Perceived Unemployment Risks over Business Cycles

Tao Wang[1] William Du[2] Adrian Monninger[2] Xincheng Qiu[3]

[1]Bank of Canada

[2]Johns Hopkins University

[3]Guanghua School of Management, Peking University

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Introduction

- Unemployment risk amplifies business cycles fluctuations in state-of-the-art INCOMPLETE-MARKET HA-MACRO MODELS (Bayer et al., 2019; Den Haan et al., 2018; Broer et al., 2021; Graves, 2020)
  1. ex-ante channel: fears of unemployment $\rightarrow$ precautionary saving $\rightarrow$ consumption $\downarrow$
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- Standard approach does not distinguish (a) perceived risk, (b) true risk, (c) realized outcome
  - full-information-rational-expectations (FIRE) assumes (a) perceived risk = (b) true risk
  - empirical implementation assumes (b) true risk = (c) realized outcome

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  - empirical implementation assumes (b) true risk = (c) realized outcome

- This paper aims to:
  - measure these three conceptually different objects
  - quantify the consumption response to unemployment risks and decompose it into (a), (b), (c)

This paper

1. Separately measure
   (a) ex-ante perceived risk: survey expectations in Survey of Consumer Expectations
   (b) ex-ante true risk: real-time machine-efficient forecasts à la Bianchi et al. (2022)
   (c) ex-post realized outcome: observed transition rates in Current Population Survey

   for job-finding rate and separation rate (the flow approach to unemployment)

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2. Plug into the workhorse heterogeneous-agent model with unemployment risk and quantify consumption response to unemployment risk due to
   - precautionary behavior from (a)
   - ex-post response from (c)
   - **under**/over insurance due to misperception (a) − (b)

Data

Perceived and realized transition rates

- Realized job-finding and separation rates from Current Population Survey:

$$JF_t = \frac{UE_t}{U_{t-1}}, \quad JS_t = \frac{EU_t}{E_{t-1}}$$

where gross flows from U to E and E to U are measured using CPS panel dimension

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- Perceived job-finding and separation rates from Survey of Consumer Expectations:
  - $\widetilde{JF}_t$: *"Suppose you were to lose your main job this month, what do you think is the percent chance that you will find a job within the following 3 months?"*
  - $\widetilde{JS}_t$: *"What do you think is the percent chance that you will lose your main (for those with multiple jobs) or current (for those with single job) job during the next 12 months?"*

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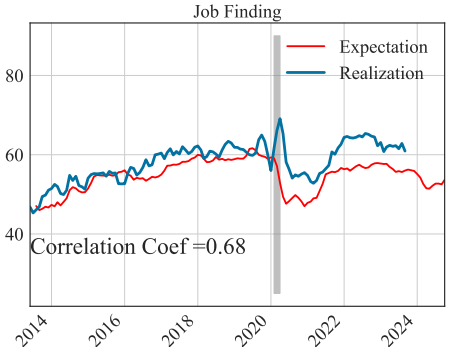
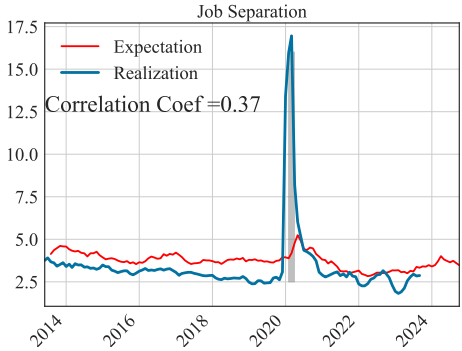
- Time (dis)aggregation from monthly (12-month) to 3-month-horizon rates

Perceived and realized transition rates are highly correlated

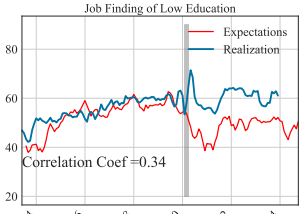


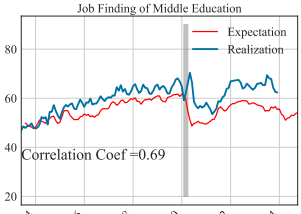


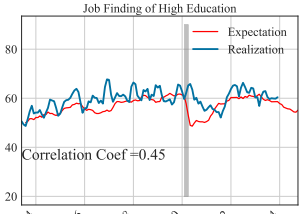
- In a 3-month horizon
- Even higher correlation without the pandemic
- Suggesting that perceptions do contain predictable future labor market movements

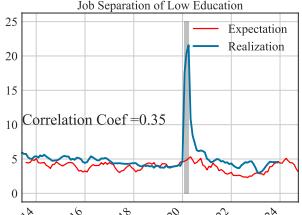
[employment status]

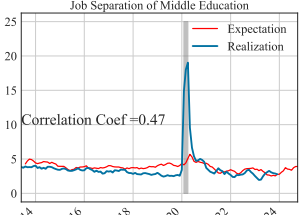
Perceived and realized transition rates remain correlated within education

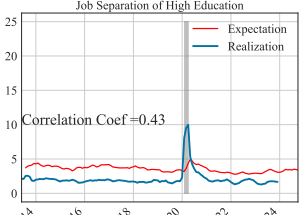












Forecast errors of perceived unemployment risks

- To systematically assess the relationship between perceived and realized risks, define

$$\mathrm{FE}^{JF}_{t,t+3} = \widetilde{\mathrm{JF}}_{t+3|t} - \mathrm{JF}_{t,t+3}$$

  - $\widetilde{\mathrm{JF}}_{t+3|t}$ represents the perceived job-finding rate for 3 months ahead at time t
  - $\mathrm{JF}_{t,t+3}$ is the realization over the same horizon

- To test informational efficiency of perceived risks Coibion and Gorodnichenko (2015); Fuhrer (2018); Coibion et al. (2018)

$$\mathrm{FE}^{JF}_{t,t+3} = \alpha + \beta \mathrm{FE}^{JF}_{t-3,t} + \gamma X_{t-3} + \epsilon_t$$

  - Null hypothesis under FIRE: $\beta = 0$
  - $\beta > 0$: past errors persist into future forecasts, reflecting information rigidity

Auto-regressions of forecast errors (FE) imply perceptions are inefficient

	JF	JF LowEdu	JF MidEdu	JF HighEdu	JS	JS LowEdu	JS MidEdu	JS HighEdu
Constant	-0.027***	-0.027***	-0.038***	-0.024***	0.003*	0.076***	0.079***	0.051***
	(0.004)	(0.007)	(0.005)	(0.004)	(0.002)	(0.009)	(0.010)	(0.009)
lag_FE_jf	0.256***	0.545***	0.272***	0.183**				
	(0.087)	(0.076)	(0.084)	(0.088)				
lag_FE_js					0.131	0.202**	0.267***	0.554***
					(0.091)	(0.089)	(0.088)	(0.075)
Observations	121	124	124	124	121	124	124	124
R^2	0.068	0.295	0.079	0.034	0.017	0.040	0.070	0.308
Adjusted R^2	0.060	0.289	0.071	0.026	0.009	0.032	0.062	0.302
F Statistic	8.628***	51.049***	10.452***	4.297**	2.062	5.103**	9.197***	54.322***

*p<0.1; **p<0.05; ***p<0.01

Ex-ante Comparison

(Proxy for) true ex-ante transition risk

- Machine-learning efficient forecasts à la Bianchi et al. (2022):
  1. Lasso forecasting model $JF_{t+3|t} = \Gamma^t X_t + \epsilon_t \rightarrow \widehat{\Gamma}^{t*}$ in the 10-year historical sample up to t
  2. Machine-efficient forecast $\widehat{JF}^*_{t+3|t} = \widehat{\Gamma}^{t*} X_t$ as a 3-month-ahead out-of-sample prediction for t

[real time]

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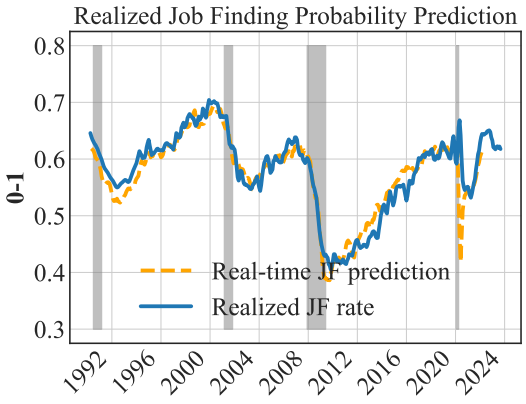
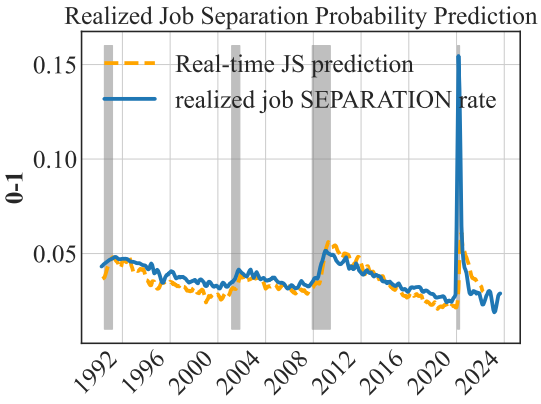
- Data: $600+$ time series
  - Real-time macroeconomic realizations, such as inflation, unemployment rate, GDP growth, etc.
  - Professional forecasts of the macroeconomy from Survey of Professional Forecasters (SPF)
  - Realized worker flow rates
  - Household expectations from Michigan Survey of Consumers (MSC)

[real time]

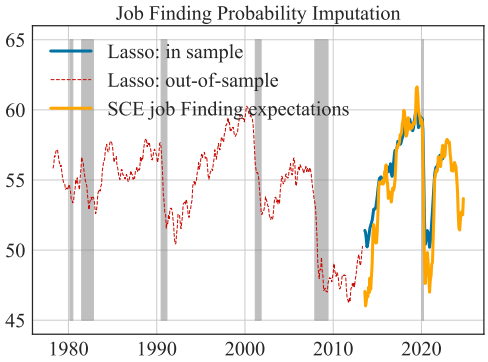
Machine-learning forecast of unemployment risks

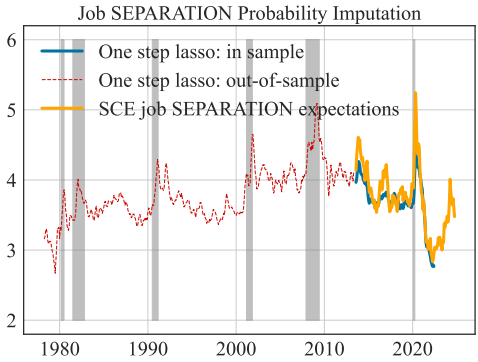




- Expectations in MSC and real-time UE rate are the most important predictors
  - e.g., income expectations, inflation expectations, news heard, durable/vehicle-buying intentions, household finance expectations, etc.

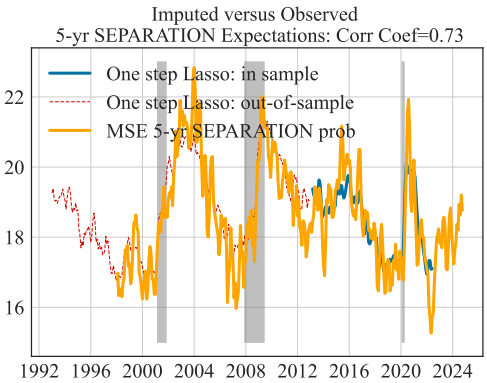
Backcasting beliefs: what were people thinking before SCE?

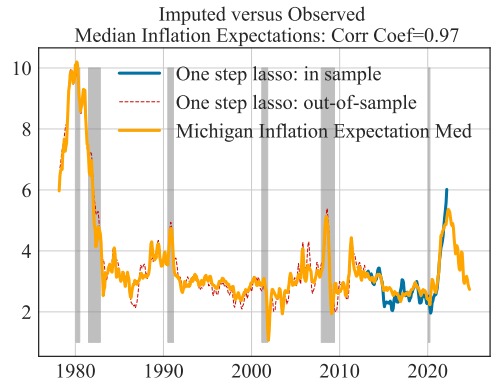




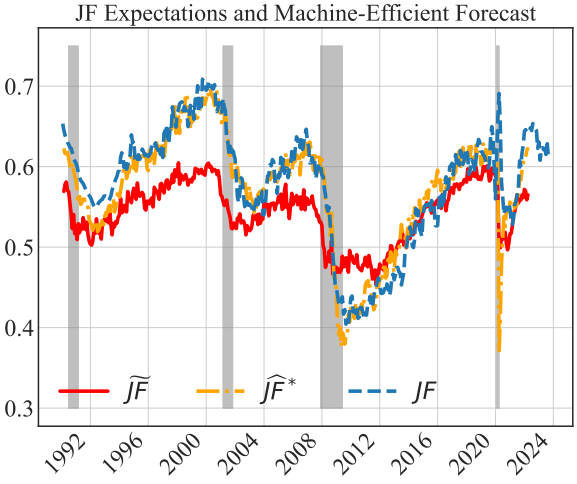
Validating the backcasting method

Imputed Beliefs versus Observed Expectations in MSC



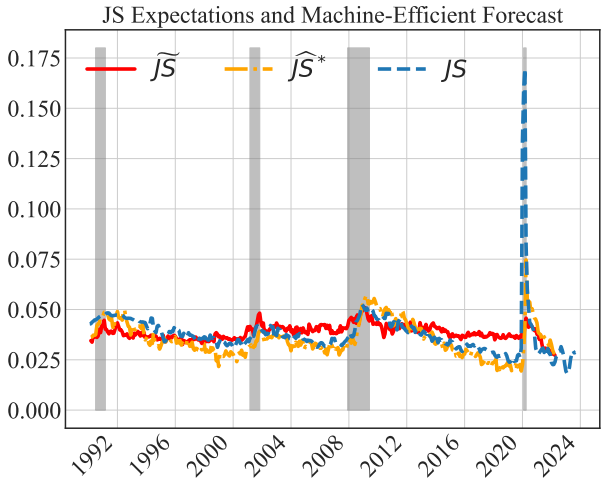


Surveys versus machine: job-finding



$$\log(\widetilde{JF}_{t+3|t}) = 1.92 + \mathbf{0.51} \log(\widehat{JF}^*_{t+3|t}) + \epsilon_t$$

Surveys versus machine: job-separation



$$\log(\widetilde{JS}_{t+3|t}) = 1.13 + \mathbf{0.19}\log(\widehat{JS}^*_{t+3|t}) + \epsilon_t$$

Information rigidity

- Sticky expectation (Mankiw and Reis, 2002; Carroll, 2003; Auclert et al., 2020)

$$\log(\widetilde{JF}_{t+3|t}) = (1-\lambda)\log(\widetilde{JF}_{t+2|t-1}) + \underbrace{\lambda}_{\approx 0.51}\log(JF^*_{t+3|t})$$

$$\log(\widetilde{JS}_{t+3|t}) = (1-\lambda)\widetilde{JS}_{t+2|t-1} + \underbrace{\lambda}_{\approx 0.19}\log(JS^*_{t+3|t})$$

- Intuition: $1-\lambda$ fraction of agents who did not update and λ fraction who update as FIRE

Heterogeneity

$$\begin{aligned}
\mathsf{JF}_{i,t} &= \eta_{i,t}\mathsf{JF}_t \\
\widetilde{\mathsf{JF}}_{i,t} &= \mathbb{E}_i(\mathsf{JF}_{i,t}) = \mathbb{E}_i(\eta_{i,t}\mathsf{JF}_t) \\
\widetilde{\mathsf{JF}}_t &= \frac{\sum \mathbb{E}_i(\mathsf{JF}_{i,t})}{N} \stackrel{?}{=} \mathsf{JF}_t
\end{aligned}$$

- Depends on distribution of $\eta_{i,t}$ and the shape of $\mathbb{E}_i()$
- Mueller et al. (2021): ex-ante heterogeneity + underreaction to variations in JF *across workers* and *over unemployment spells* $\rightarrow$ underinsurance $\rightarrow$ amplified dispersion in JF rates
- This paper: underreaction to variations in unemployment risks over **business cycles**

Distribution of unemployment risks

- Repeat the exercise with q-th percentile perceived risks $\widetilde{JF}^q$ and $\widetilde{JS}^q$, $\forall q \in \{0.25, 0.5, 0.75\}$
- Whose expectations react to their real-time unemployment risks the most?

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$$\log(\widetilde{JF}^{0.25}_{t+3|t}) = -1.55 + \mathbf{1.22}\log(\widehat{JF}^{*}_{t+3|t}) + \epsilon_t \qquad \log(\widetilde{JS}^{0.25}_{t+3|t}) = -0.42 + \mathbf{0.46}\log(\widehat{JS}^{*}_{t+3|t}) + \epsilon_t$$

$$\log(\widetilde{JF}^{0.5}_{t+3|t}) = 1.54 + \mathbf{0.63}\log(\widehat{JF}^{*}_{t+3|t}) + \epsilon_t \qquad \log(\widetilde{JS}^{0.5}_{t+3|t}) = 1.06 + \mathbf{0.68}\log(\widehat{JS}^{*}_{t+3|t}) + \epsilon_t$$

$$\log(\widetilde{JF}^{0.75}_{t+3|t}) = 3.62 + \mathbf{0.20}\log(\widehat{JF}^{*}_{t+3|t}) + \epsilon_t \qquad \log(\widetilde{JS}^{0.75}_{t+3|t}) = 2.57 + \mathbf{0.27}\log(\widehat{JS}^{*}_{t+3|t}) + \epsilon_t$$

Observable heterogeneity: education

$$\log(\widetilde{JF}^{LEdu}_{t+3|t}) = 1.28 + \mathbf{0.66}\log(\widehat{JF}^{*LEdu}_{t+3|t}) + \epsilon_t$$

$$\log(\widetilde{JF}^{MEdu}_{t+3|t}) = 2.53 + \mathbf{0.36}\log(\widehat{JF}^{*MEdu}_{t+3|t}) + \epsilon_t$$

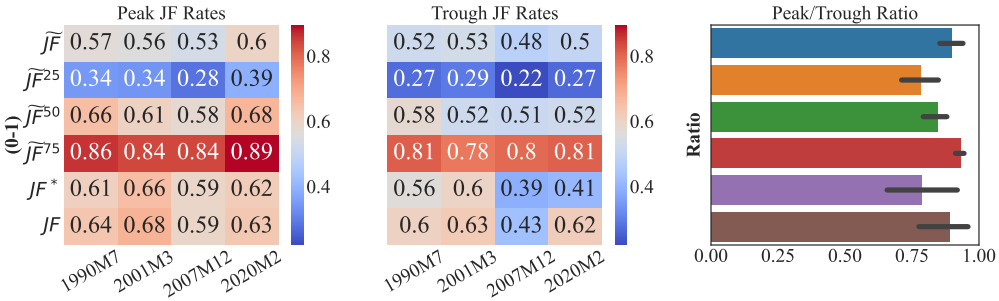
$$\log(\widetilde{JF}^{HEdu}_{t+3|t}) = 1.87 + \mathbf{0.53}\log(\widehat{JF}^{*HEdu}_{t+3|t}) + \epsilon_t$$

$$\log(\widetilde{JS}^{LEdu}_{t+3|t}) = 1.1 + \mathbf{0.17}\log(\widehat{JS}^{*LEdu}_{t+3|t}) + \epsilon_t$$

$$\log(\widetilde{JS}^{MEdu}_{t+3|t}) = 0.95 + \mathbf{0.35}\log(\widehat{JS}^{*MEdu}_{t+3|t}) + \epsilon_t$$

$$\log(\widetilde{JS}^{HEdu}_{t+3|t}) = 1.08 + \mathbf{0.33}\log(\widehat{JS}^{*HEdu}_{t+3|t}) + \epsilon_t$$

Business cycle patterns of risks and perceptions



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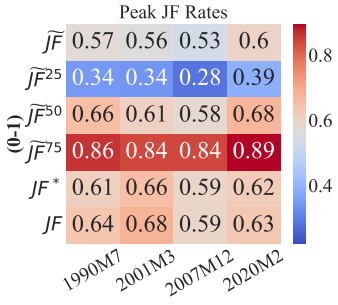
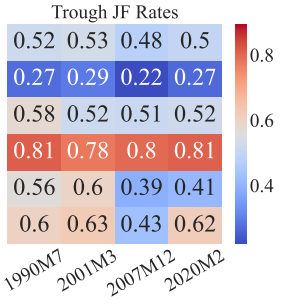
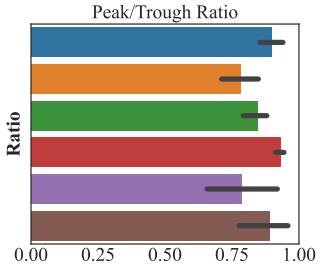
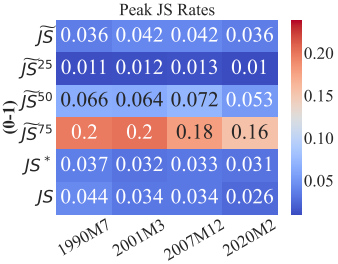
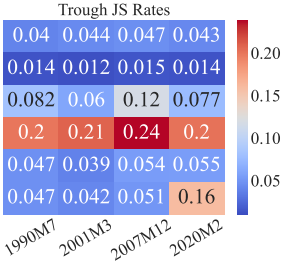
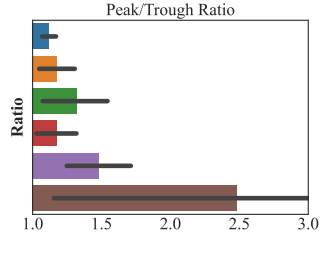












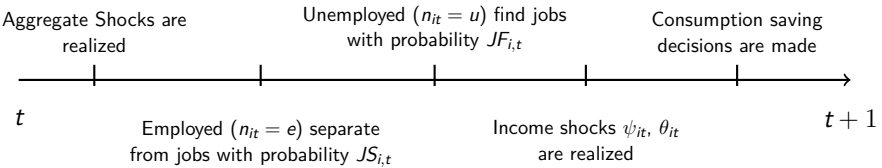
Empirical Findings

- Ex-ante perceived unemployment risks are predictive of ex-post realized outcomes
- But average perceived risks are "sticky" relative to true risks
- Explanation I: **information rigidity** – agents don't update macro conditions instantaneously
- Explanation II: **risk heterogeneity** – people face risks and form expectations differently

Model

Model elements

- Buffer-stock consumers
- Uninsured idiosyncratic income risks: persistent job spells, persistent+ transitory wage risks
- No-borrowing constraints
- Homogeneous/heterogeneous unemployment risks
- monthly frequency



Household block of the model

$$v_t\left(\mathbf{m}_{it}, e_{it}, n_{it}\right) = \max_{\{\mathbf{c}_{it}, \mathbf{a}_{it}\}} \left\{ U\left(\mathbf{c}_{it}\right) + \beta_i (1 - D) \mathrm{E}_{\mathrm{t}} \left[v_{t+1}\left(\mathbf{m}_{t+1}, e_{it+1}, n_{it+1}\right) \right] \right\}$$

$$\begin{aligned} s.t. \qquad \mathbf{a}_{it} &= \mathbf{m}_{it} - \mathbf{c}_{it} \\ \mathbf{a}_{it} + \mathbf{c}_{it} &= \mathbf{z}_{it} + (1 + r_t^a)\mathbf{a}_{it-1} \\ \mathbf{a}_{it} &\geq 0 \end{aligned}$$

Household block of the model: income process

Wage

$$\mathbf{z}_{i,t} = e_{i,t}\zeta_{it}$$

$$\log e_{i,t} = \rho_e \log e_{i,t-1} + \eta_{i,t}, \quad \eta_{i,t} \sim \mathcal{N}(0, \sigma_e^2)$$

$$\zeta_{it} = \begin{cases} \theta_{it}, \text{ if employed : } n_{i,t} = e \\ \\ \theta_{it}\gamma, \text{ if unemployed : } n_{i,t} = u \end{cases}$$

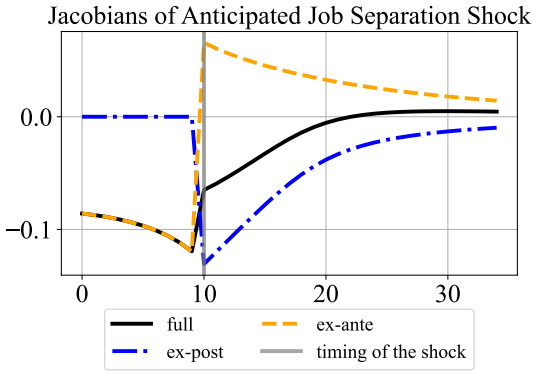
Labor market transitions

$$p(n_{i,t+1} = e | n_{i,t} = u) = JF_{i,t}$$
$$p(n_{i,t+1} = u | n_{i,t} = e) = JS_{i,t}$$

Calibration

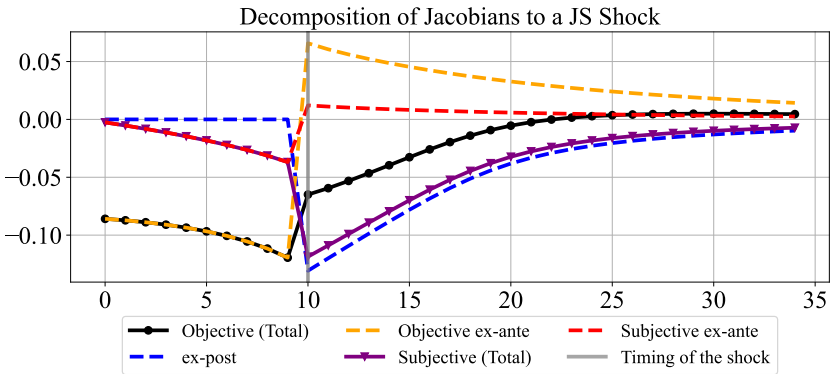
Description	Parameter	Value	Source/Target
CRRA	CRRA	2	Standard
Real Interest Rate	r	$1.05^{\frac{1}{12}} - 1$	5% annualized real rate
UI replacement rate	γ	0.5	50% replacement rate
Persistence of idiosyncratic income process	ρ_e	0.997	Kekre (2023)
Std Dev of idiosyncratic income process	σ_e	0.057	Kekre (2023)
Std Dev of Log Transitory Shock	σ_θ	0.244	Kekre (2023)
Steady state Job Finding Rate	JF	0.25	CPS
Steady state Job Separation Rate	JS	0.017	CPS
Discount Factor	β	0.988	Quarterly MPC $= 0.21$

Decomposition of aggregate consumption response



- Sequence-space Jacobian method Auclert et al. (2021)
- Jacobian decomposed into (a) ex-ante precautionary response (b) ex-post shock response
- $\beta = 0.97$ matched to a target average quarterly MPC of 0.21
- UI replacement ratio $\gamma = 0.5$

Decomposition of Subjective Consumption Jacobians



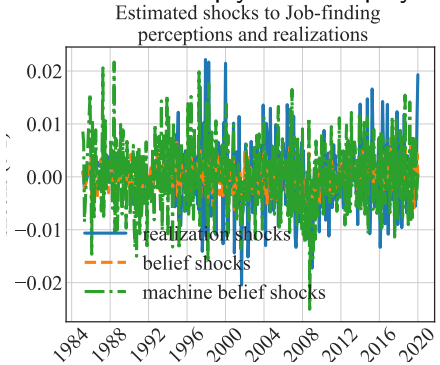
- Subjective under-perceiving true risks → underinsurance ex-ante and sharper post-shock drop in consumption

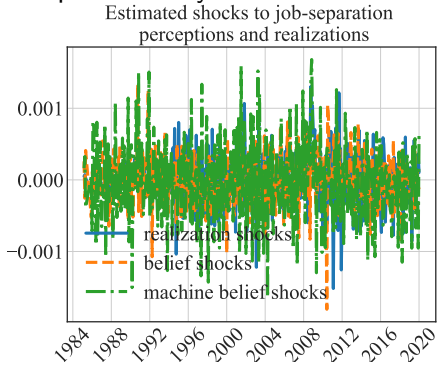
Quantifying consumption impacts of unemployment risks

$$\text{Overal Impact} = \text{Sensitivty} \times \text{shocks}$$

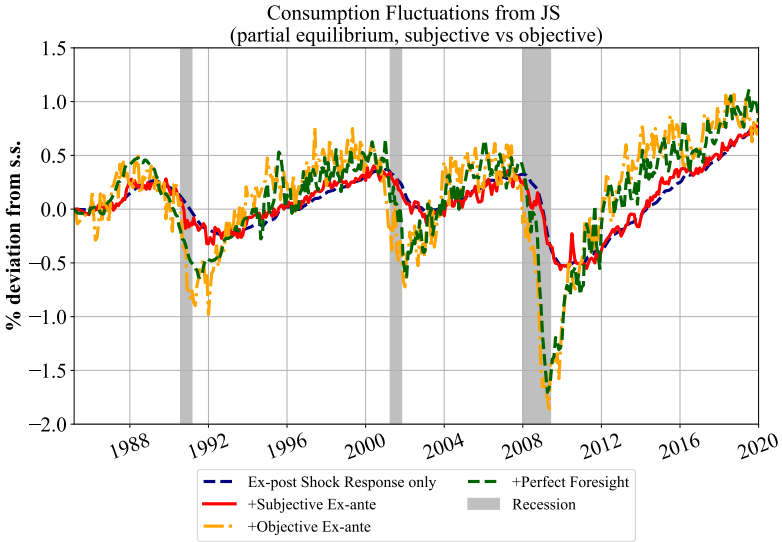
- Simulating the partial equilibrium aggregate consumption deviations from the steady state based on estimated AR(1) and shocks of realized rates, perceived risks, and machine forecast

- Validation: shocks imply an unemployment rate path broadly close to the data

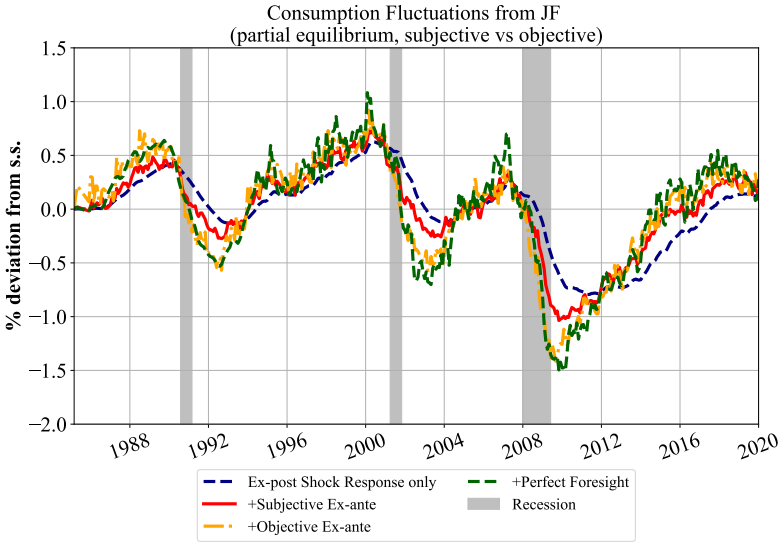




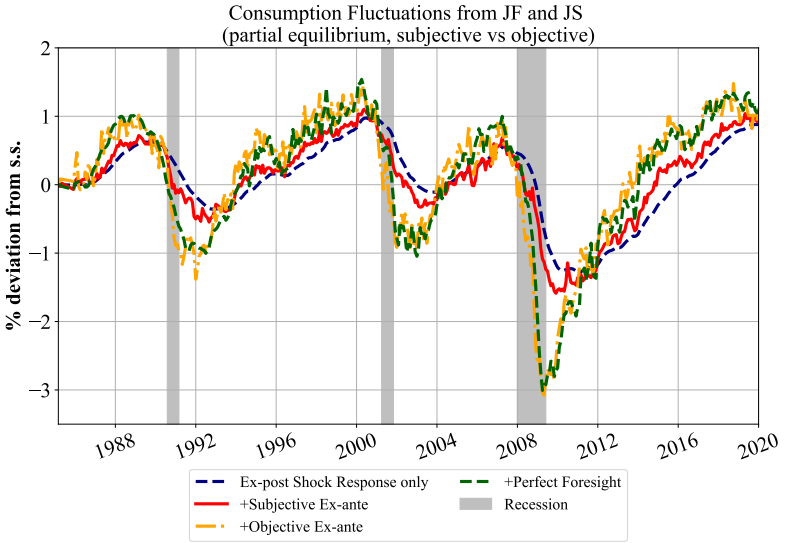
Consumption impacts of unemployment risks: job separation



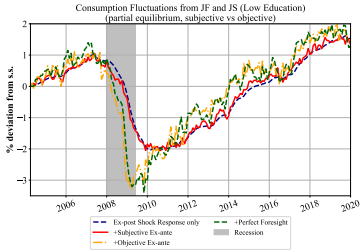
Consumption impacts of unemployment risks: job finding

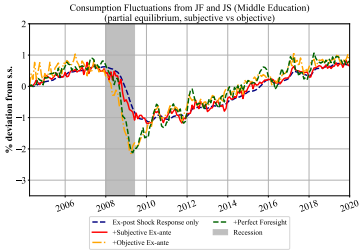


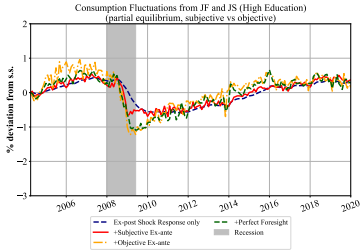
Consumption impacts of unemployment risks: separation+finding



Quantification by education: JS+JF







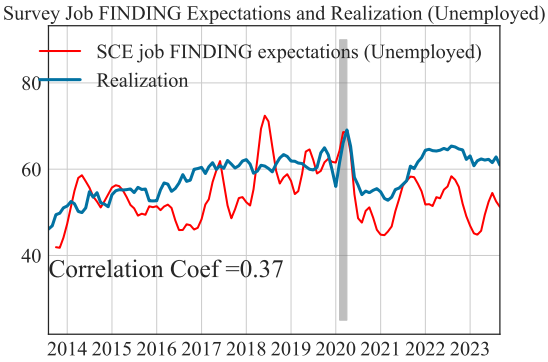
- Group with the larger risk exposure has stickier belief, hence more underinsured
- Amplification due to heterogeneous risk exposures + heterogeneous belief distortions

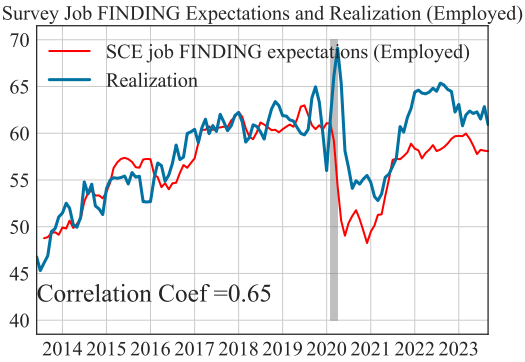
Conclusion

- We quantify the aggregate consumption fluctuations due to
  - Perceived risks $\rightarrow$ ex-ante responses
  - Realized shocks $\rightarrow$ ex-post impacts
  - True risks (a counterfactual benchmark as opposed to perceived risks)
- Ex-ante responses are important and sizable in past recessions
- But the **stickiness** of risk perceptions limited the role of precautionary saving motives
- Both risks and perceptions are widely **heterogeneous**
- The correlation pattern of risk exposure and belief distortion as an **amplification** mechanism

Appendix

JF perceptions by the unemployed and employed





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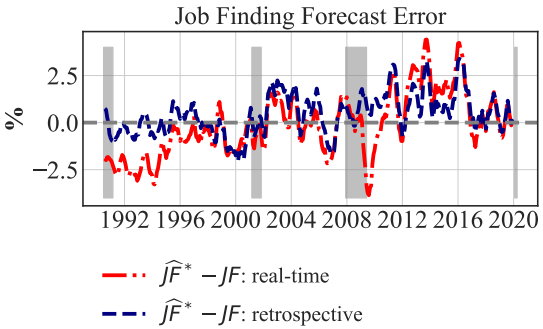
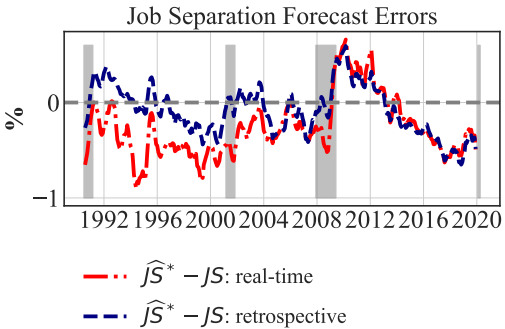
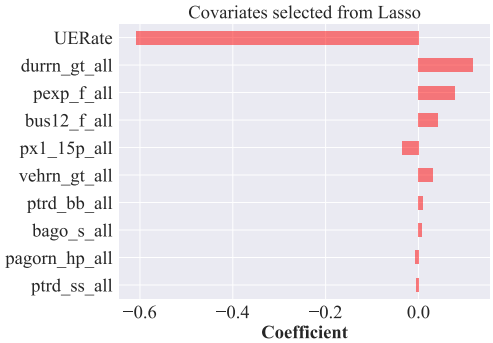
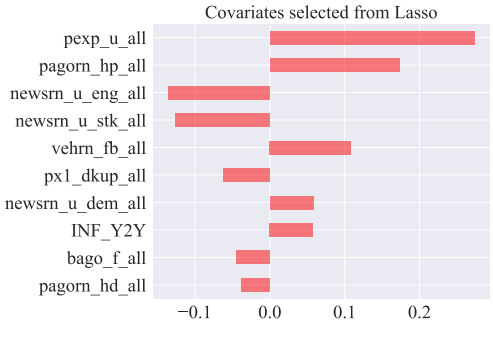
Why is real-time important?





The most important covariates of perceived unemployment risks

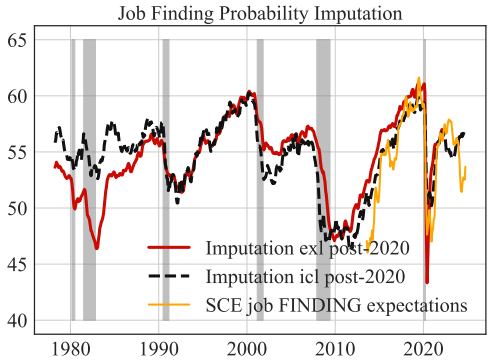


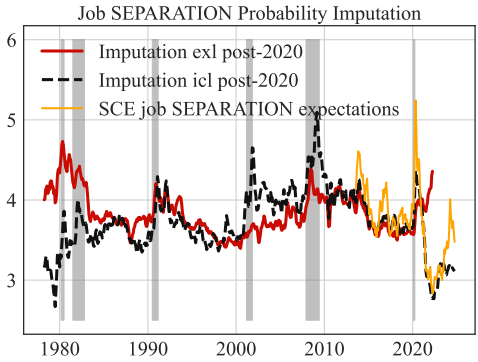


- UERate: real-time unemployment rate.
- Durrn_gt_all: good time to buy durables.
- Pexp_f_all: expecting better finance.
- Bus12_f_all: better business conditions.
- Px1_15p_all: expected inflation above 15 percent.
- Vehrn_gt_all: good time to buy vehicles.
- ptrd_bb_all: better off financially now and future.
- bago_s_all: same business conditions.
- Pagorn_hp_all: worse finance due to higher prices.
- Ptrd_ss_all: same personal finance now and future.

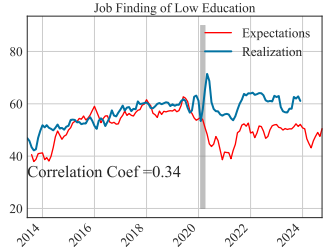
- Pexp_u_all: expecting worse personal finance.
- Newsrn_u_eng_all: heard unfavorable news about energy crisis.
- Newsrn_u_stk_all: heard about unfavorable news regarding stock market.
- Vehrn_fb_all: bad time to buy vehicles due to uncertain future.
- Px1_dkup_all: do not know about future inflation.
- Newsrn_u_dem_all: heard unfavorable news about lower consumer demand.
- INF_Y2Y: real-time inflation rate.
- Bago_f_all: better business conditions.
- Pagorn_hd_all: worse personal finance due to higher debt.

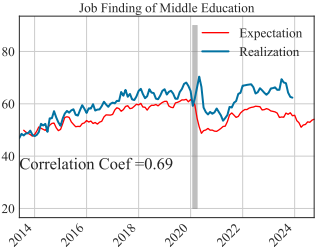
Imputing beliefs including or excluding the Covid era

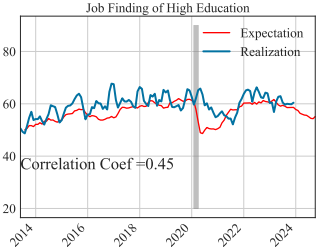


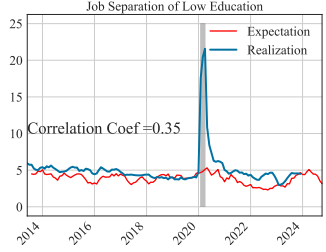


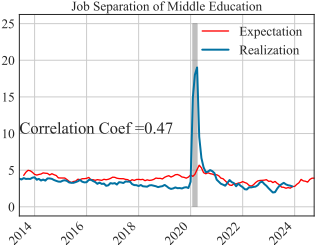
Observable heterogeneity: education

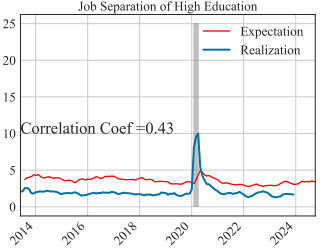






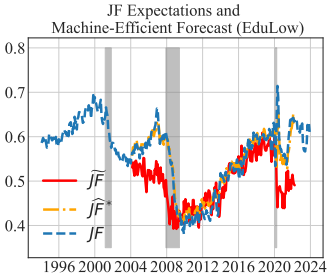


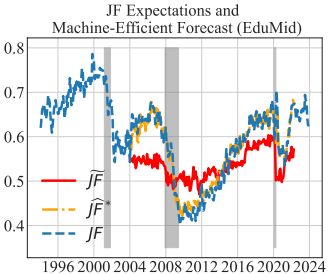


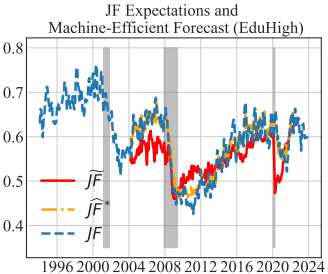


- In recessions, low-educ workers lower perceived job finding more than high-educ ones but the finding rate did not drop as much as high-educ workers

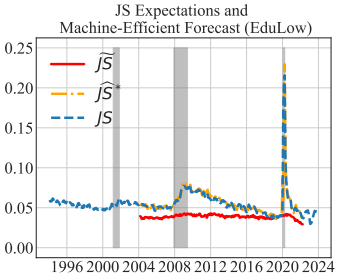
Belief distortions by education: job finding

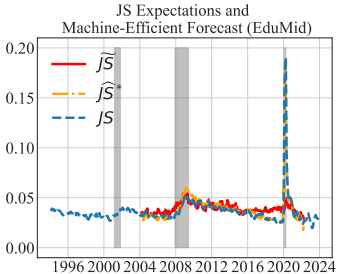


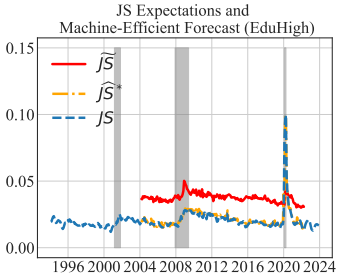




Belief distortions by education: job separation







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