Self-Insurance and Welfare in Turbulent Labour Markets

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Motivation

- Job loss entails long-lasting **negative consequences** **(“earnings scarring”)**
  Jacobson, LaLonde and Sullivan (93), Davis and von Wachter (11), Jarosch (21)
  - Specially for workers that **switch occupation**
    Kamburov Manovskii (02, 08, 09), Fujita (18), Huckfeldt (22), Postel-Vinay and Sepahsalari (21)
  - Consequence of **persistent loss of skills/experience** **(“turbulence”)**
    Ljungqvist and Sargent (98, 07, 08), Jung and Kuhn (2019), Baley, Figueiredo, Ulbricht (22)
- Literature focuses on earnings scars, less attention on **insurance and welfare**
  Rogerson and Schindler (01)
- We ask:
  - Which **insurance mechanisms** do workers use to cope with these risks?
  - What are the **welfare consequences** of job loss?

This Paper

1. **New facts on long-term consequences of job loss**
   - unemployment and reemployment dynamics
   - joint role of **liquid wealth** and **skill loss**
2. **Directed search model with rich worker heterogeneity**
   - **Risks:** transitory (unemployment) + persistent (skill loss)
   - **Self-insurance mechanisms:**
     (i) *precautionary savings*
     (ii) *precautionary search*
3. **Welfare consequences**
   - ⋆ Persistent welfare effects arise primarily from **"wealth scarring"**
   - ⋆ Role of unemployment insurance and retraining programs (in progress)

Empirical Evidence

Data

- **Data:** NLSY79, monthly worker panel 1979-2016
- **Labor Market Information:**
  - worker's labor history:
    - EUE' transitions: non-employed at workers at time $t-1$ but employed at t
  - unemployment duration, wage growth at reemployment ($\Delta w = log(w'/w)$)
  - time-consistent occupation codes (Dorn, 09) $\rightarrow$ occupation tenure & switching
- **Sample:** EUE' transitions with occupation tenure at separation > 2 years

Key Heterogeneity Dimensions

1. **skill loss** Fujita (18), Huckfeldt (22)

   - **turbulent workers**: occup. tenure > 2 years $\times$ occ. switcher

   - **tranquil workers**: occup. tenure > 2 years $\times$ occ. stayer

   turbulence shock

2. **wealth upon separation** Rendón (06), Lise (12), Herkenhoff, Phillips and Cohen-Cole (16)

   - net liquid wealth = financial assets

     + farm and business assets + vehicles, all net of debts

     - debt on residential property.

   - split wealth distribution into three groups: $< P33$, $P33 - P66$, $> P66$

   turbulence & wealth

Summary statistics

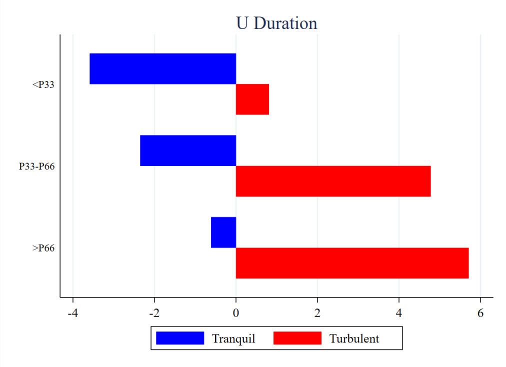
	Tranquil	Turbulent
Worker characteristics at separation		
Female (%)	57.2	57.7
White (%)	84.7	80.1
College Degree (%)	22.0	19.7
Age	36.6	36.0
Job tenure	3.0	3.6
Occupational tenure	7.2	5.8
Labor market experience	14.8	13.5
Liquid wealth (000's, 2000 dollars)	43.0	35.2
Outcomes at reemployment		
Wage growth	0%	-12%
Unemployment duration (months)	4	12
% of total transitions	62.2	37.8

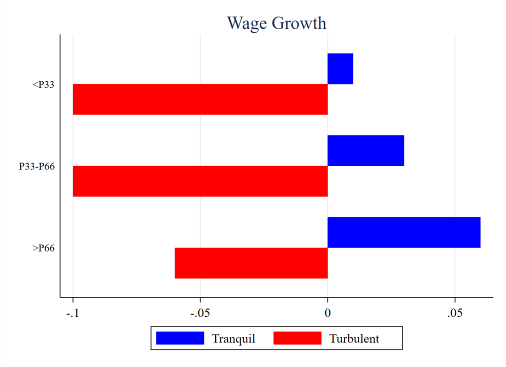
all transitions

Unemployment Duration & Wage Growth

Residuals

- **Turbulent:** longer duration and negative wage growth
- **Wealth:** amplifies duration and wage growth





(controls = past wage, age, age^2, gender, race, education, ability, industry, year and month)

Long-term Scarrs on Wages

- Focus on the first separation recorded for each individual in the sample

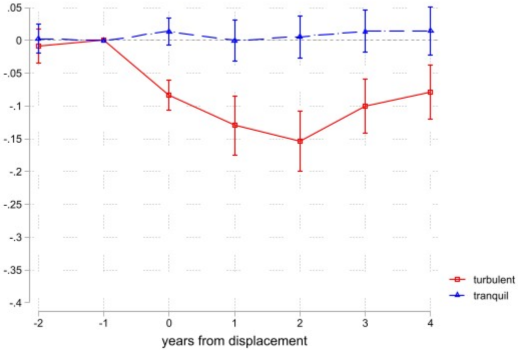
$$\log w_{it} = \sum_{p \in \{<33, >66\}} \sum_{k=-24}^{62} \delta^k_{tranq,p} \mathbf{1}^k_{tranq,p} + \sum_{p \in \{<33, >66\}} \sum_{k=-24}^{62} \delta^k_{turb,p} \mathbf{1}^k_{turb,p} + \lambda_t + \beta' X_{it} + \epsilon_{it}$$

- $\mathbf{1}^k_{tranq,p} = 1$: displaced worker in k^{th} year after job loss that was at wealth percentile p and had a tranquil transition
- $\mathbf{1}^k_{turb,p} = 1$: displaced worker in k^{th} year after job loss that was at wealth percentile p and suffered a turbulent transition
- control group = non-displaced workers with occ tenure $>$ 2 years old
- X_{it} = **past wage**, age, age^2, gender, race, education, ability, industry, occupation

Long-term Scarrs on Wages

By skill loss

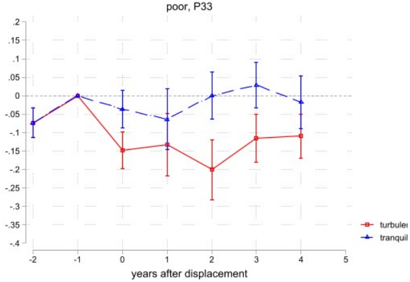
- Scarring effects of unemployment: **concentrated among turbulent** (Huckfeldt, 22)

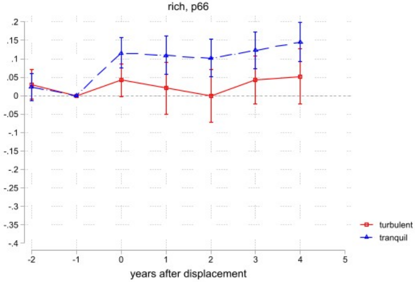


Long-term Scarrs on Wages

By skill loss × wealth upon separation

- Scarring effects of unemployment: **concentrated among turbulent** and **poor**





Model

Environment
Demographics

- Continuum of ex-ante identical risk-averse workers
  - ex-post heterogenous (s, x, a, y)
    - status s: employed (e) or unemployed (u)
    - skills x: low (l) or high (h)
    - wealth a
    - income y: after-tax wages (w) or unemployment benefits (b)
- Continuum of one-worker homogenous firms
  - linear production $f(x) = x$

Environment

Key elements

1. Directed search
   Shi, (09), Menzio and Shi (11), Eeckhout and Sepahsalari (21)
   - submarkets $\theta(x, a, b)$: trade-off between wage and finding rate
   - random search within submarket $m(\theta)$
   - vacancies: free entry, posted at cost κ, zero profits

2. Skill dynamics
   Ljungqvist and Sargent (98, 07)
   - while employed, skill upgrades w/prob γ^u $(x_l \to x_h)$
   - exogenous separation w/prob λ_x: skill downgrades w/prob γ^d $(x_h \to x_l)$

3. Imperfect financial market: borrowing constraint $a \geq -\underline{a}$
   - one risk-free bond that pays r

VF: workers VF: firms

Calibration

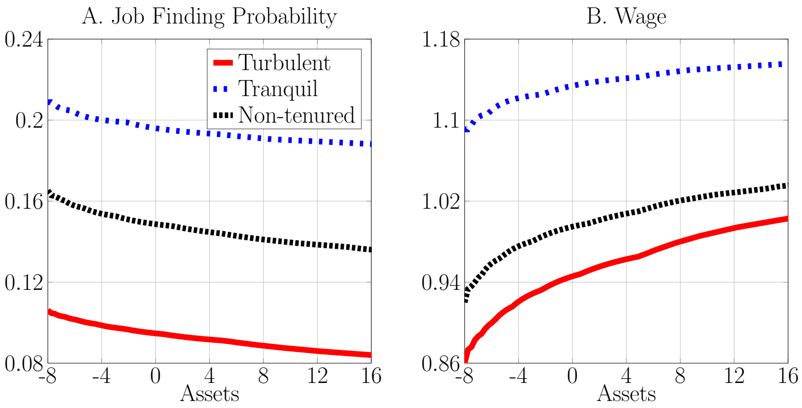
- Assigned:
  - standard values: discount factor β, interest rate r, risk aversion σ
  - separation rates λ_h, λ_l (NLSY) + upgrading probability γ^u (Fujita, 18)
- Estimation via SMM:
  - vacancy cost κ, matching elasticity α and efficiency χ_x, replacement rate ϕ
  - productivity gap, turbulence risk γ^d
  - borrowing constraint $\underline{a}$

Targeted Moments	Source	Data	Model
Experience premium $\mathbb{E}[w_h]/\mathbb{E}[w_l]$	NLSY	1.18	1.15
Proportion of turbulent transitions EUE'	NLSY	0.12	0.12
Elasticity of job finding to tightness	Shimer (2005)	0.72	0.66
Excess duration $\mathbb{E}[\tau_{lh}]/\mathbb{E}[\tau_{hh}]$	NLSY	3	2.1
Excess duration $\mathbb{E}[\tau_{lh}]/\mathbb{E}[\tau_{ll}]$	NLSY	1.6	1.5
Avg. unemployment duration (months)	NLSY	7.7	6.4
Assets/Annual Income (Median)	PSID	0.62	0.63
Fraction with negative assets	NLSY	0.16	0.15
OLS coefficient (assets of jobfinding on assets)	Lise (2013)	-0.08	-0.03

functional forms | parameters | asset distributions | wage distributions

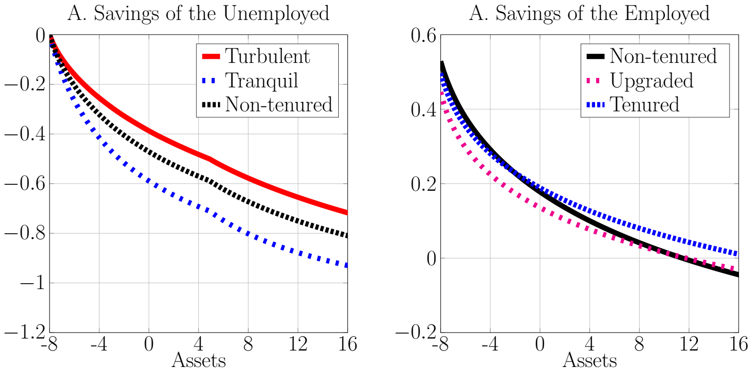
Eq'm Search Policies

- Assets and skills:
  - **decrease** job finding rate (increase duration)
  - **increase** reemployment wage



Eq'm Savings Policies

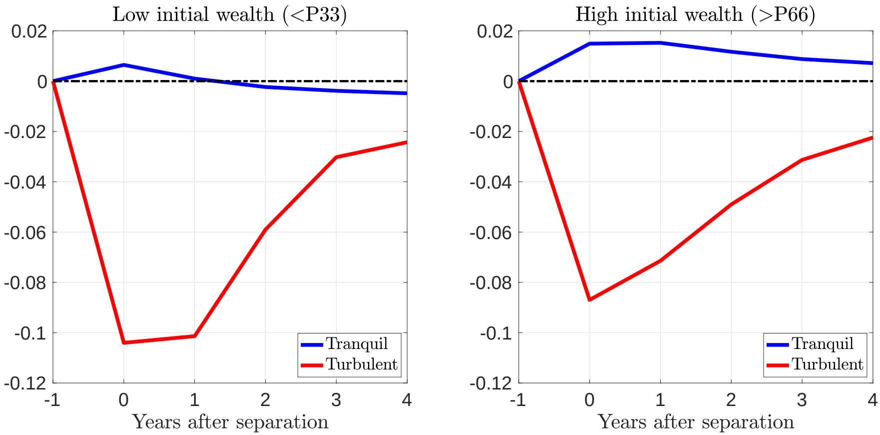
- To smooth consumption across states:
  - Employed **accumulate** and unemployed **deplete** assets



Wage scarring effects

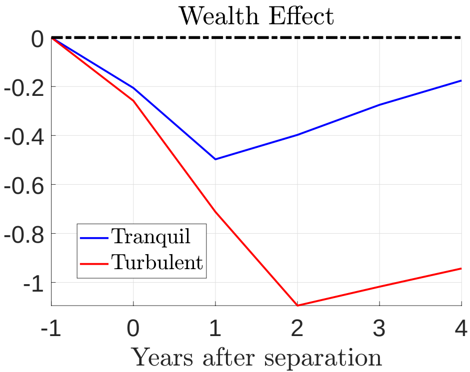
By skill loss × wealth upon separation

- Track worker earnings (log wages) after separation, regression as in data
    - Tranquil transitions entail wage increases only for rich
    - Turbulent transitions entail wage losses, recover faster for rich



Wealth scarring

- **Poverty feedback loop:**
  - Assets depletion during unemployment for both types $a \downarrow$
  - Lower reemployment wage $w'(a) \downarrow$
  - Slower asset accumulation during employment $a \downarrow$



⋆ Asset transformation $\log(a + \sqrt{1 + a^2})$

Welfare Analysis

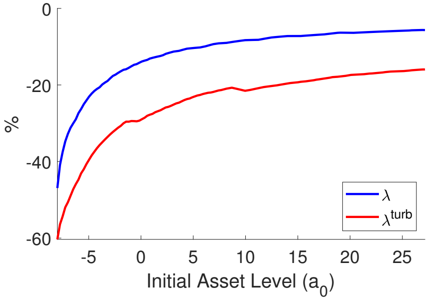
Welfare Costs of Job Loss

By initial wealth

- Life-time consumption equivalent $\lambda(a_0)$: compensation for avoiding job loss at $t = 0$

$$\underbrace{\mathbb{E}_0 \left[\sum_{t=0}^{\infty} \beta^t \frac{((1+\lambda(a_0))c_t)^{1-\sigma}}{1-\sigma} \right]}_{\text{no separation counterfactual}} = \underbrace{\mathbb{E}_0 \left[\sum_{t=0}^{\infty} \beta^t \frac{\tilde{c}_t^{1-\sigma}}{1-\sigma} \right]}_{\text{tranquil/turbulent}}$$

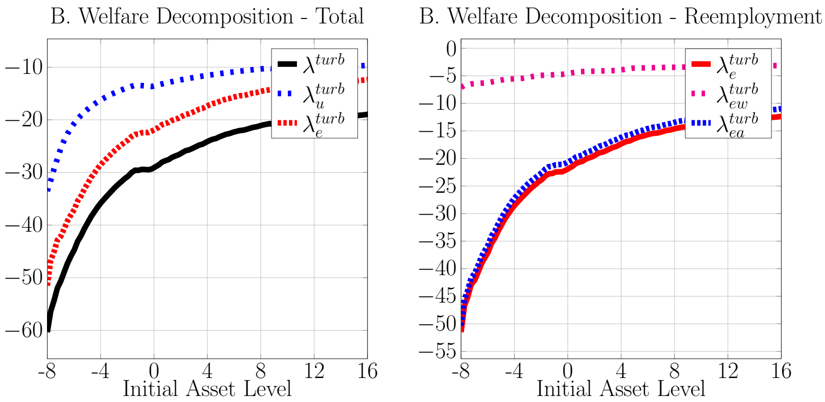
- Welfare costs decreasing with initial wealth



Welfare Costs of Job Loss

Decomposition: wage vs. wealth scarring

$$\underbrace{\lambda}_{\text{Total cost}} = \underbrace{\lambda_u}_{\text{unemployment phase}} + \underbrace{\lambda_e}_{\text{reemployment phase}} = \underbrace{\lambda_u}_{\text{unemployment phase}} + \underbrace{\lambda_{ew}}_{\text{fixed assets}} + \underbrace{\lambda_{ea}}_{\text{fixed wage}}$$



Moving forward

- **Uncovered key role for self-insurance**
  - "w scars": wage, wealth and welfare
  - precautionary savings and search
  - feedback loop
- **Potential directions:**
  - endogenous occupational attachment
    Baley, Figueiredo, Ulbricht (22)
  - on-the-job search
    Krusell, Mukoyama and Sahin (10), Chaumont and Shi (18)
  - unemployment insurance and retraining programs

Appendix

Summary statistics

All EUE' transitions

	All Transitions	Non-Tenured	Tranquil	Turbulent
Observations	37,324	25,910	7,102	4,212
% of total transitions	100	69.4	19.0	11.6
Worker characteristics at separation				
Age	29.7	26.8	36.6	36.0
Job tenure	1.4	0.5	3.0	3.6
Occupational tenure	2.5	0.7	7.2	5.8
Total experience	8.3	5.7	14.8	13.5
Liquid wealth (000's, 2000 dollars)	28.9	20.1	43.0	35.2
Outcomes at reemployment				
Wage growth	1%	4%	0%	-12%
Unemployment duration (months)	7.7	8	4	12

Source: NLSY79.

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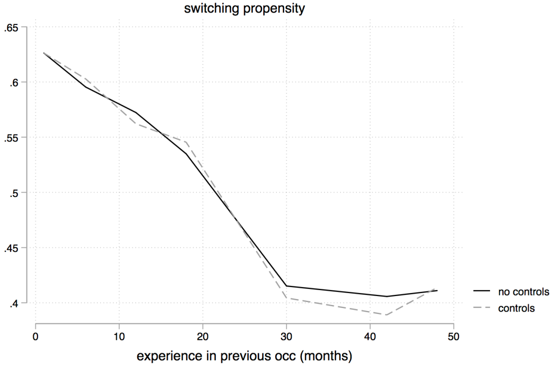
Turbulence Shock

Definition

- Switching propensity decreases during the first 2.5 years, then flat



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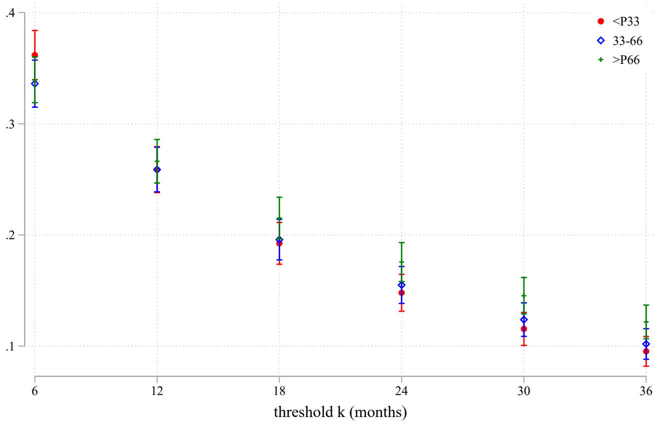
Turbulence Shock

- Probability of being hit by a turbulence shock not correlated with wealth

Figure: Turbulence Shock



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Value Functions

Appendix: Workers

- **Unemployed**

$$\begin{aligned} U(a,x,b) &= \max_{a',\theta}\; u(c) + \beta\left[m(\theta)E(a',x,w(\theta)) + (1-m(\theta))U(a',x,b)\right] \\ c + a' &= Ra + b, \qquad a' \geq \underline{a} \end{aligned}$$

- **Inexperienced Employed,** x_l

$$\begin{aligned} E(a,x_l,w) &= \max_{a'}\; u(c) + \beta\lambda U(a',x_l,b_l) \\ &+ \beta(1-\lambda)[(1-\gamma^u)E(a',x_l,w) + \gamma^u E(a',x_h,w)] \\ c + a' &= Ra + (1-\tau_a)w \quad \text{and} \quad a' \geq \underline{a} \end{aligned}$$

- **Experienced Employed,** x_h

$$\begin{aligned} E(a,x_h,w) &= \max_{a'}\; u(c) + \beta(1-\lambda)E(a',x_h,w) \\ &+ \beta\lambda[\gamma^d U(a',x_l,b_h) + (1-\gamma^d)U(a',x_h,b_h)] \\ c + a' &= Ra + (1-\tau_a)w \quad \text{and} \quad a' \geq \underline{a} \end{aligned}$$

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Value Functions

Appendix: Firms

Value of a vacant job

$$V = -\kappa + \beta \max_{w} \{q(\theta)J(w(\theta), x_i) + (1 - q(\theta))V\} \qquad \forall i$$

Value of a filled job

$$J(w, x_h) = x_h - w + \beta [\lambda V + (1 - \lambda)J(w, x_h)]$$
$$J(w, x_l) = x_l - w + \beta [\lambda V + (1 - \lambda)(\gamma^u J(w, x_h) + (1 - \gamma^u)J(w, x_l)]$$

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Calibration

appendix: functional forms

- Utility funtion (CRRA)

$$u(c) = \frac{c^{1-\sigma} - 1}{1 - \sigma}$$

- Matching function (CES)

$$m(\theta) = \chi\theta(1 + \theta^{\alpha})^{\frac{-1}{\alpha}}$$

- Production function (linear)

$$f(x) = x$$

- One period is one month

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Calibration

appendix

Parameter	Definition	Value	Source
pre-calibrated			
$\hat{\beta}$	discount factor	0.9965	monthly frequency
ρ_r	retirement probability	0.0021	avg. worklife = 40 years
$\beta \equiv \hat{\beta}(1-\rho_r)$	adjusted discount	0.9944	0.93 annual
σ	relative risk aversion	2	standard in the literature
r	interest rate	0.003	yearly risk-free rate = 4%
λ_h	separation tenured	0.01	NLSY
λ_l	separation untenured	0.045	NLSY
γ^u	experience upgrade	0.0417	experience = 2 years
calibrated			
$\Delta = x_h - x_l$	productivity gap	0.1	
α	matching elasticity	0.6	
γ^d	experience depreciation	0.1	
$\chi_{ll}, \chi_{lh}, \chi_{hh}$	matching efficiencies	0.17, 0.25, 0.30	
ϕ	replacement rate	0.1	
κ	vacancy creation cost	0.20	
$\underline{a}$	borrowing constraint	-8	

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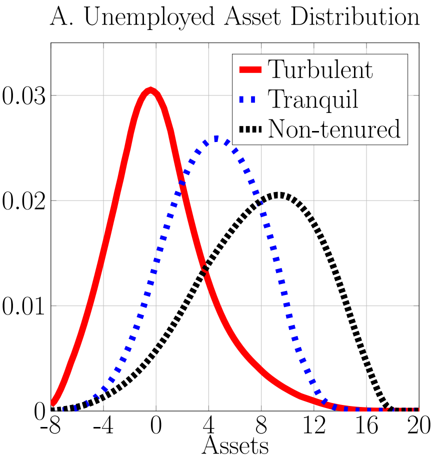
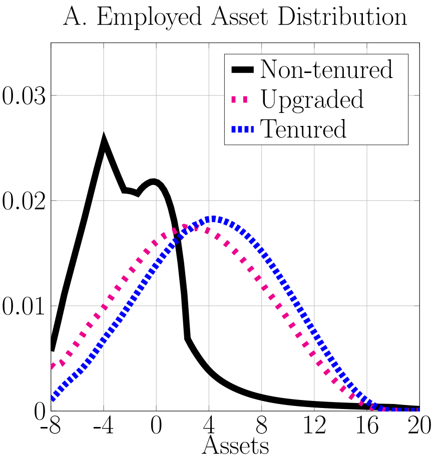
Asset Distribution





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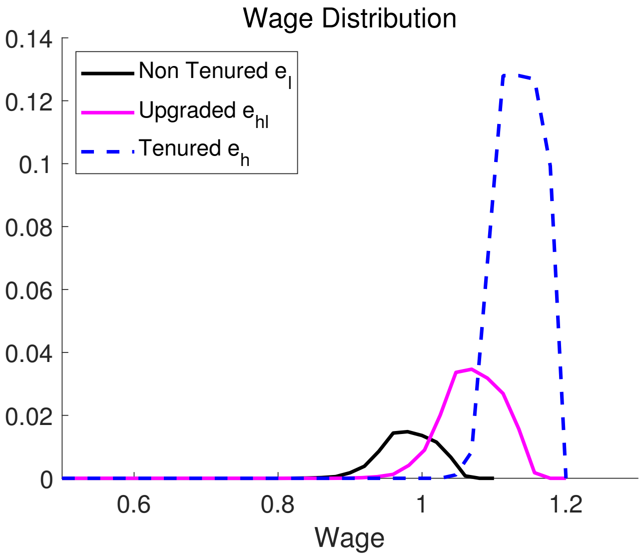
Wage Distribution



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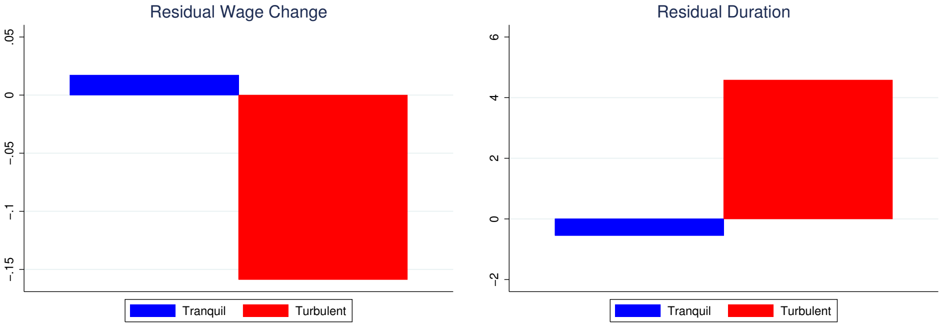
Model Predictions

appendix: unconditional averages

- For turbulen workerst:
  - Average reemployment wage growth $\mathbb{E}[\Delta w']$ is lower
  - Average unemployment duration $\mathbb{E}[\tau]$ is longer



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Model Predictions

appendix: regression tables

- Run wage and duration regressions
  - Controls: previous wage
- Same results as in the data
  - **Turbulence shock** associated with **lower** re-employment wages and **longer** unemployment duration
  - **Initial wealth** associated with **higher** re-employment wages and **longer** unemployment duration

Dependent variable:	$\Delta w'$		τ	
	(1)	(2)	(3)	(4)
(β_1) Turbulent	-0.187	-0.187	0.926	0.928
	(0.001)	(0.002)	(0.06)	(0.06)
(β_2) Initial Wealth		0.0117		0.21
		(0.0064)		(0.03)
Observations	44,571	44,571	44,571	44,571
R^2	0.368	0.161	0.055	0.059

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Higher Turbulence Risk

I. Self-insurance mechanisms (policies)

- Precautionary savings increase
  - Higher risk ⇒ more savings
- Precautionary search decreases
  - Higher risk ⇒ value of employment falls
  - Search for riskier jobs, lower finding rate, higher wages
  - Stronger effect for wealthy unemployed (unconstrained)

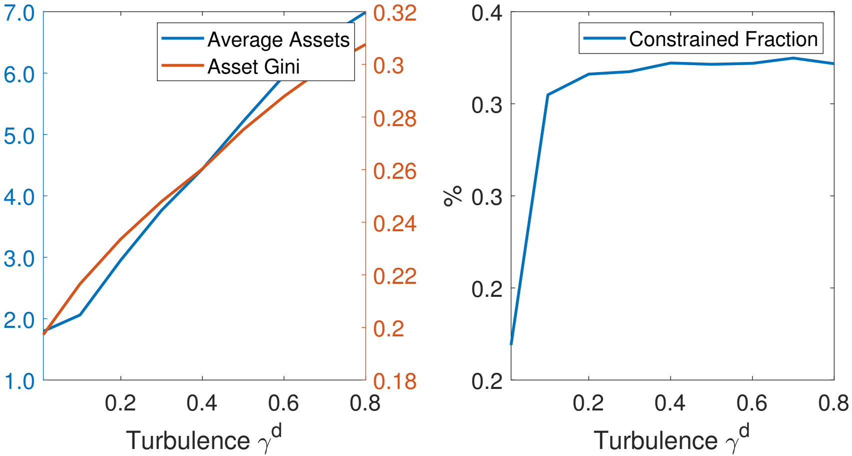
job search decisions saving decisions

II. Distributional effects

- More low experience workers x_l
- Lower finding rates, wages, savings and output

Higher Turbulence

Financial Markets



- Lower avg. assets and larger fraction of constrained worker

inequality

CRISTIANO: UPDATED

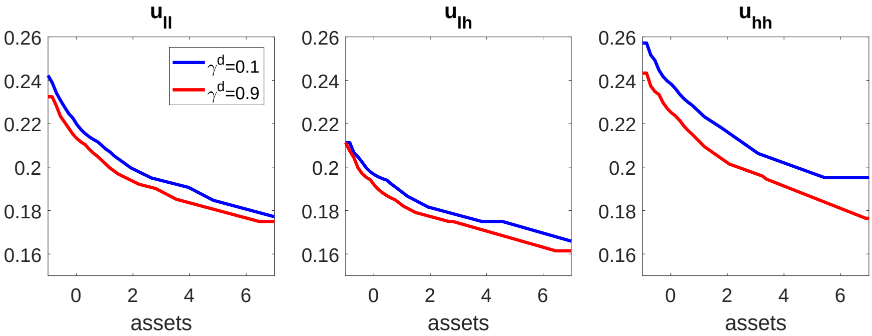


FIGURE: Job search policies for high and low turbulence risk γ^d

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Higher Turbulence

Appendix: Saving Decision

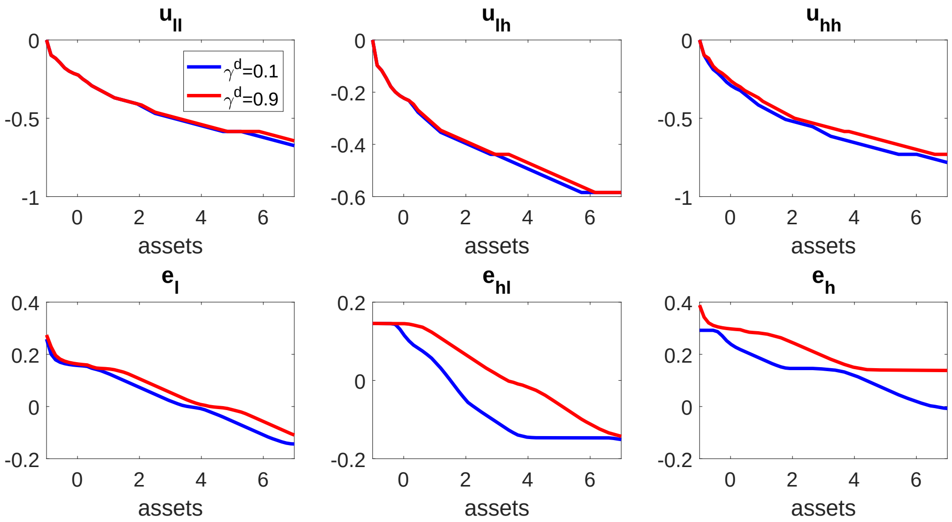
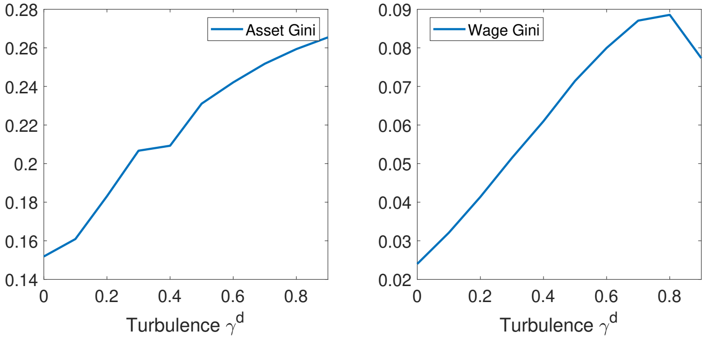


Figure: Savings policies for high and low turbulence risk

Higher Turbulence

Inequality



Non-monotonic effects on wealth and wage Gini

- Low γ^d: inequality $\uparrow$, diff btw turb vs. non-turb
- High γ^d: inequality $\downarrow$, all transitions are turbulent

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Welfare Analysis
Increase in Turbulence Risk

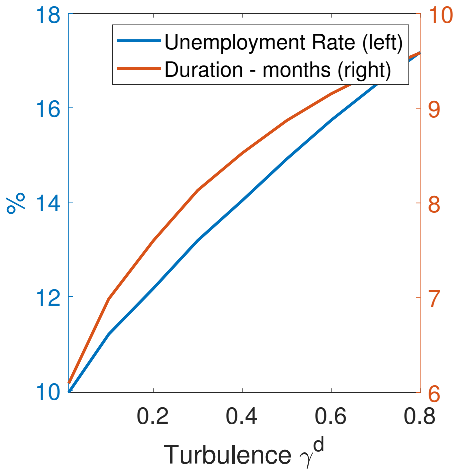
Higher turbulence reduces welfare:

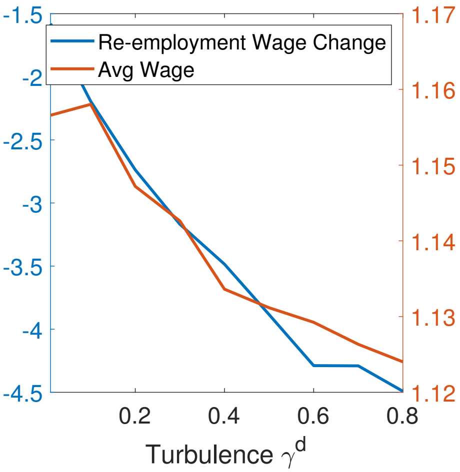
When turbulance risks $\uparrow$

- Positive effect: precautionary saving increases
- Negative effects:
  - experience loss $\uparrow$
  - value of employment $\downarrow$
  - probability of job finding $\downarrow$
- Losses outweigh gains
- Unemployed: Turbulent workers have the lowest welfare loss
- Employed: high skill workers have the highest welfare loss

Higher Turbulence

Appendix: Labour Market





- Higher unemployment rate and duration

Model Predictions

Regression Tables

	Residual Wage Change	Residual Duration
	(1)	(2)
turbulent	-0.156***	4.355***
	(0.000)	(0.094)
non-turbulent	0.017***	-0.798***
	(0.000)	(0.042)
$a_{0,m}$	0.007***	0.240***
	(0.000)	(0.037)
$a_{0,h}$	0.007***	0.370***
	(0.000)	(0.037)
Observations	159745	159745
R^2	0.892	0.062

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Welfare Mechanisms

appendix

$$(1+\lambda_u(a_0,w_0))^{1-\sigma} = \frac{\sum_{t=0}^{T-1}\beta^t u(\tilde{c}_t) + \beta^T E_{hh}(a_T, w_0)}{\sum_{t=0}^{T-1}\beta^t u(c_t) + \beta^T E_{hh}(a_T, w_0)}$$

$$(1+\lambda_e(a_0,w_0))^{1-\sigma} = \frac{\sum_{t=0}^{T-1}\beta^t u(c_t) + \beta^T E_{hh}(\tilde{a}_T, \tilde{w}_T)}{\sum_{t=0}^{T-1}\beta^t u(c_t) + \beta^T E_{hh}(a_T, w_0)}$$

$$(1+\lambda_{ea}(a_0,w_0))^{1-\sigma} = \frac{\sum_{t=0}^{T-1}\beta^t u(c_t) + \beta^T E_{hh}(\tilde{a}_T, w_0)}{\sum_{t=0}^{T-1}\beta^t u(c_t) + \beta^T E_{hh}(a_T, w_0)}$$

$$(1+\lambda_{ew}(a_0,w_0))^{1-\sigma} = \frac{\sum_{t=0}^{T-1}\beta^t u(c_t) + \beta^T E_{hh}(a_T, \tilde{w}_T)}{\sum_{t=0}^{T-1}\beta^t u(c_t) + \beta^T E_{hh}(a_T, w_0)}$$

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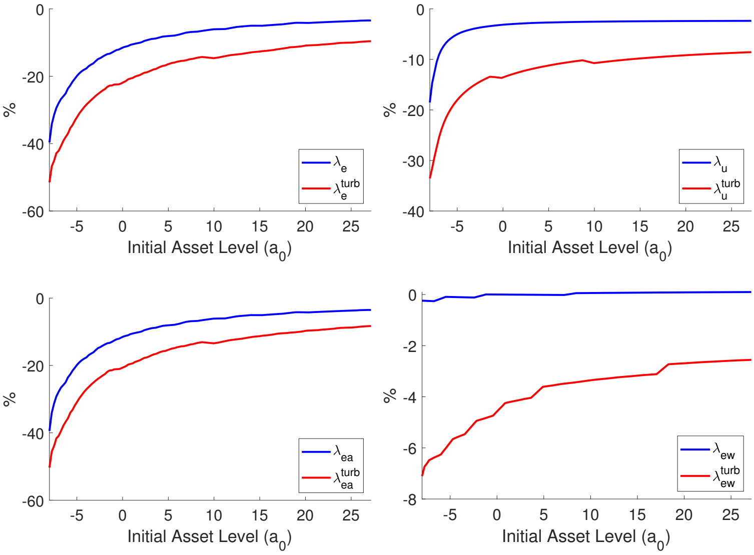
Turbulent vs Tranquil

Appendix: welfare losses



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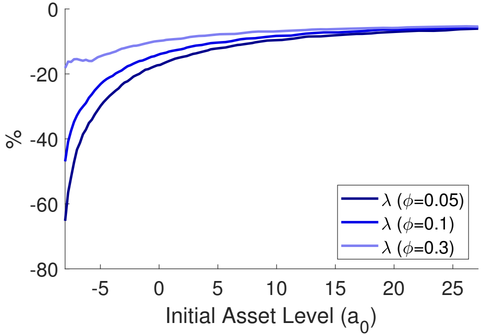
UI Analysis

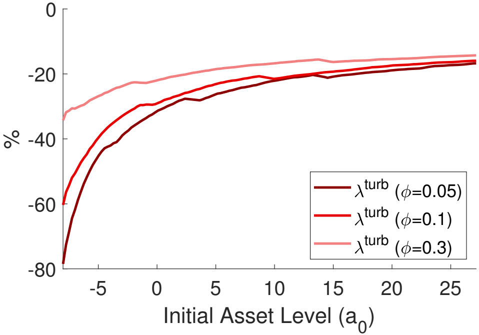
appendix: across steady state

	Tranquil					Turbulent				
ϕ	λ	λ_u	λ_e	λ_{ea}	λ_{ew}	λ	λ_u	λ_e	λ_{ea}	λ_{ew}
0.05	−11.3%	−2.8%	−9.0%	−9.0%	0.02%	−24.6%	−11.6%	−17.9%	−16.6%	−3.8%
0.1	−9.7%	−2.7%	−7.4%	−7.4%	0.02%	−22.6%	−11.0%	−15.8%	−14.6%	−3.6%
0.3	−7.5%	−3.1%	−4.7%	−4.7%	0.01%	−17.9%	−10.6%	−10.6%	−9.4%	−2.9%

UI Analysis

Appendix: across steady state





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