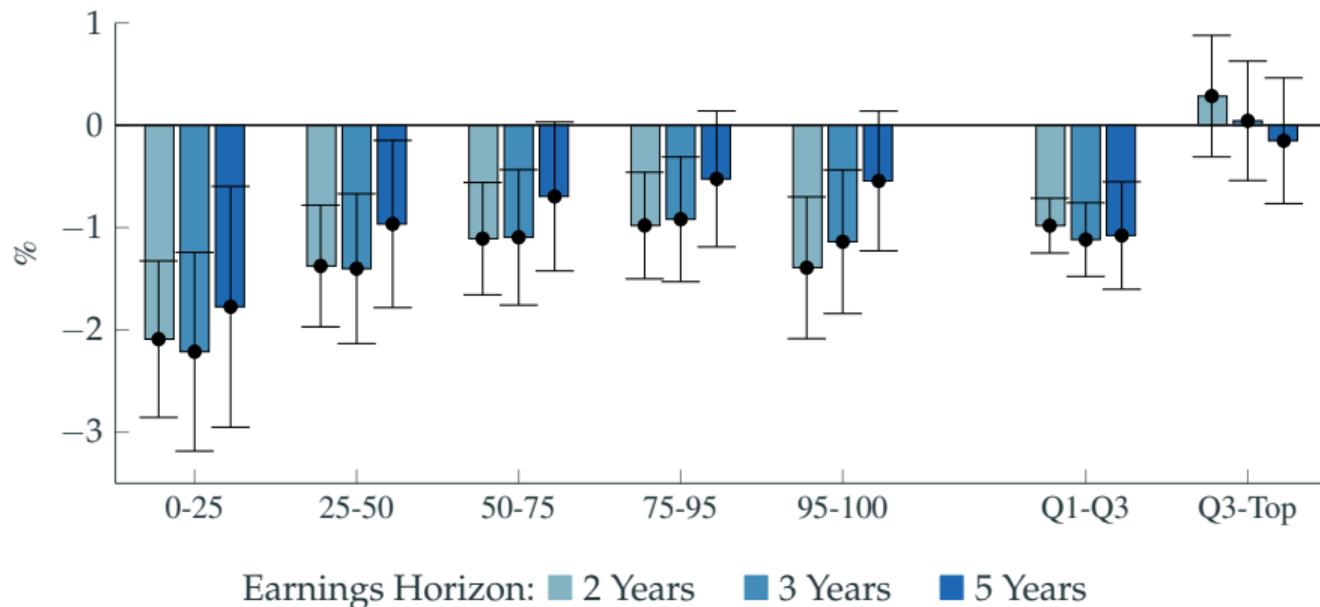
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Controls include worker earnings history and industry $\times$ income FEs:
   compare two workers in same industry at different parts of pay distribution.
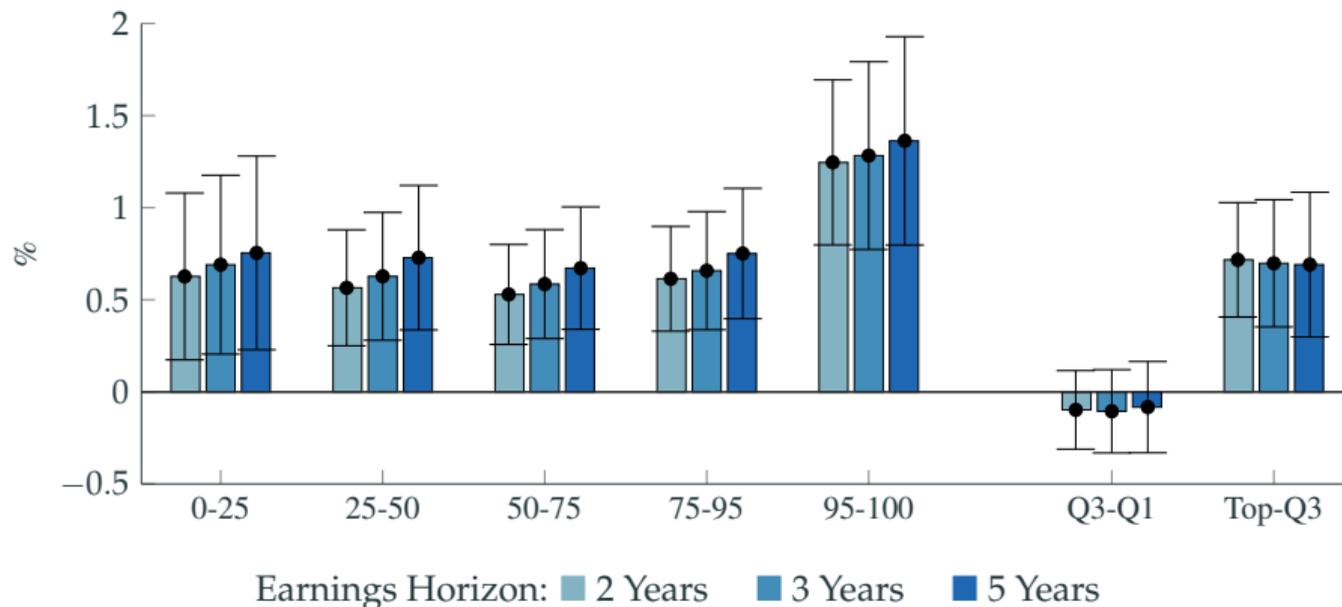
Worker Earnings Exposures to Risk Premium Shocks

Earnings Horizon: ■ 2 Years ■ 3 Years ■ 5 Years

Shock: 10% increase in risk premia

(corresponding to a 10% drop in market returns, ∼ standard deviation of RP shocks)

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    Add controls for worker earnings $\times$ business cycle controls..

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4. Are workers in public firms special?

   Expand sample to all firms in LBD.

Alternative Design: Shift-Share Estimates

Exploit heterogeneous exposure of firms to risk premium shocks.

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How to measure?

Directly: Firm stock return betas to to risk premium shocks

Indirectly: Measures of firm dependence on external finance

Cash holdings to assets
Firm size
High levels of maturing debt in short run
Distance to default

All these measures are correlated, so take first principal component χ_f.

Interact χ_f with aggregate output or TFP, add industry $\times$ year FEs.

Alternative Design: Shift-Share Estimates

Measure predicts differences in response of employment growth to risk premia:

Firm Employment Growth	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Firm TFP	0.63	0.48	0.38	0.62	0.48	0.37	0.61	0.48	0.38
	(8.73)	(7.16)	(23.71)	(8.75)	(7.15)	(24.43)	(9.03)	(7.17)	(24.58)
Risk Premium	-1.21		-1.09	-1.11		-0.61	-1.12		-1.02
	(-9.90)		(-7.42)	(-6.47)		(-3.42)	(-8.16)		(-6.98)
Firm RP Exposure × Risk Premium		-0.35			-0.36			-0.36	
		(-7.36)			(-6.31)			(-7.38)	
Business Cycle				1.67		5.78	0.74		0.57
				(1.07)		(3.69)	(1.34)		(0.92)
Firm RP Exposure × Business Cycle					-0.16			-0.09	
					(-0.27)			(-0.35)	
Business Cycle Controls:					×ΔGDP			× ΔAggTFP	
Sample	Public	Public	All	Public	Public	All	Public	Public	All
Fixed Effects									
NAICS2	✓	✓	✓	✓	✓	✓	✓	✓	✓
NAICS2 × Year, Firm	-	✓	-	-	✓	-	-	✓	-
Observations	486,000	290,000	8,898,000	555,000	309,000	8,898,000	568,000	319,000	8,898,000

Alternative Design: Shift-Share Estimates

Shift-share design:

$$g_{i,t:t+h} = \beta \left(\chi_{f,t} \varepsilon_{t+1}^{rp} \right) + c' \mathbf{Z}_{i,t} + a_{I,s,t} + \eta_{i,t+h}.$$

now two modifications relative to baseline specification:

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   Include NAICS2 × income bin × year FE

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2. Ensure our exposure proxy does not pick up business cycle fluctuations.

   Control for interactions $\chi_{f,t}$ with aggregate output or TFP shock

Alternative Design: Shift-Share Estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Worker Earn. (0–25) × Firm RP Exp.	-0.82	-0.37	-0.72	-0.31	-0.83	-0.34	-0.88	-0.37
	(-6.47)	(-4.58)	(-6.96)	(-3.91)	(-5.62)	(-3.72)	(-7.67)	(-4.03)
Worker Earn. (25–50) × Firm RP Exp.	-0.56	-0.10	-0.48	-0.06	-0.54	-0.05	-0.60	-0.09
	(-4.57)	(-2.72)	(-4.57)	(-1.81)	(-3.66)	(-1.35)	(-5.43)	(-2.42)
Worker Earn. (50–75) × Firm RP Exp.	-0.46	—	-0.42	—	-0.49	—	-0.51	—
	(-4.03)		(-3.99)		(-3.23)		(-4.46)	
Worker Earn. (75–95) × Firm RP Exp.	-0.31	0.15	-0.28	0.14	-0.35	0.14	-0.37	0.14
	(-3.25)	(3.34)	(-3.05)	(3.44)	(-2.77)	(2.49)	(-3.84)	(3.08)
Worker Earn. (95–100) × Firm RP Exp.	-0.18	0.29	-0.14	0.28	-0.21	0.28	-0.28	0.23
	(-0.90)	(1.74)	(-0.71)	(1.77)	(-0.87)	(1.40)	(-1.51)	(1.34)
[Bottom (1) – Mid. (3)] × Firm RP Exp.	-0.36	—	-0.31	—	-0.34	—	-0.36	—
	(-4.48)		(-3.91)		(-3.65)		(-3.93)	
[Mid (3) – Top (5)] × Firm RP Exp.	-0.28	—	-0.27	—	-0.28	—	-0.24	—
	(-1.71)		(-1.66)		(-1.41)		(-1.34)	
[Bottom (1) – Top (5)] × Firm RP Exp.	-0.65	—	-0.58	—	-0.62	—	-0.60	—
	(-3.23)		(-3.06)		(-2.56)		(-3.16)	
Firm Controls:								
Earn Grp ×	ΔFirmTFP		ΔRevenue		ΔFirmTFP		ΔFirmTFP	
Business Cycle Controls:								
Earn Grp × Firm RP Exp. ×					ΔGDP		ΔAggTFP	
Fixed Effects								
Age × Gender × NAICS2	✓	✓	✓	✓	✓	✓	✓	✓
Earn Grp × NAICS2 × Year	✓	✓	✓	✓	✓	✓	✓	✓
Firm × Year	-	✓	-	✓	-	✓	-	✓
Observations	32.5m	32.5m	32.5m	32.5m	32.5m	32.5m	32.5m	32.5m

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Note 1: Time-variation in the severity of financial frictions is not an alternative but part of the same mechanism we aim to capture.

Note 2: Even if all we are capturing is some other shock that is correlated with risk premia, our evidence points to amplification.

Drivers of Earnings Losses

Worker earnings can decline (in relative terms) when risk premia rise because:

1. Workers receive wage cuts or slower wage increases.
2. Workers work fewer hours.
3. Workers are laid off.
4. Unemployed workers need to wait longer to find a job, or new jobs have worse

We cannot separate (1) and (2) because we do not observe hours worked. But, we disentangle (1/2) from (3) and (4).

Worker Exposures: Likelihood of Job Loss

RP shocks are associated with job loss for low-income workers:
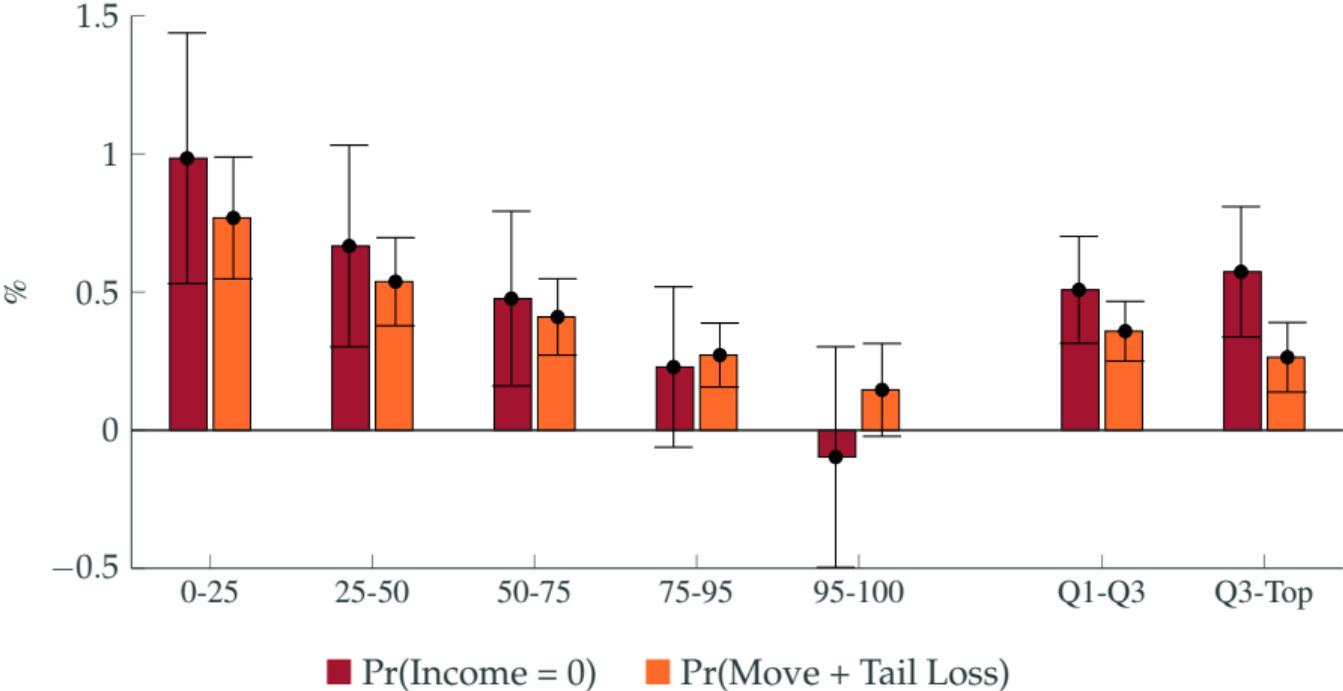
Worker Earnings Exposures: Stayers vs Movers

RP exposures predict variation in earnings conditional on separation:
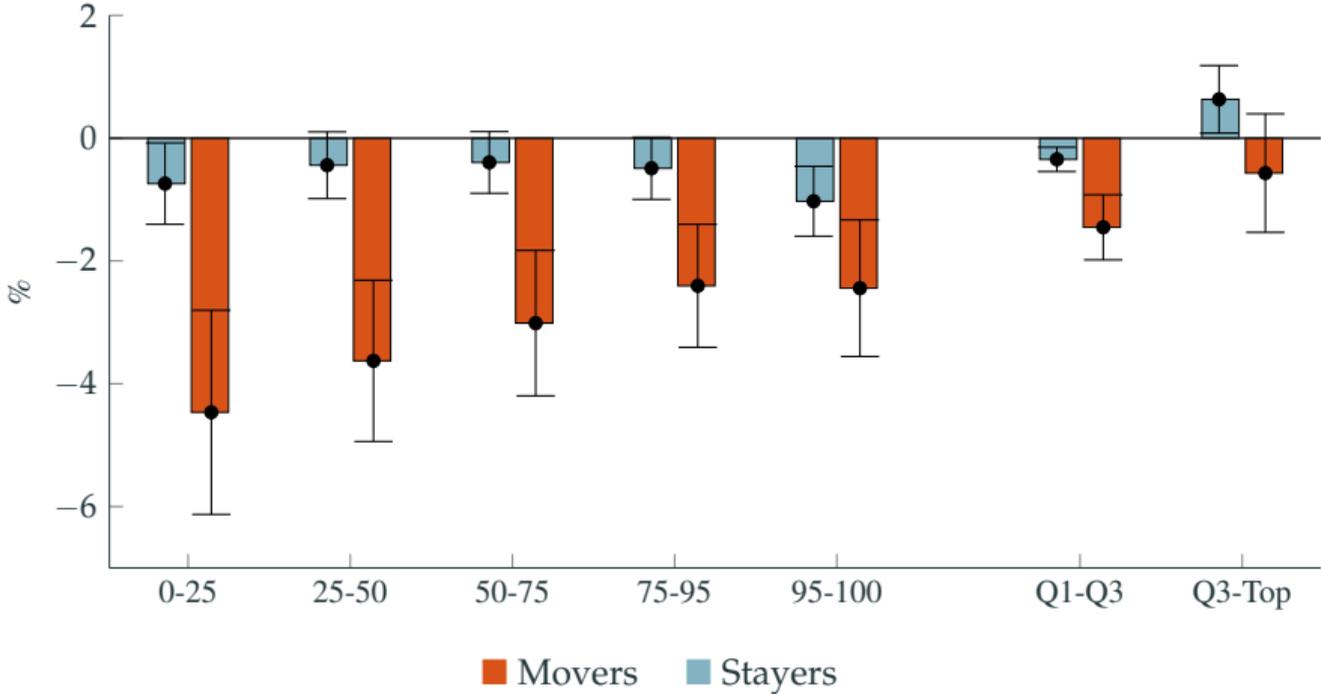
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New facts:

Lower-paid workers are more exposed to risk premium shocks than higher-paid workers.

Decline in earnings driven both by separations but also worse outcomes conditional on separation.

Next: Why?

Outline

Main Ingredients

Labor market search

Firms directly search for workers with heterogeneous levels of productivity

Free entry, firms post wages (in NPV terms).

Labor market conditions determine surplus allocation for new matches.

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Endogenous Separations

Worker-firm matches efficiently terminated when (joint) surplus is zero.

Worker Productivity

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$$\log z_{i,t+1} = \psi_z \log z_{i,t} + (1 - \psi_z) \log \bar{z}_{i,t} + \sigma_z \varepsilon_{z,i,t+1}$$

Long-run mean $\bar{z}_{i,t} \in [\bar{z}_U, \bar{z}_E]$ varies with worker employment status.
Human capital depreciates when not employed: $\bar{z}_U < \bar{z}_E \equiv 1$.

Discount Rates

Model SDF exogenously building on Lettau and Wachter (2007):

$$\Lambda_{t+1} = \exp\left\{ -r_f - \frac{1}{2}x_t{}^2 \left(1 + \delta^2 + 2\delta\rho_{A,x}\right) - x_t\varepsilon_{A,t+1} - \delta x_t\varepsilon_{x,t+1}\right\},$$

where r_f is the (constant) real risk-free rate.

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where r_f is the (constant) real risk-free rate.

Risk premium shocks:

$$x_{t+1} = \psi_x x_t + (1 - \psi_x)\bar{x} + \sigma_x\varepsilon_{x,t+1}, \quad \text{with} \quad \text{cov}(\varepsilon_{A,t+1}, \varepsilon_{x,t+1}) < 0$$

Calibrate SDF to match moments of asset returns of short and long duration.

Firms and Labor Markets

Firms:

Post vacancies directed at worker of type z with cost $\kappa_t(z) = \bar{\kappa}_0 A_t z^{\bar{\kappa}_1}$

Matching between vacancies and workers: $m(u,v) \equiv uv\left(u^\alpha + v^\alpha\right)^{-\frac{1}{\alpha}}$

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Employed: receive wages
  Face endogenous and exogenous separations
Nonemployed: receive flow payoff $b_t(z) = (b_0 + b_1 z_t)\, A_t$
  Can be searching for a job (unemployed) or not (nonparticipant)
  Initiating search incurs fixed cost $c_t = \bar{c} A_t \left(\theta_t(\bar{z}_O)\right)^\lambda$
  Workers search harder when labor market is weak (Mukokyma et al. 2018)

Worker Wages

Assumption: Free entry of firms who compete by posting wages (in NPV terms)

Competitive equilibrium is efficient.

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Worker value of new match determined by labor market conditions:

$$W_\tau(z_\tau) = \underbrace{J_\tau^O(z_\tau)}_{\text{Value of unemployment}} + \underbrace{\eta(\theta_\tau(z_\tau))}_{\text{elasticity of vacancy filling rate}} \underbrace{\left(J_\tau^{MC}(z_\tau) - J_\tau^O(z_\tau)\right)}_{\text{Match surplus}}$$

Per period wages deliver promised worker value with some smoothing:

$$\log w_t = \log w_\tau(z_\tau) + (1-\phi)\,\mu_A(t-\tau) + \phi\left(\log\frac{A_t}{A_\tau} + \log\frac{z_t}{z_\tau}\right).$$

Job Destruction and Risk Premia

Why do firms lay off workers?

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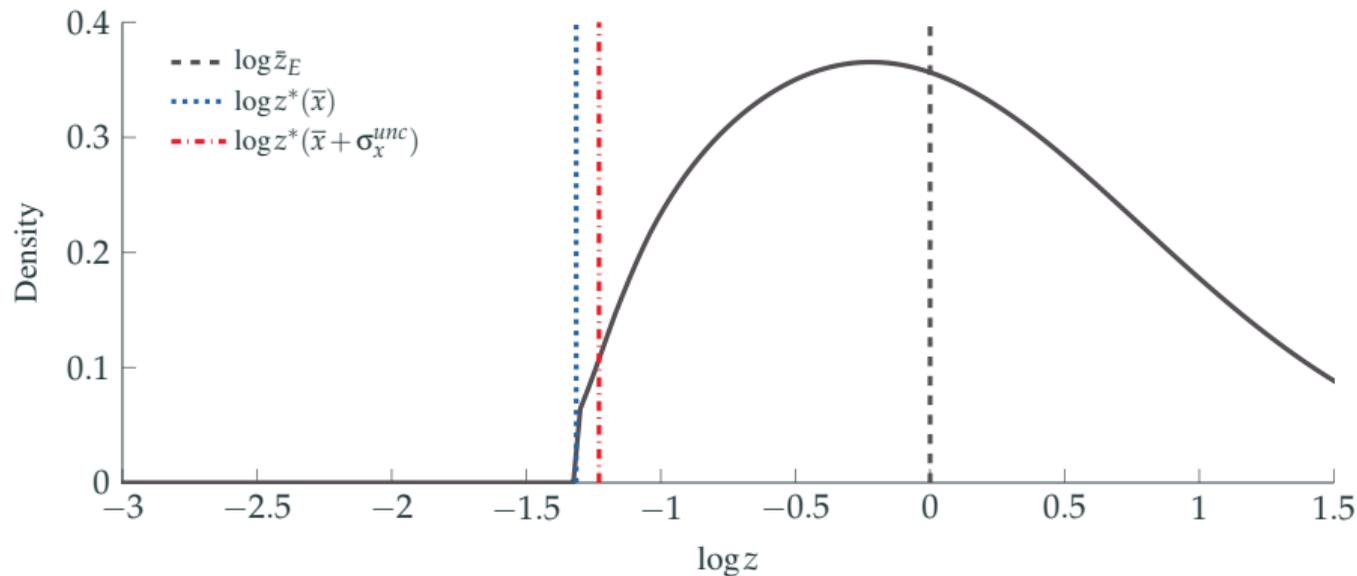
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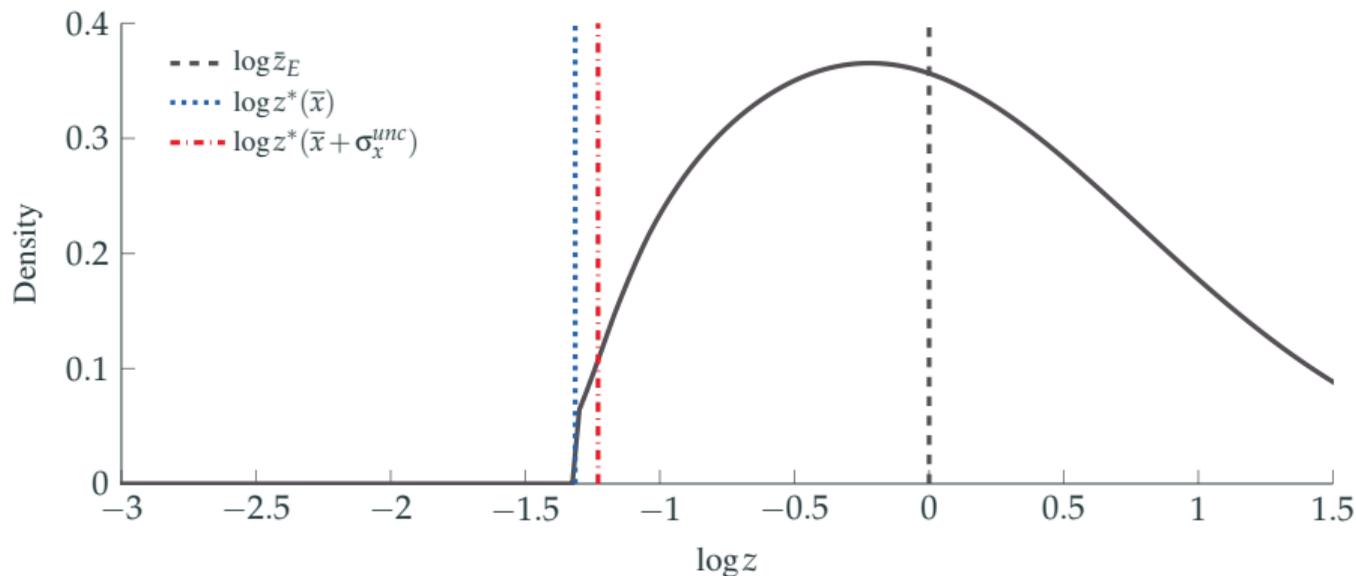
Endogenous termination threshold $z^*(x_t)$ is increasing in x_t.

Job Destruction and Risk Premia

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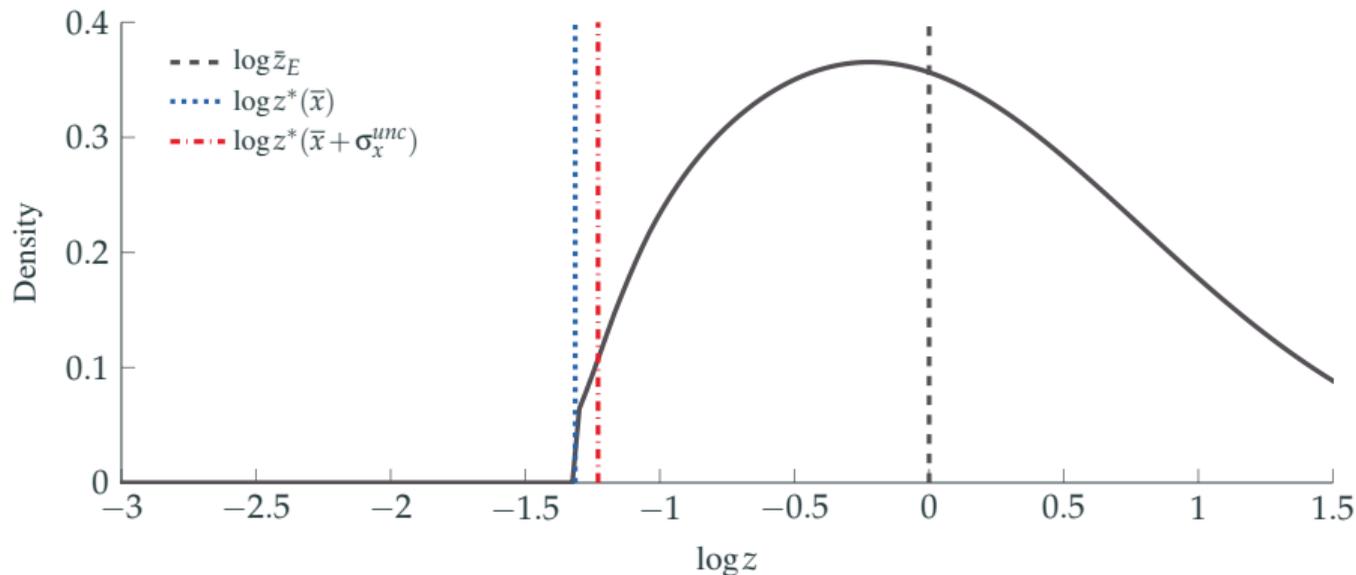
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Job Destruction

For marginal workers, increases in risk premia lower the value of employment.

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Value of employment is increasing in z

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Value of employment is increasing in z

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2. Value of non-employment less sensitive to z than employment.

Job Destruction

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Value of employment is increasing in z
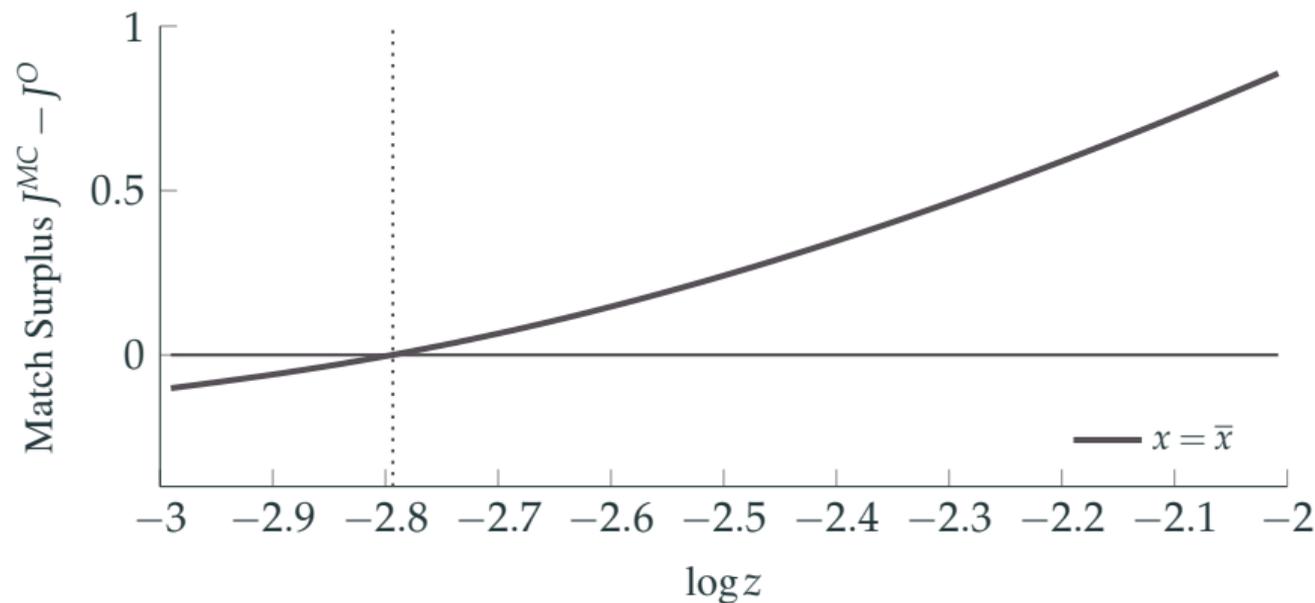
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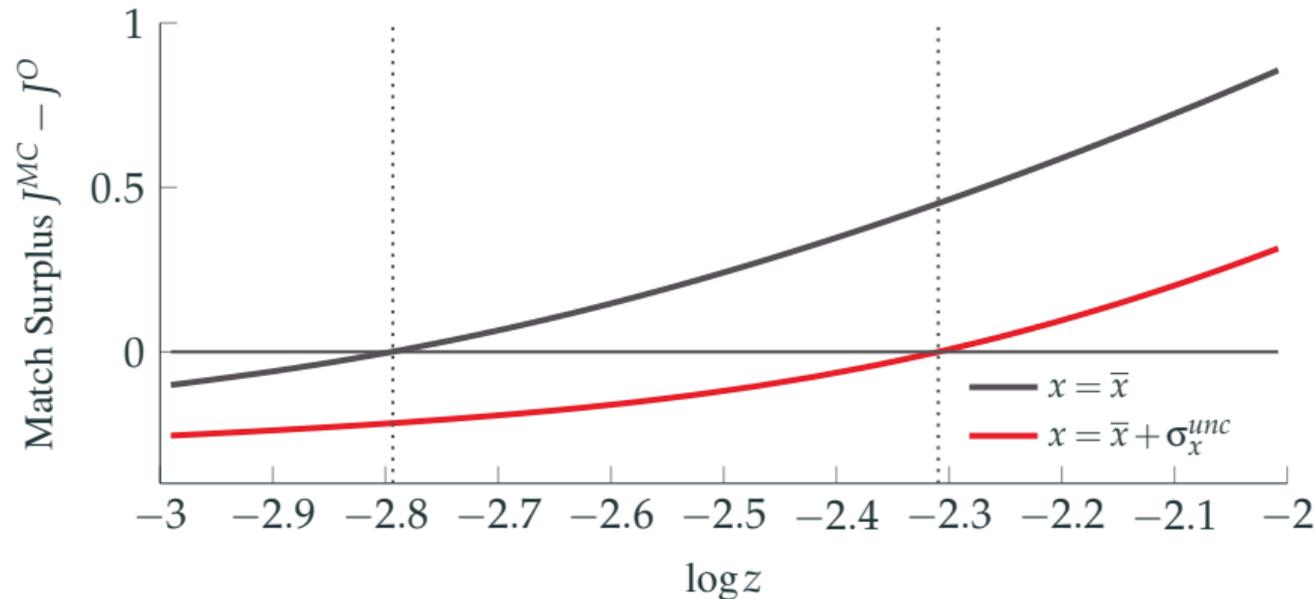
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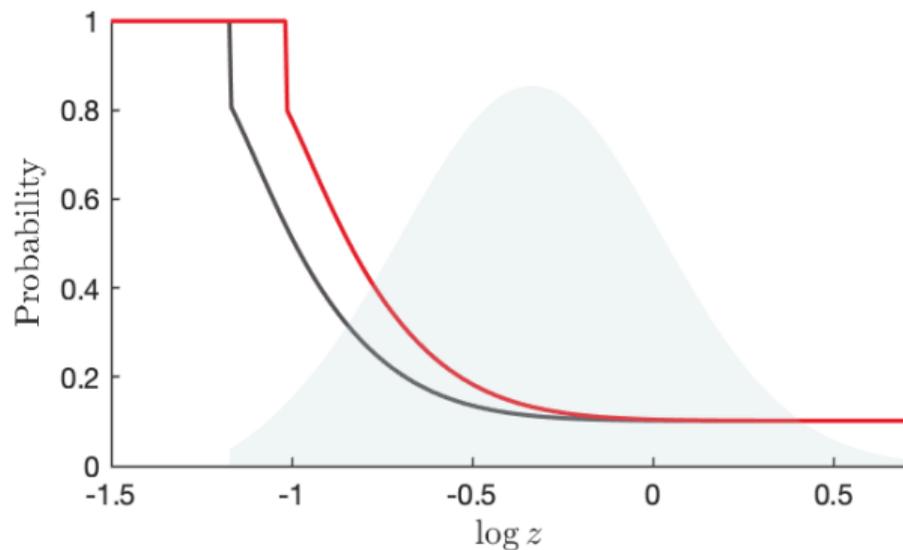
Job Finding

Job finding rate increasing in labor market tightness,

$$\theta_t(z) = \left(\left(\frac{J_t^{MC}(z) - J_t^O(z)}{\kappa_t(z)} \right)^{\frac{\alpha}{1+\alpha}} - 1 \right)^{\frac{1}{\alpha}}.$$

Increases in risk premia move the employment surplus disproportionately more for low-z workers

This pattern is offset by the fact that vacancy posting costs increase in z

Job finding rate of high- and low-skill workers can have homogeneous dynamics

Job Finding

↑ risk premia → ↓ job-finding rate.

Job Finding

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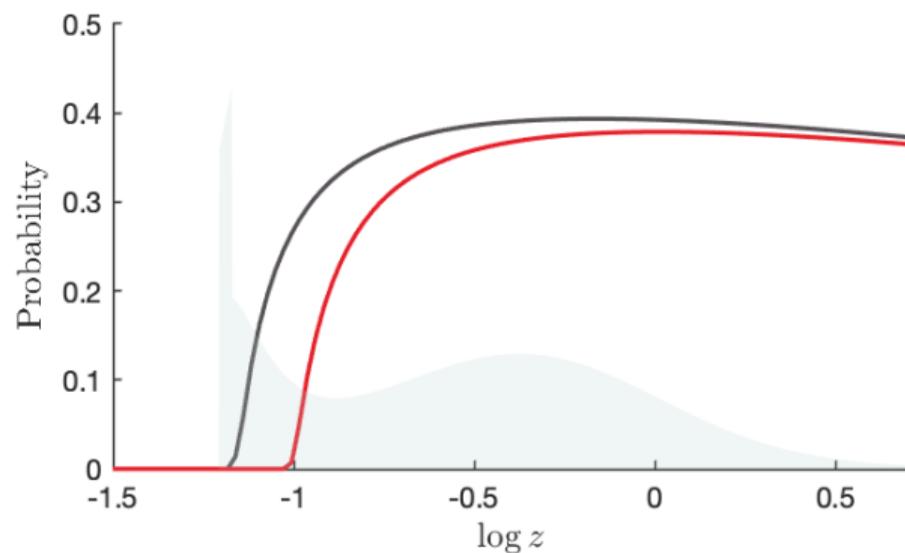
Unemployment Spells

Decline in job-finding rate implies longer unemployment for low-z workers
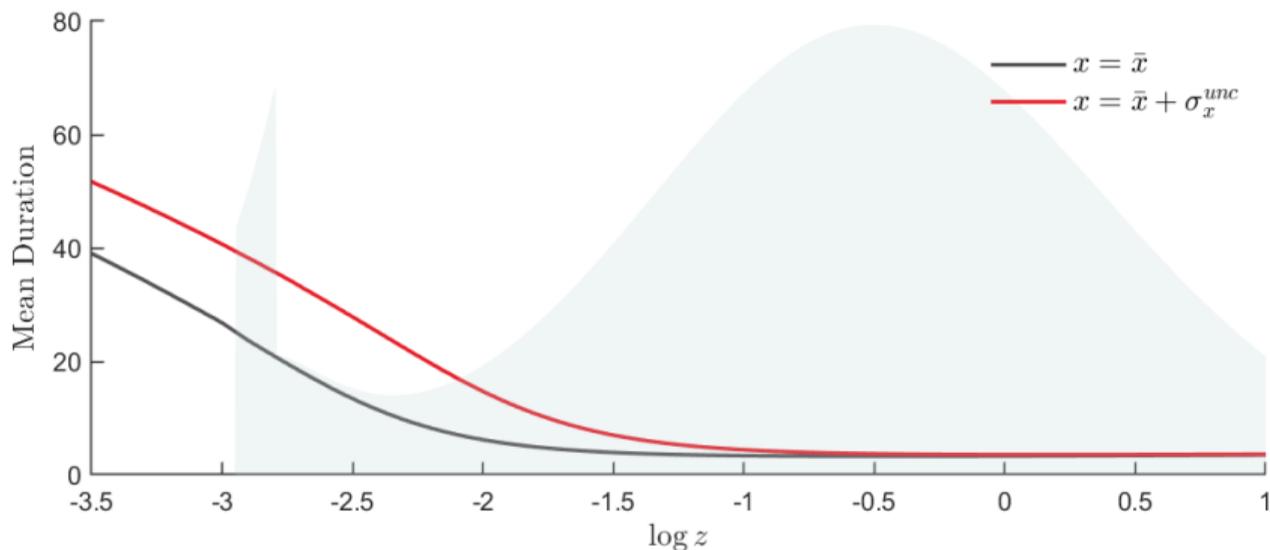
Outline

Calibration Strategy

Most parameters calibrated a priori: ▸ Details

SDF: moments of asset prices, also as function of duration

Worker productivity: Menzio et al. (2016)

Matching function: Hagedorn and Manovskii (2008)

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    SDF: moments of asset prices, also as function of duration

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Remaining parameters calibrated to match micro/macro-level targets:

    Volatility of unemployment rate

    Average job finding and separation rates, by income

    Cyclicality of job finding and separation rates, by income

Calibrated level of human capital depreciation in nonemployment: 7.7% / year

Model vs Data: Job Flows

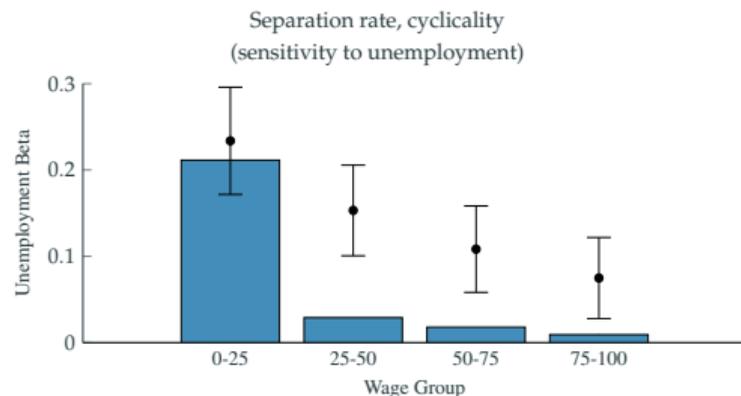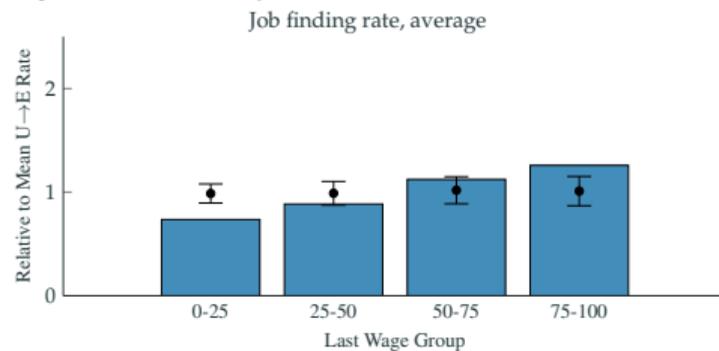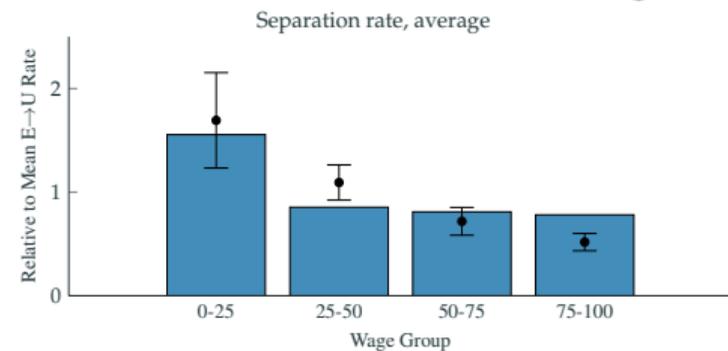Model calibrated to match heterogenous dynamics of job flows

Model vs Data: Job Flows

Model calibrated to match heterogenous dynamics of job flows

Model vs Data: Job Flows

Model calibrated to match heterogenous dynamics of job flows

Model vs Data: Labor market dynamics

Overall, model matches both targeted and non-targeted moments.

Variable	Volatility		Autocorrelation		Cyclicality Corr. w unemp	
	Model	Data	Model	Data	Model	Data
A. Labor Market Dynamics						
Unemployment rate	1.49	1.44	0.93	0.97	1.00	1.00
Long-term unemployment share	5.42	5.78	0.83	0.97	0.58	0.86
Employment-population ratio	1.93	1.08	0.95	0.97	-0.81	-0.96
Labor force participation rate	1.34	0.35	0.93	0.91	-0.14	-0.28
Labor market tightness (Log V/U ratio)	0.25	0.38	0.92	0.97	-0.80	-0.97

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B. *Job Flows*						
Separation rate into unemployment	0.17	0.17	0.62	0.83	0.59	0.82
Job finding rate	4.30	2.93	0.86	0.92	-0.71	-0.94

Model vs Data: Labor market dynamics

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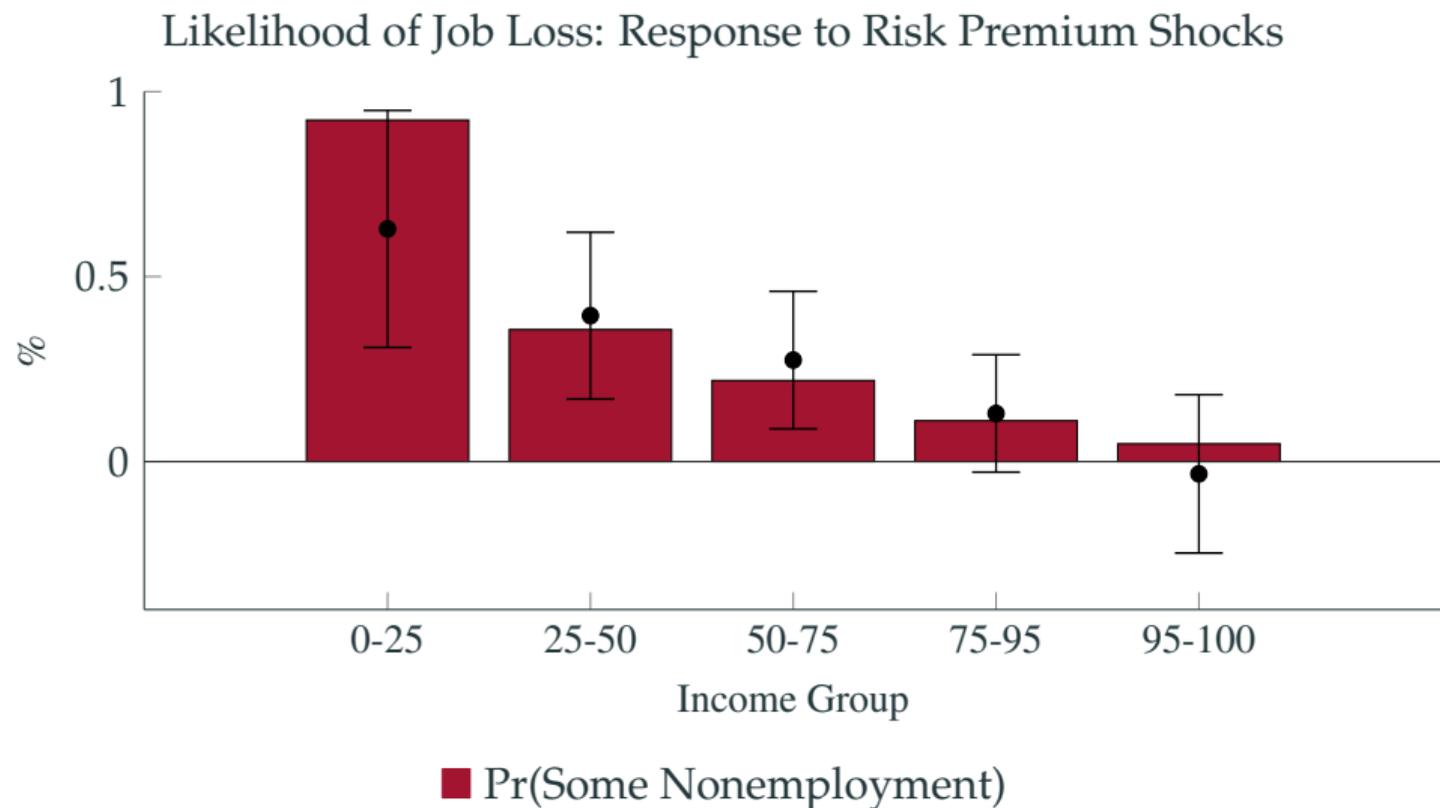| Variable	Volatility		Autocorrelation		Cyclicality Corr. w unemp	
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C. *Decomposition of Unemployment Rate*						
Unemployment rate assuming constant separations	0.88	0.79	0.96	0.97	0.93	0.93
Unemployment rate assuming constant job-finding	0.56	0.61	0.88	0.95	0.72	0.94

Model: Impulse Responses to Risk Premium Shocks
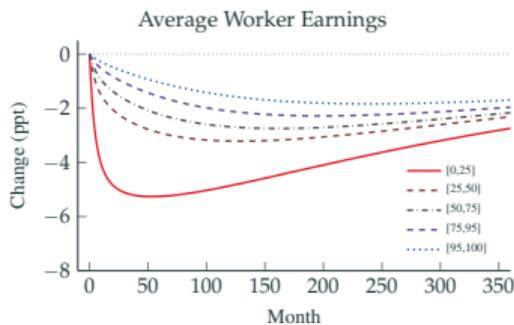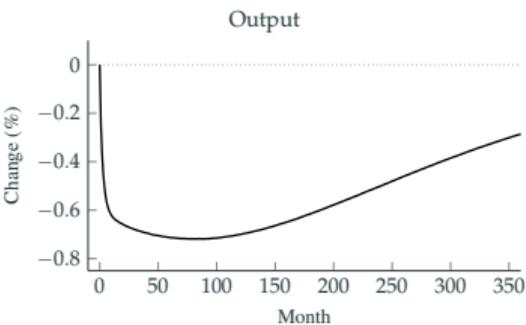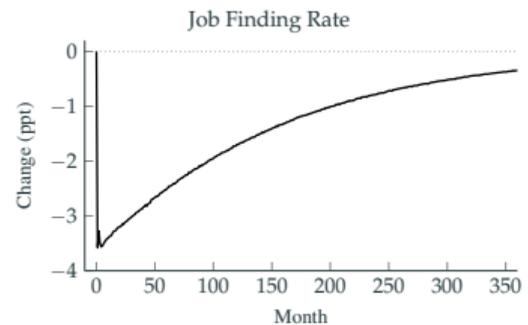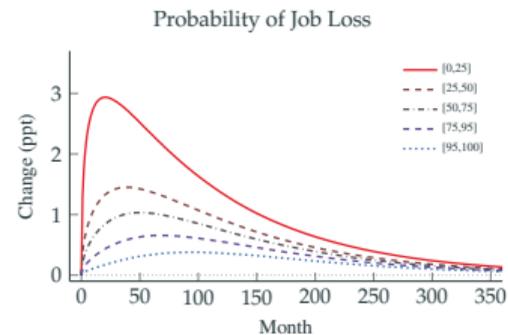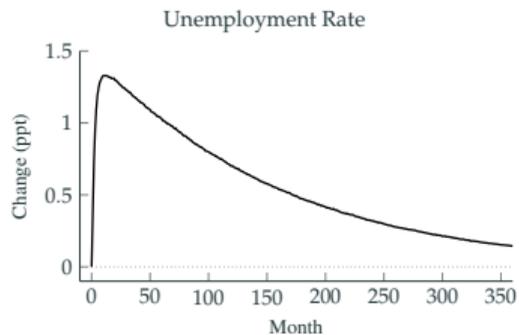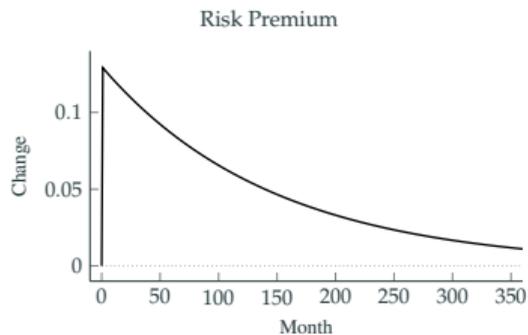
Model vs Data: Worker Earnings Dynamics

Worker Earnings: Response to Risk Premium Shocks

Earnings Horizon: ■ 2 Years ■ 3 Years ■ 5 Years
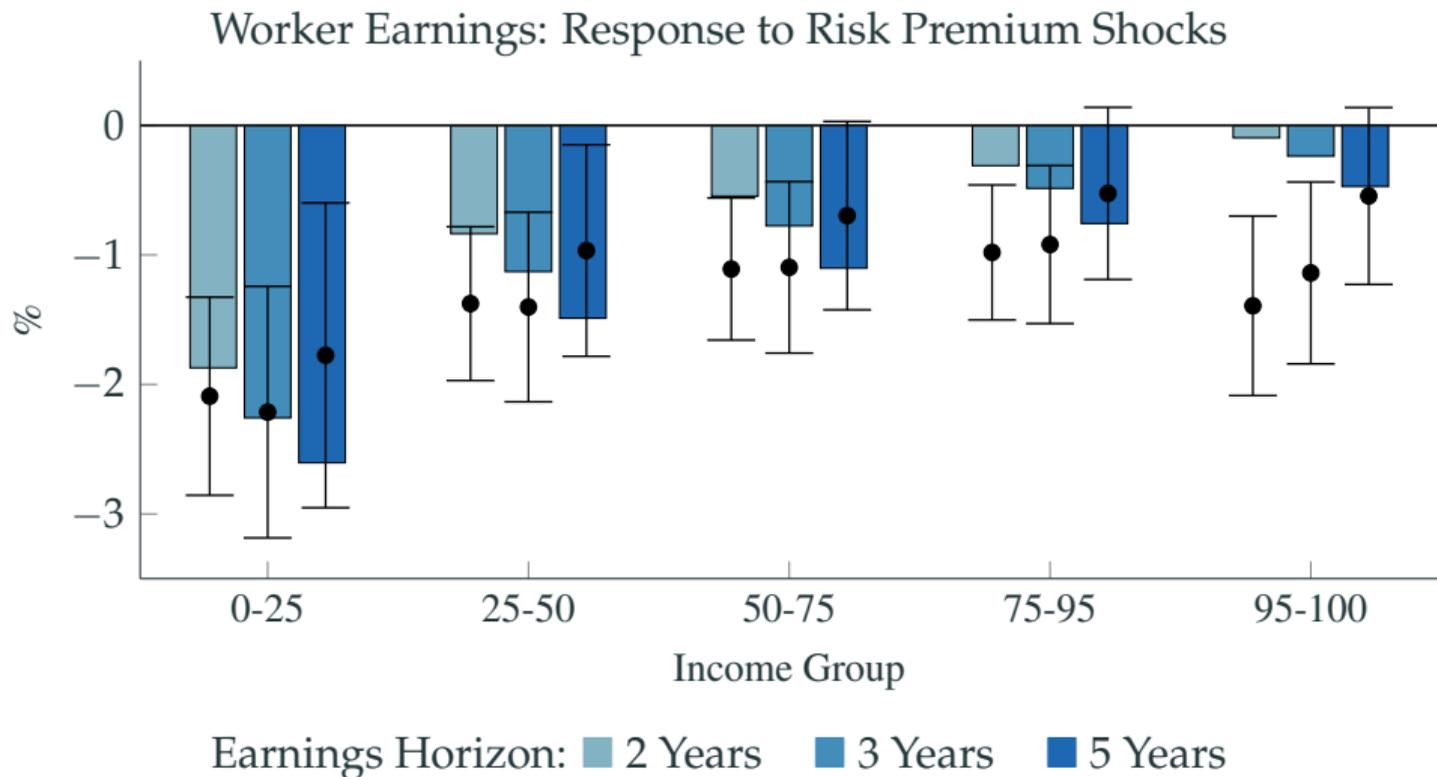
Model vs Data: Job Destruction

Likelihood of Job Loss: Response to Risk Premium Shocks

■ Pr(Some Nonemployment)
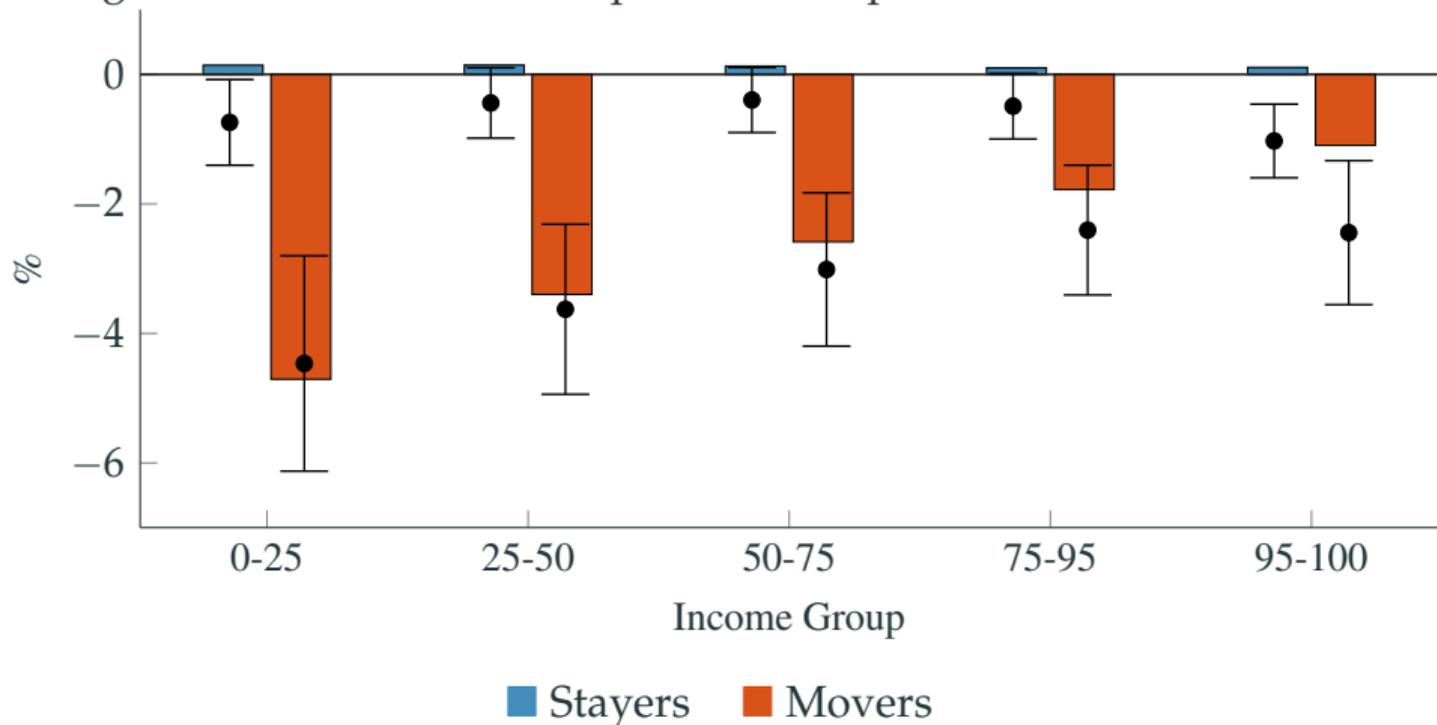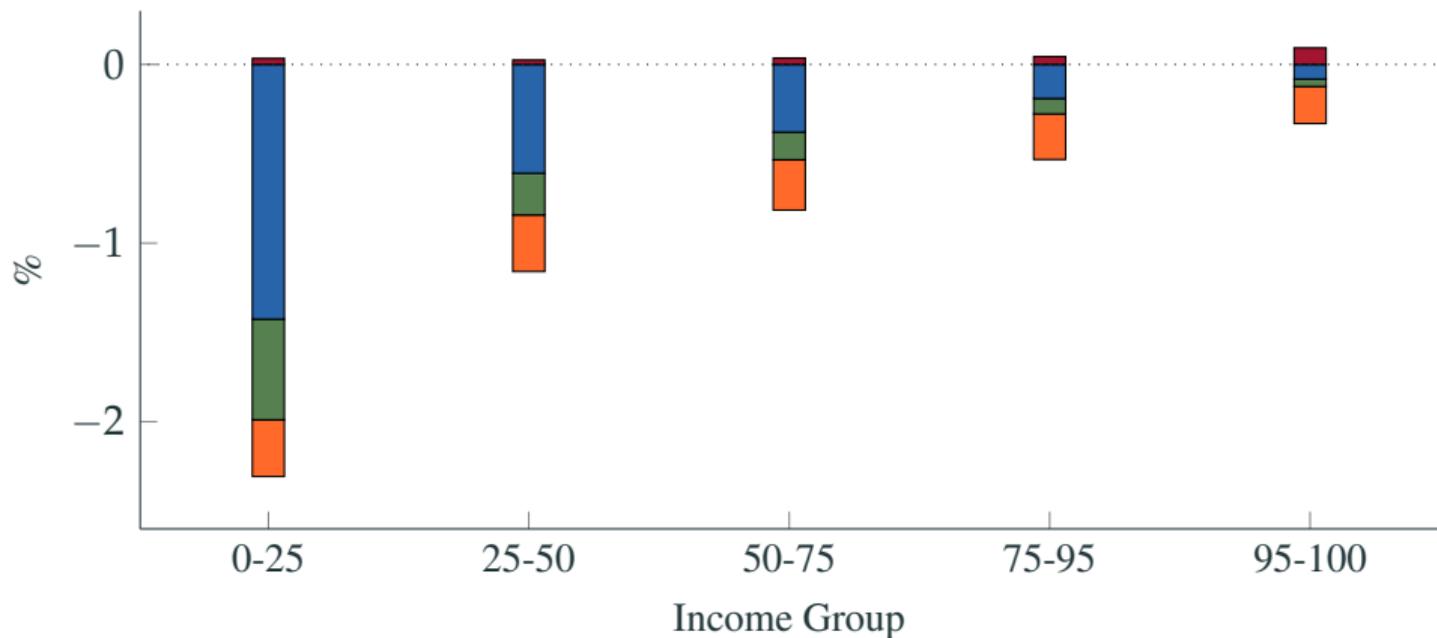
Model vs Data: Earnings Losses Conditional on Separation

Earnings losses conditional on separation: Response to Risk Premium Shocks

Model Decomposition: Worker Earnings Dynamics

Outline

Testable Implications: Duration of Employment Matches

Heterogeneous exposures to risk premia arise due to differences in duration:

The employment value of low-z workers is more back-loaded (i.e. has longer Macaulay duration) than the employment value of high-z workers, and therefore it declines by more than the employment value of high-z workers when risk premia rise.

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Testable Prediction: Workers with higher expected earnings growth should experience greater earnings declines than workers with low-earnings growth when risk premia rise.

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Predict earnings growth using dummies for industry $\times$ age $\times$ gender, and industry $\times$ worker tenure $\times$ prior earnings.

Worker Expected Earnings Growth × Prior Earnings

Worker Expected Earnings Growth

Model quantitatively replicates these patterns since z is mean-reverting.
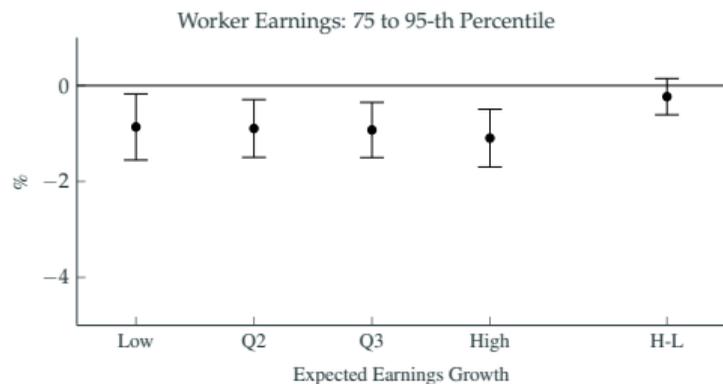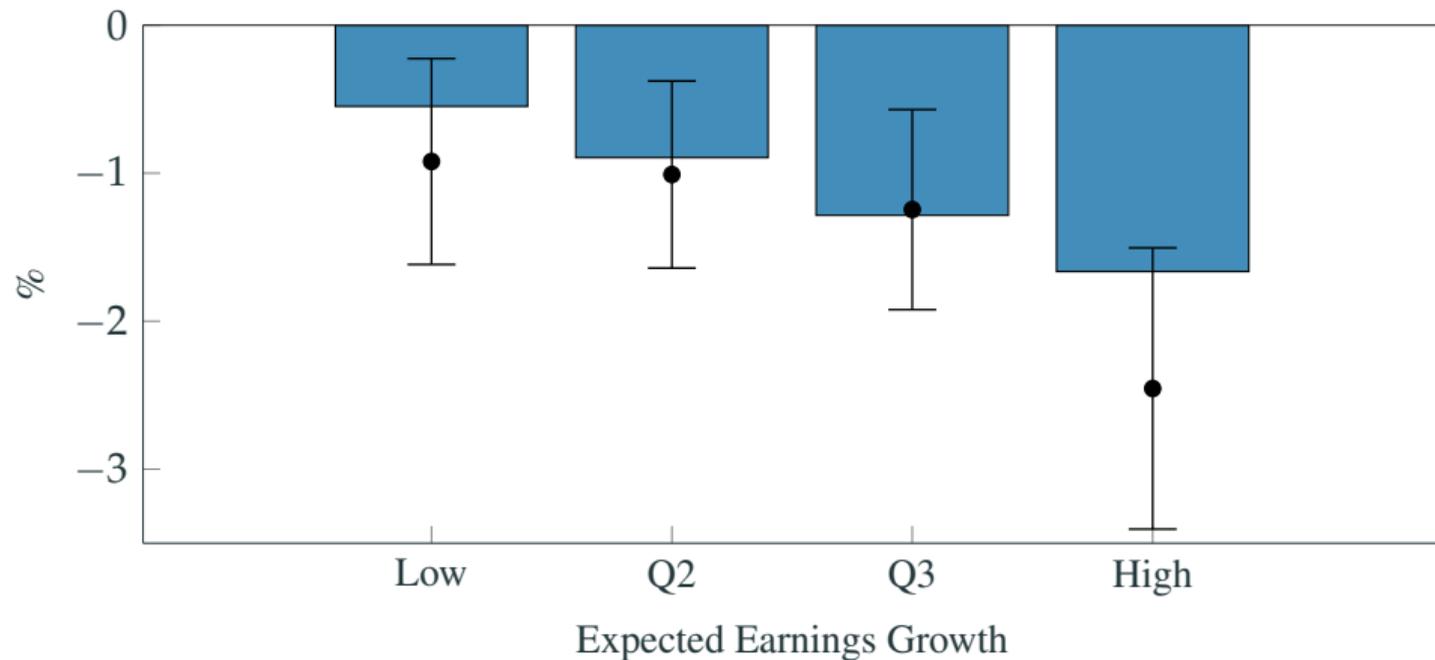
Testable Implications: Duration of Employment Matches (cont)

Heterogeneous exposures to risk premia arise due to differences in duration.

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Testable Prediction: Younger workers should experience greater earnings declines
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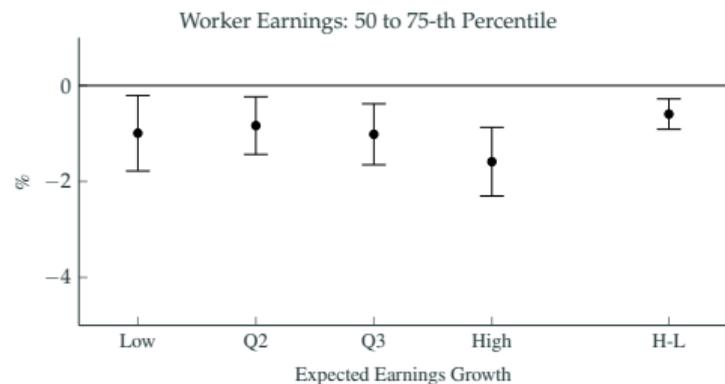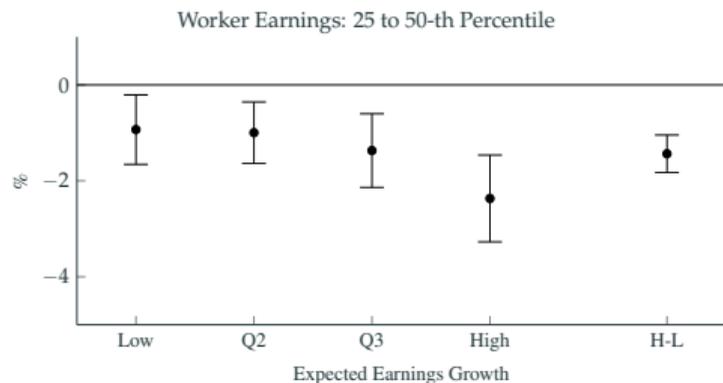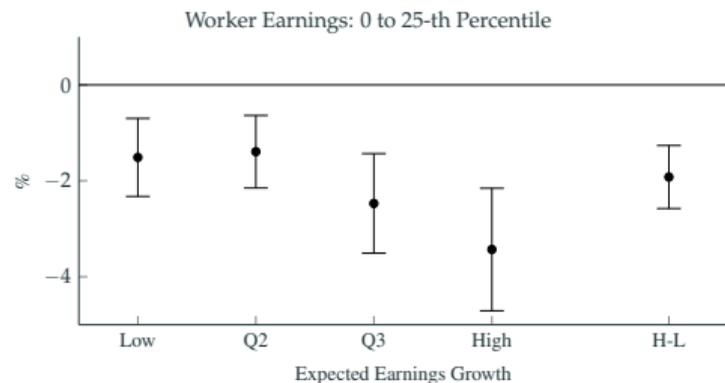
Testable Implications: Duration of Employment Matches (cont)

Heterogeneous exposures to risk premia arise due to differences in duration.
Testable Prediction: Younger workers should experience greater earnings declines than older workers when risk premia rise.

Testable Implications: Duration of Employment Matches (cont)

Heterogeneous exposures to risk premia arise due to differences in duration.

Model has no explicit role for age, though age is positively correlated with z.
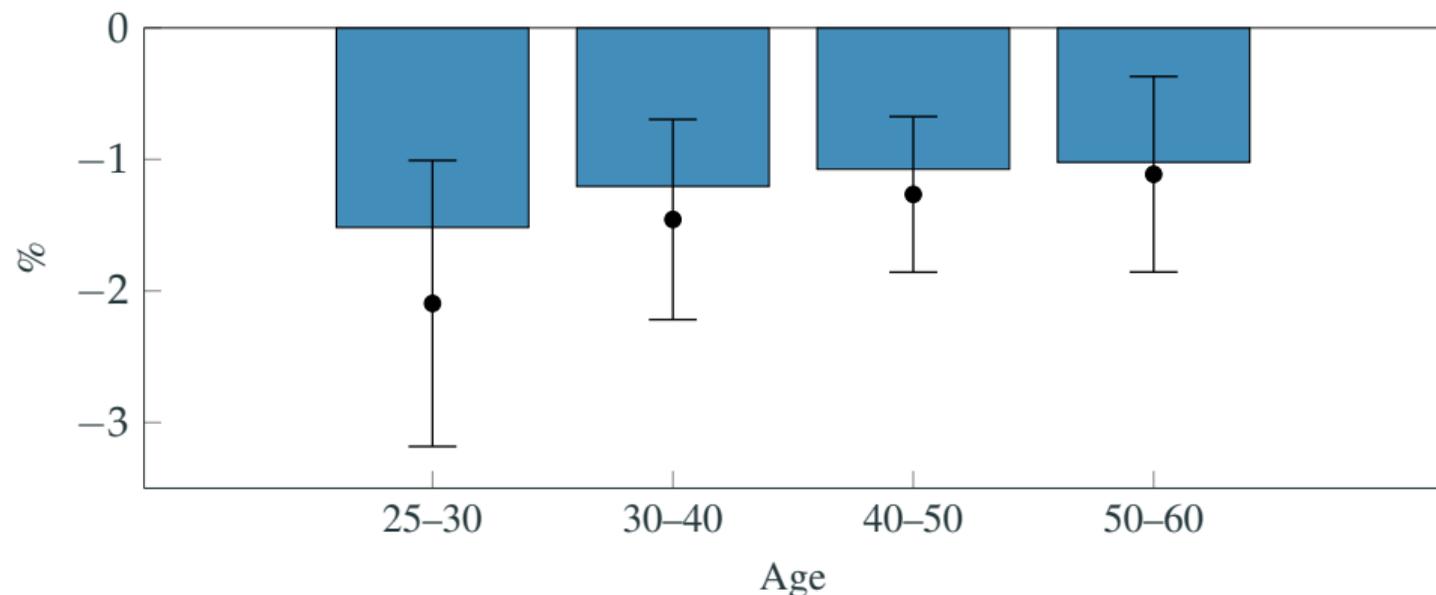
Testable Implications: Endogenous Separations

Employed workers positively selected on z, which grows faster when employed.

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Model-Implied Fluctuations

Feed realizations of RP shocks and aggregate TFP shocks into model

Examine model's ability to predict realized path of

Employment dynamics

Job flows

Income inequality

Model vs Data: Realized Fluctuations (I)
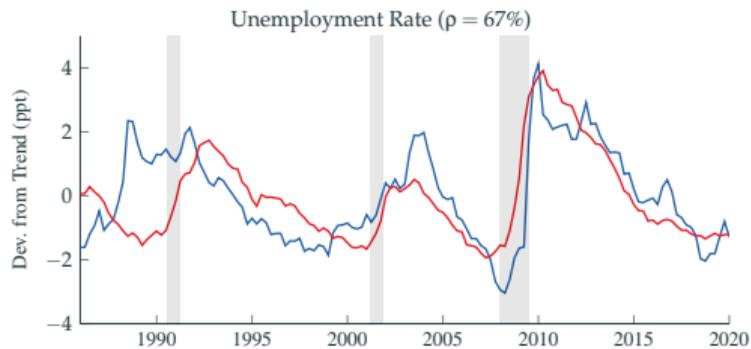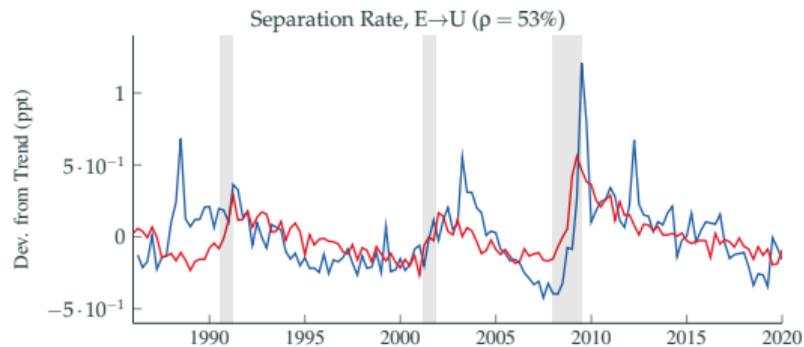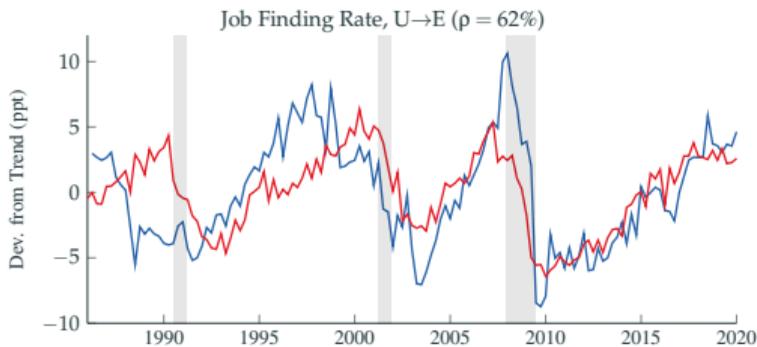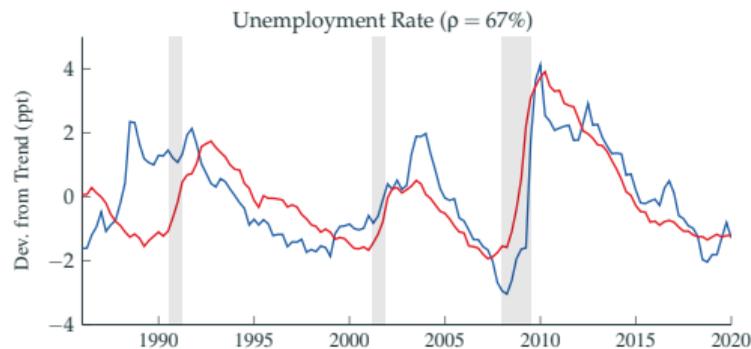
Model vs Data: Realized Fluctuations (I)

Model vs Data: Realized Fluctuations (II)

Employment–Population Ratio ($\rho = 70\%$)

Labor Market Tightness: V/U Ratio ($\rho = 68\%$)
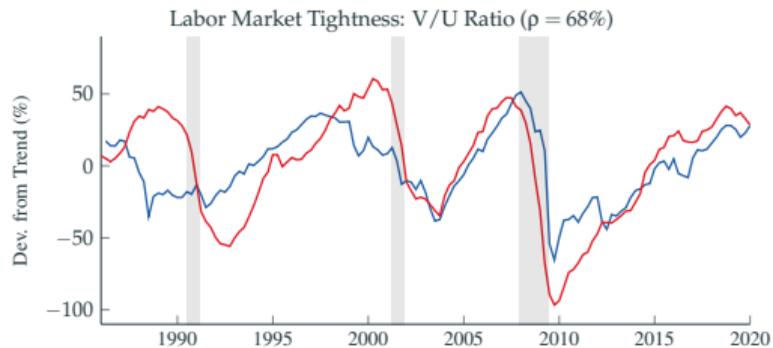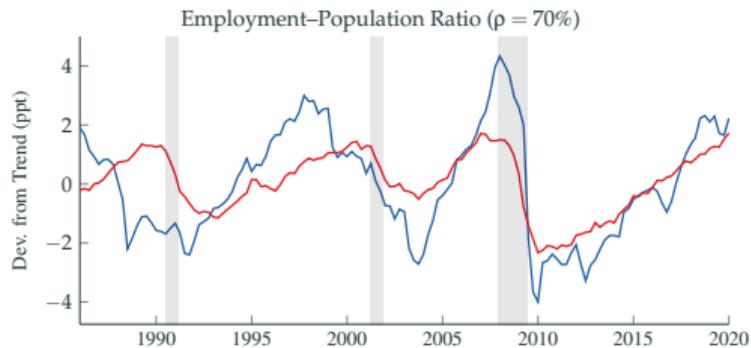
Model vs Data: Realized Fluctuations (II)
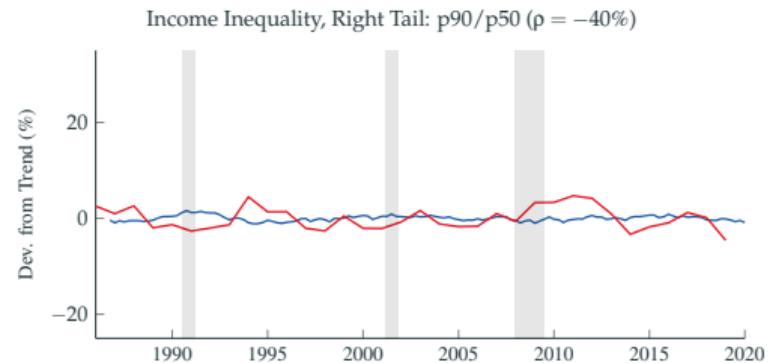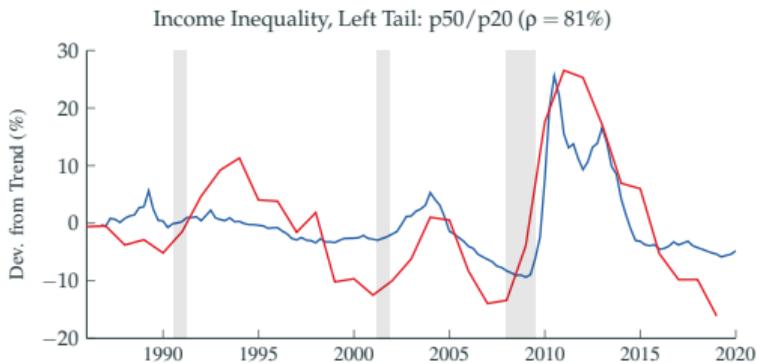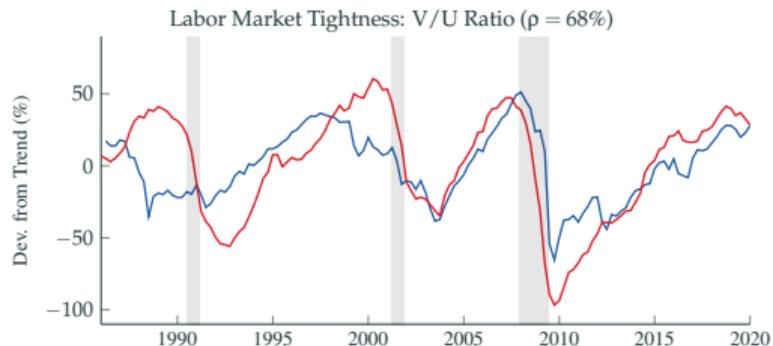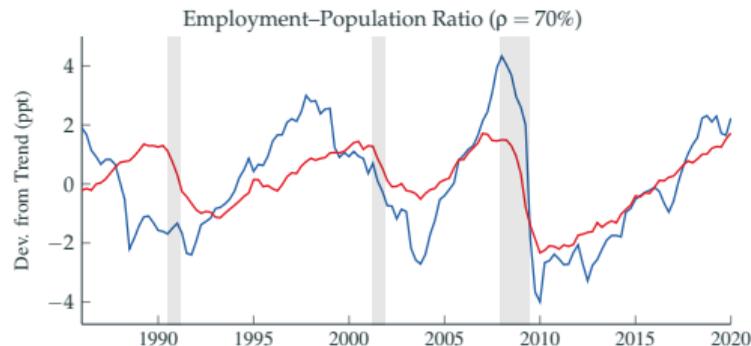
Conclusion

Time-varying risk premia generate heterogeneous earnings dynamics.

Next on the agenda:

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1. Risk premia $\rightarrow$ endogenous labor income risk.

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4. Monetary policy should also affect (1) to (3) above, either directly, or indirectly through changes in risk premia.

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Stay tuned...

APPENDIX SLIDES

Financial Series

Excess bond premium (Gilchrist and Zakrajsek, 2012)

Shiller's Cyclically-Adjusted Price-Earnings (CAPE) Ratio

Chicago Fed's National Financial Conditions Index (NFCI)

Risk appetite index (Bauer, Bernanke, and Milstein, 2023)

Risk aversion index (Bekaert, Engstrom, and Xu, 2022)

Variance risk premium (Bekaert and Hoerova, 2014)

CBOE VIX index

Financial uncertainty index (Jurado, Ludvigson, and Ng, 2015)

SVIX index (Martin, 2016)

◂ Back

Risk Premium and Future Stock Market Returns

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Worker Earnings, 0–25th Percentile	-2.21	-1.12	-2.11	-1.09	-1.79	-0.88	-2.27	-1.11
	(-4.47)	(-6.05)	(-4.06)	(-5.87)	(-2.63)	(-3.69)	(-3.51)	(-5.42)
Worker Earnings, 25–50th Percentile	-1.40	-0.31	-1.34	-0.32	-1.15	-0.24	-1.46	-0.30
	(-3.75)	(-6.56)	(-3.33)	(-6.09)	(-2.23)	(-4.11)	(-2.91)	(-5.60)
Worker Earnings, 50–75th Percentile	-1.10		-1.03	—	-0.91	—	-1.16	—
	(-3.24)		(-2.83)		(-1.93)		(-2.53)	
Worker Earnings, 75–95th Percentile	-0.92	0.19	-0.82	0.22	-0.74	0.15	-0.99	0.18
	(-2.96)	(3.58)	(-2.47)	(3.82)	(-1.70)	(2.17)	(-2.30)	(2.90)
Worker Earnings, 95–100th Percentile	-1.14	0.01	-1.01	0.08	-0.95	-0.06	-1.24	-0.05
	(-3.18)	(0.02)	(-2.45)	(0.27)	(-1.76)	(-0.16)	(-2.65)	(-0.15)
Bottom (1) – Middle (3) Earners	-1.12		-1.08		-0.89		-1.11	
	(-6.08)		(-5.90)		(-3.74)		(-5.34)	
Middle (3) – Top (5) Earners	0.04		-0.02		0.04		0.07	
	(0.14)		(-0.08)		(0.11)		(0.20)	
Bottom (1) – Top (5) Earners	-1.08		-1.10		-0.85		-1.03	
	(-2.68)		(-2.75)		(-1.64)		(-2.06)	
Firm Controls:								
Earn Grp ×	ΔFirmTFP		ΔRevenue		ΔFirmTFP		ΔFirmTFP	
Business Cycle Controls:								
Earn Grp ×					ΔGDP		ΔAggTFP	
Fixed Effects								
Earn Grp × NAICS2	✓	✓	✓	✓	✓	✓	✓	✓
Age × Gender × NAICS2	✓	✓	✓	✓	✓	✓	✓	✓
Firm × Year	-	✓	-	✓	-	✓	-	✓
Observations	45.2m	45.2m	45.2m	45.2m	45.2m	45.2m	45.2m	45.2m

▸ Back

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Bottom (1) – Middle (3) Earners	-1.12		-1.08		-0.89		-1.11	
	(-6.08)		(-5.90)		(-3.74)		(-5.34)	
Middle (3) – Top (5) Earners	0.04		-0.02		0.04		0.07	
	(0.14)		(-0.08)		(0.11)		(0.20)	
Bottom (1) – Top (5) Earners	-1.08		-1.10		-0.85		-1.03	
	(-2.68)		(-2.75)		(-1.64)		(-2.06)	
Firm Controls:								
Earn Grp ×		ΔFirmTFP		ΔRevenue		ΔFirmTFP		ΔFirmTFP
Business Cycle Controls:								
Earn Grp ×						ΔGDP		ΔAggTFP
Fixed Effects								
Earn Grp × NAICS2	✓	✓	✓	✓	✓	✓	✓	✓
Age × Gender × NAICS2	✓	✓	✓	✓	✓	✓	✓	✓
Firm × Year	-	✓	-	✓	-	✓	-	✓
Observations	45.2m	45.2m	45.2m	45.2m	45.2m	45.2m	45.2m	45.2m

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Worker Earnings, 0–25th Percentile	-2.21	-1.12	-2.11	-1.09	-1.79	-0.88	-2.27	-1.11
	(-4.47)	(-6.05)	(-4.06)	(-5.87)	(-2.63)	(-3.69)	(-3.51)	(-5.42)
Worker Earnings, 25–50th Percentile	-1.40	-0.31	-1.34	-0.32	-1.15	-0.24	-1.46	-0.30
	(-3.75)	(-6.56)	(-3.33)	(-6.09)	(-2.23)	(-4.11)	(-2.91)	(-5.60)
Worker Earnings, 50–75th Percentile	-1.10	—	-1.03		-0.91	—	-1.16	—
	(-3.24)		(-2.83)		(-1.93)		(-2.53)	
Worker Earnings, 75–95th Percentile	-0.92	0.19	-0.82	0.22	-0.74	0.15	-0.99	0.18
	(-2.96)	(3.58)	(-2.47)	(3.82)	(-1.70)	(2.17)	(-2.30)	(2.90)
Worker Earnings, 95–100th Percentile	-1.14	0.01	-1.01	0.08	-0.95	-0.06	-1.24	-0.05
	(-3.18)	(0.02)	(-2.45)	(0.27)	(-1.76)	(-0.16)	(-2.65)	(-0.15)
Bottom (1) – Middle (3) Earners	-1.12		-1.08		-0.89		-1.11	
	(-6.08)		(-5.90)		(-3.74)		(-5.34)	
Middle (3) – Top (5) Earners	0.04		-0.02		0.04		0.07	
	(0.14)		(-0.08)		(0.11)		(0.20)	
Bottom (1) – Top (5) Earners	-1.08		-1.10		-0.85		-1.03	
	(-2.68)		(-2.75)		(-1.64)		(-2.06)	
Firm Controls:								
Earn Grp ×		ΔFirmTFP		ΔRevenue		ΔFirmTFP		ΔFirmTFP
Business Cycle Controls:								
Earn Grp ×						ΔGDP		ΔAggTFP
Fixed Effects								
Earn Grp × NAICS2	✓	✓	✓	✓	✓	✓	✓	✓
Age × Gender × NAICS2	✓	✓	✓	✓	✓	✓	✓	✓
Firm × Year	-	✓	-	✓	-	✓	-	✓
Observations	45.2m	45.2m	45.2m	45.2m	45.2m	45.2m	45.2m	45.2m

| | A. Public Firms | | | | | | B. All Firms | | | | | |
| | 2 Years | | 3 Years | | 5 Years | | 2 Years | | 3 Years | | 5 Years | |
	RP	TFP	RP	TFP	RP	TFP	RP	TFP	RP	TFP	RP	TFP
Worker Earnings, 0–25th Percentile	-2.09	0.63	-2.21	0.69	-1.77	0.75	-2.34	0.05	-2.46	0.04	-1.98	0.04
	(-5.36)	(2.71)	(-4.47)	(2.79)	(-2.96)	(2.81)	(-5.88)	(1.61)	(-4.69)	(1.32)	(-3.07)	(1.35)
Worker Earnings, 25–50th Percentile	-1.38	0.57	-1.40	0.63	-0.97	0.73	-1.68	0.07	-1.72	0.06	-1.26	0.06
	(-4.54)	(3.52)	(-3.75)	(3.54)	(-2.32)	(3.64)	(-5.07)	(2.69)	(-4.08)	(2.27)	(-2.54)	(2.06)
Worker Earnings, 50–75th Percentile	-1.11	0.53	-1.10	0.59	-0.70	0.67	-1.38	0.08	-1.40	0.07	-0.96	0.08
	(-3.96)	(3.82)	(-3.24)	(3.88)	(-1.88)	(3.96)	(-4.63)	(4.13)	(-3.73)	(3.54)	(-2.24)	(3.46)
Worker Earnings, 75–95th Percentile	-0.98	0.61	-0.92	0.66	-0.53	0.75	-1.17	0.10	-1.15	0.11	-0.76	0.13
	(-3.69)	(4.23)	(-2.96)	(4.02)	(-1.55)	(4.16)	(-4.41)	(4.92)	(-3.53)	(4.67)	(-2.06)	(5.72)
Worker Earnings, 95–100th Percentile	-1.39	1.25	-1.14	1.28	-0.54	1.36	-1.37	0.21	-1.25	0.24	-0.73	0.29
	(-3.94)	(5.45)	(-3.18)	(4.93)	(-1.56)	(4.72)	(-5.18)	(7.85)	(-4.19)	(8.45)	(-2.54)	(12.39)
Bottom (1) – Middle (3) Earners	-0.98	0.10	-1.12	0.11	-1.08	0.08	-0.96	-0.03	-1.06	-0.03	-1.01	-0.03
	(-7.19)	(0.90)	(-6.08)	(0.92)	(-4.02)	(0.66)	(-7.92)	(-1.86)	(-6.28)	(-1.77)	(-4.39)	(-1.43)
Middle (3) – Top (5) Earners	0.28	-0.72	0.04	-0.70	-0.15	-0.69	-0.01	-0.13	-0.15	-0.16	-0.23	-0.21
	(0.94)	(-4.52)	(0.14)	(-3.96)	(-0.48)	(-3.45)	(-0.05)	(-6.44)	(-0.74)	(-7.85)	(-1.00)	(-9.54)
Bottom (1) – Top (5) Earners	-0.70	-0.62	-1.08	-0.59	-1.23	-0.61	-0.97	-0.16	-1.21	-0.20	-1.24	-0.24
	(-1.91)	(-3.36)	(-2.68)	(-2.93)	(-2.31)	(-2.58)	(-4.03)	(-6.81)	(-3.98)	(-8.27)	(-2.97)	(-7.88)
Fixed Effects												
Earn Grp × NAICS2	✓		✓		✓		✓		✓		✓	
Age × Gender × NAICS2	✓		✓		✓		✓		✓		✓	
Observations	47.6m		45.2m		40.4m		28.1m		26.4m		23.1m	

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Mean risk premia, by cashflow duration
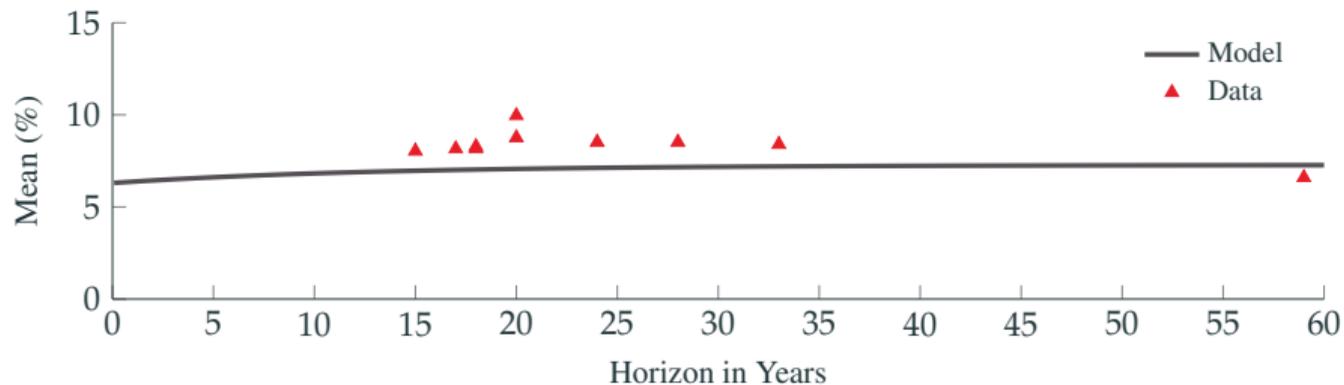
Return volatility, by cashflow duration

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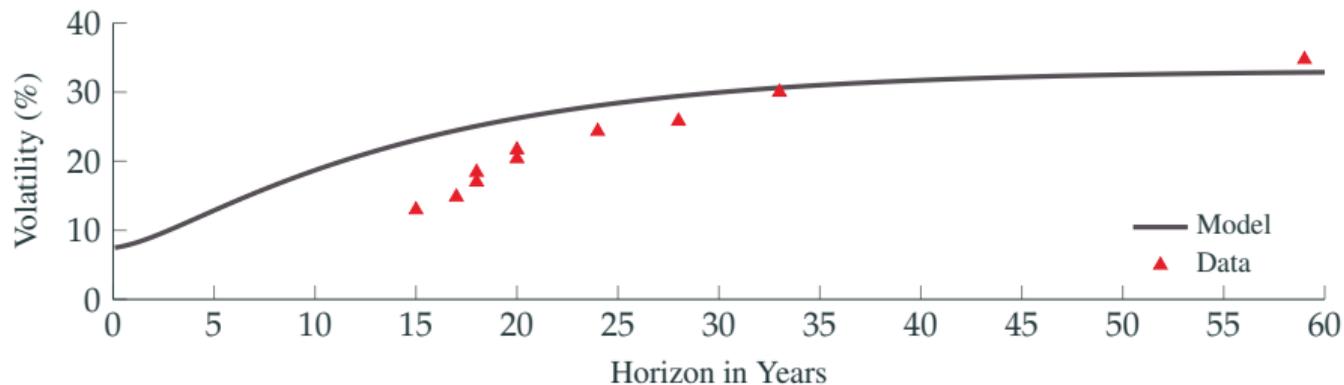
A. *Parameters Calibrated a Priori*	Symbol	Value	Source
Average TFP growth (%)	μ_A	0.18	Bureau of Labor Statistics (BLS)
Volatility of TFP growth (%)	σ_A	1.02	Section A.3
Correlation between TFP and RP shock	$\rho_{A,x}$	-0.39	Sections 1.1 and A.3
Interest rate (%)	r	0.16	Lettau and Wachter (2007)
Mortality rate (%)	ζ	0.28	Average working life span of 30 years
Matching function elasticity	α	0.41	Hagedorn and Manovskii (2008)
Wage pass-through (%)	ϕ	14.9	Carlsson et al. (2015)
Persistence of z	ψ_z	0.99	Menzio et al. (2016)
Long-run mean of z in employment	$\bar{z}_E$	1	Normalization
Volatility of initial z (%)	σ_{z0}	66.6	Guvenen et al. (2022)

B. *Parameters Calibrated to Asset Returns*	Symbol	Value	Moment	Model	Data
Persistence of price of risk	ψ_x	0.99	Autocorrelation of $\log P/E$	0.90	0.90
Average price of risk	$\bar{x}$	0.39	Average excess market return (%)	6.80	7.93
Volatility of price of risk (%)	σ_x	3.72	Volatility of excess market return (%)	20.2	20.0
Price of risk premium shock	δ	0.36	Average excess long-run strip return (%)	7.27	6.60
			Volatility of excess long-run strip return (%)	32.9	34.7
			Duration of market portfolio (years)	20.0	20
			Average P/E	18.1	18.2

C. *Parameters Calibrated to Job Flows*	Symbol	Value	Moment	Model	Data
Vacancy posting cost, scale ($\times 100$)	$\bar{\kappa}_0$	3.61	Job-finding rate, mean (%)	26.5	22.5
Vacancy posting cost, elasticity to z	$\bar{\kappa}_1$	1.48	Job-finding rate, mean by last wage	(Figure 4a)	
Exogenous separation rate (%)	s	0.82	Separation rate, mean (%)	1.09	1.34
Nonemployment flow, intercept	$\bar{b}_0$	0.41	Separation rate, mean by wage	(Figure 4b)	
Job search cost at $x = \bar{x}$ ($\times 100$)	$\bar{c}_0$	0.36	Unemployment rate, mean (%)	6.89	6.53
Long-run mean of z in nonemployment	$\bar{z}_O$	0.47	Unemployment rate, volatility (%)	1.49	1.44
Volatility of z (%)	σ_z	10.9	Earnings growth for continuing workers, mean by prior earnings	(Figure A.5)	
Job search cost, dependence on x	$\bar{c}_1$	6.05	Labor force participation rate, unemployment beta	-0.13	-0.07
Nonemployment flow, dependence on z	$\bar{b}_1$	0.58	Job-finding rate, unemployment beta	-2.04	-1.91
			Job-finding rate, unemployment beta by last wage	(Figure 4c)	
			Separation rate, unemployment beta	0.07	0.10
			Separation rate, unemployment beta by wage	(Figure 4d)	

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