

Perceived Unemployment Risks over Business Cycles

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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; Haan et al., 2018; Broer et al., 2021; Graves, 2020)
 1. **ex-ante** channel: fears of unemployment \rightarrow precautionary saving \rightarrow consumption \downarrow
 2. **ex-post** channel: realized unemployment \rightarrow reduced income \rightarrow consumption \downarrow
- 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
- This paper aims to:
 - measure these three conceptually different objects
 - quantify the consumption response to unemployment risks due to (a), (b), (c)

This paper

1. Separately measure

- (a) ex-ante **perceived** risk: expectations (and backcasts) 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)

2. “Plug” into the workhorse heterogeneous-agent model with unemployment risk and quantify consumption response to unemployment risk due to

- ex-ante precautionary responses to (a)
- ex-post impacts of (c)
- **under/over** insurance due to misperception (a) – (b)

Related Literature

1. Labor market/income expectations

Mueller and Spinnewijn (2023); Mueller, Spinnewijn and Topa (2021); Arni (2013); Spinnewijn (2015); Conlon, Pilossoph, Wiswall and Zafar (2018); Balleer, Duernecker, Forstner and Goensch (2021); Rozsypal and Schlafmann (2023); Caplin, Gregory, Lee, Leth-Petersen and Sæverud (2023); Wang (2023); Koşar and Van der Klaauw (2025); Mitra (2024); Lee (2025)

→ focus on the **business cycle** fluctuations of these perceptions

2. Subjective job risk perceptions in standard macro models

- incomplete market model: Pappa, Ravn and Sterk (2023); Bardóczy and Guerreiro (2023)
- search and matching model: Morales-Jiménez (2022); Menzio et al. (2022); Rodríguez (2023)

→ directly incorporating **patterns of households' perceived risks** in the model

3. Real-time forecasts to proxy uncertainty and rational benchmark

Jurado, Ludvigson and Ng (2015); Rossi and Sekhposyan (2015); Bianchi, Ludvigson and Ma (2022)

→ apply it to forecasting **labor risks**

Data

Perceived and realized transition rates

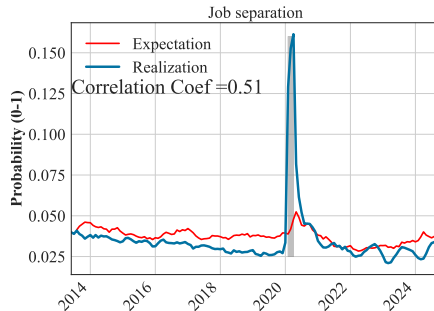
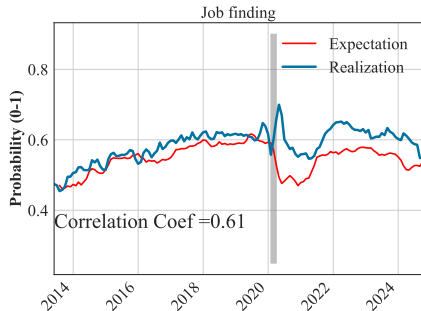
- **Realized** job-finding and separation rates from Current Population Survey:

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

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

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

Perceived and realized transition rates are highly correlated



- Over 3-month horizon
- A higher correlation if the month of Covid outbreak excluded
- Suggesting that perceptions do contain predictable future labor market movements
- Such pattern remains within each group: [by employment status](#) [by education](#)

Forecast errors of perceived unemployment risks

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

$$FE_{t,t+3}^{JF} = \widetilde{JF}_{t+3|t} - JF_{t,t+3}$$

- $\widetilde{JF}_{t+3|t}$ represents the perceived job-finding rate for 3 months ahead at time t
- $JF_{t,t+3}$ is the realization over the same horizon
- To test informational efficiency of perceived risks Coibion and Gorodnichenko (2015); Fuhrer (2018); Coibion et al. (2018)

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

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

Positive serial correlation of forecast errors implies inefficient **perceptions**

	JF	JF LowEdu	JF MidEdu	JF HighEdu	JS	JS LowEdu	JS MidEdu	JS HighEdu
Constant	-0.027*** (0.004)	-0.027*** (0.007)	-0.038*** (0.005)	-0.024*** (0.004)	0.003* (0.002)	0.076*** (0.009)	0.079*** (0.010)	0.051*** (0.009)
lag_FE_jf	0.256*** (0.087)	0.545*** (0.076)	0.272*** (0.084)	0.183** (0.088)				
lag_FE_js					0.131 (0.091)	0.202** (0.089)	0.267*** (0.088)	0.554*** (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***

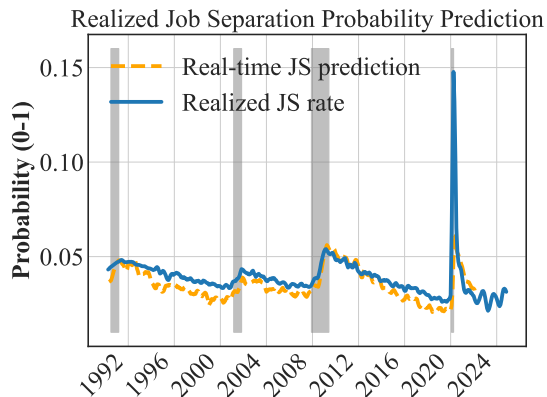
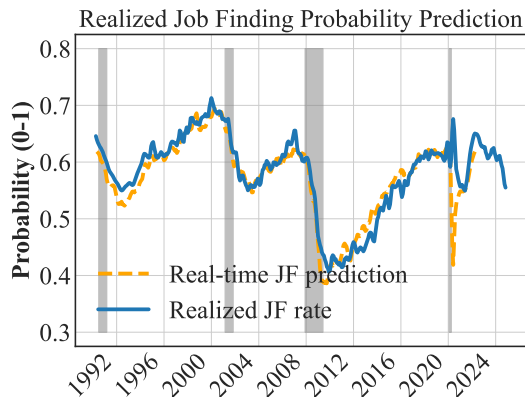
*p<0.1; **p<0.05; ***p<0.01

Ex-ante Comparison

(Proxy for) true ex-ante unemployment risk

- Machine-learning efficient forecasts à la Bianchi et al. (2022):
 1. LASSO forecasting model $JF_{t+3|t} = \Gamma^t X_t + \epsilon_t$ with real-time data up to t
 2. Use the optimal model $\widehat{JF}_{t+3|t}^* = \widehat{\Gamma}^{t*} X_t$ to generate one-step out-of-sample prediction
 3. Repeat for each t
- 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)

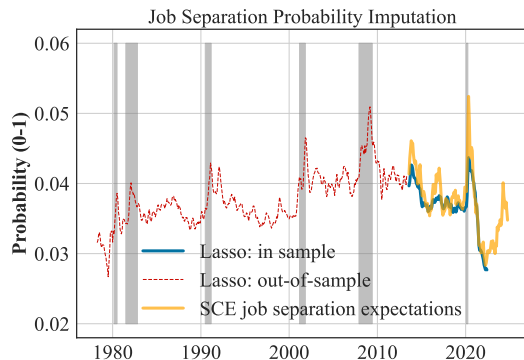
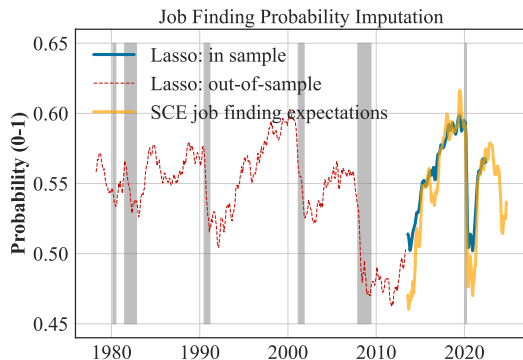
Machine-learning forecast of unemployment risks



- Expectations in the 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.

►► Why real-time?

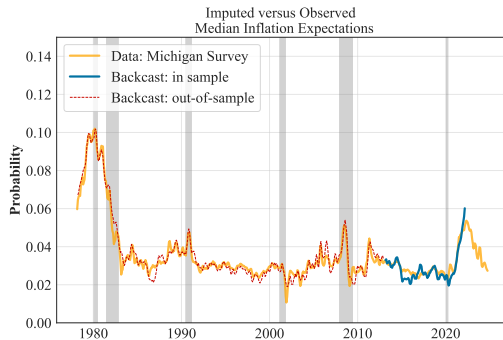
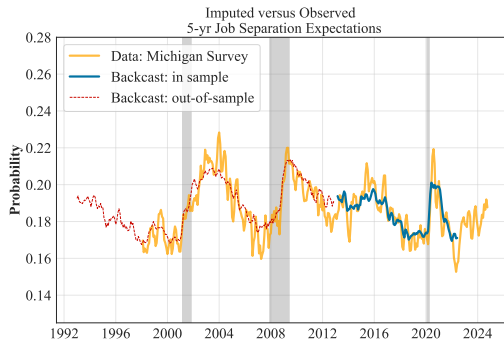
Backcasting beliefs: what were people thinking before the SCE?



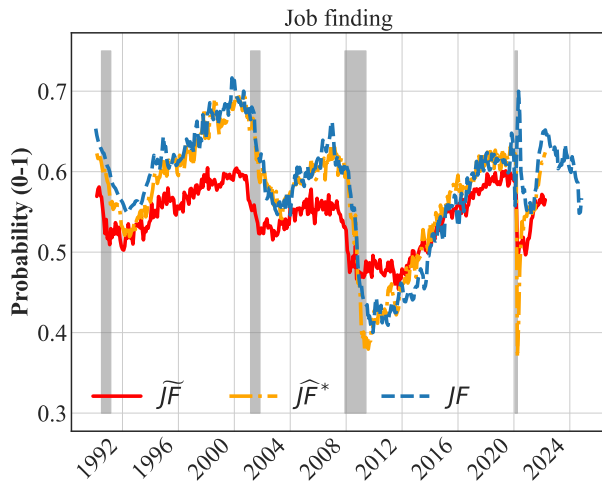
- Based on the optimal LASSO estimated on post-2013 SCE/MSD patterns
- No evidence for a structural break in survey beliefs based on the test of Andrews (1993)

Validating the backcasting method: two examples

Imputed Beliefs versus Observed Expectations in the MSC



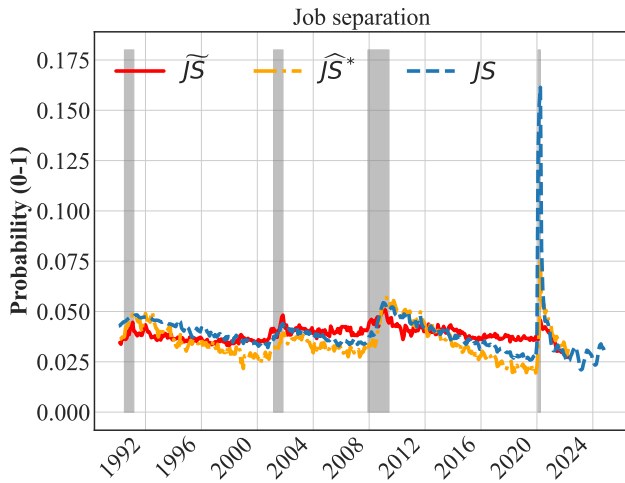
Surveys versus machine: job-finding



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

► In-sample

Surveys versus machine: job-separation



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

► In-sample

Heterogeneity in risks and perceptions

- 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?

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

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

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

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

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

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

►► In-sample

►► by education

Business cycle patterns of risks and perceptions: job-finding

Table: Peak-to-trough ratio of JF

	1990	2001	2007	2020	Mean
\widetilde{JF}	$\frac{0.57}{0.52} = 1.10$	$\frac{0.56}{0.53} = 1.06$	$\frac{0.53}{0.48} = 1.10$	$\frac{0.60}{0.50} = 1.20$	1.11
\widetilde{JF}^{25}	$\frac{0.34}{0.27} = 1.26$	$\frac{0.34}{0.29} = 1.17$	$\frac{0.28}{0.22} = 1.27$	$\frac{0.39}{0.27} = 1.44$	1.29
\widetilde{JF}^{50}	$\frac{0.66}{0.58} = 1.14$	$\frac{0.61}{0.52} = 1.17$	$\frac{0.58}{0.51} = 1.14$	$\frac{0.68}{0.52} = 1.31$	1.19
\widetilde{JF}^{75}	$\frac{0.86}{0.81} = 1.06$	$\frac{0.84}{0.78} = 1.08$	$\frac{0.84}{0.80} = 1.05$	$\frac{0.89}{0.81} = 1.10$	1.07
JF^*	$\frac{0.61}{0.56} = 1.09$	$\frac{0.66}{0.60} = 1.10$	$\frac{0.59}{0.39} = 1.51$	$\frac{0.62}{0.41} = 1.51$	1.30
JF	$\frac{0.64}{0.60} = 1.07$	$\frac{0.68}{0.63} = 1.08$	$\frac{0.59}{0.43} = 1.37$	$\frac{0.63}{0.62} = 1.02$	1.13

Business cycle patterns of risks and perceptions: job-separation

Table: Peak-to-trough ratio of JS

	1990	2001	2007	2020	Mean
\widetilde{JS}	$\frac{0.036}{0.040} = 0.90$	$\frac{0.042}{0.044} = 0.95$	$\frac{0.042}{0.047} = 0.89$	$\frac{0.036}{0.043} = 0.84$	0.90
\widetilde{JS}^{25}	$\frac{0.011}{0.014} = 0.79$	$\frac{0.012}{0.012} = 1$	$\frac{0.013}{0.015} = 0.87$	$\frac{0.010}{0.014} = 0.71$	0.84
\widetilde{JS}^{50}	$\frac{0.066}{0.082} = 0.80$	$\frac{0.064}{0.060} = 1.07$	$\frac{0.072}{0.120} = 0.6$	$\frac{0.053}{0.077} = 0.69$	0.79
\widetilde{JS}^{75}	$\frac{0.20}{0.20} = 1$	$\frac{0.20}{0.21} = 0.95$	$\frac{0.18}{0.24} = 0.75$	$\frac{0.16}{0.20} = 0.80$	0.88
JS^*	$\frac{0.037}{0.047} = 0.79$	$\frac{0.032}{0.039} = 0.82$	$\frac{0.033}{0.054} = 0.61$	$\frac{0.031}{0.055} = 0.56$	0.70
JS	$\frac{0.044}{0.047} = 0.94$	$\frac{0.034}{0.042} = 0.81$	$\frac{0.034}{0.051} = 0.67$	$\frac{0.026}{0.16} = 0.16$	0.64

Model quantification of consumption
fluctuations due to (a), (b), (c)

Model elements

- Buffer-stock consumers
- Uninsured idiosyncratic income risks:
 - persistent unemployment
 - persistent + transitory wage risks
- CRRA utility
- Zero-borrowing constraint
- Self-insurance via one risk-free asset
- Homogeneous (baseline) → heterogeneous unemployment risks (extension)
- Monthly frequency

Household block of the model: income process

Wage

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

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

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

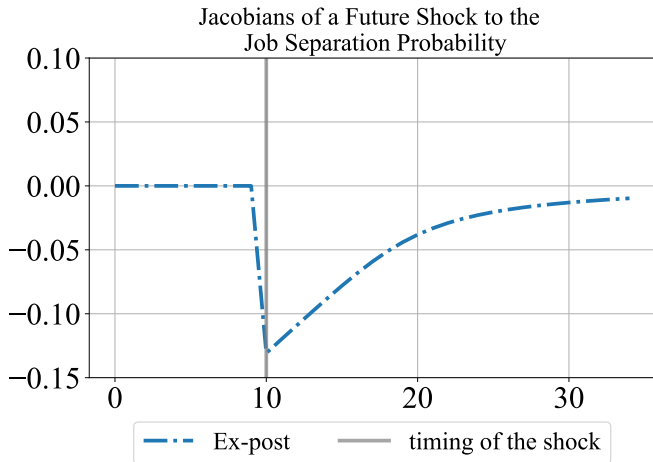
Labor market transitions

$$p(n_{i,t} = e | n_{i,t-1} = u) = JF_t$$

$$p(n_{i,t} = u | n_{i,t-1} = e) = JS_t$$

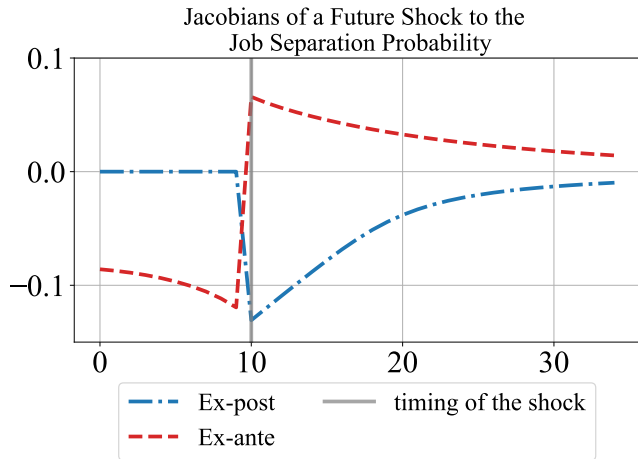
- $\beta \rightarrow$ average quarterly MPC of 0.21; UI replacement ratio $\gamma = 0.5$.

Aggregate consumption response: **ex-post impacts**



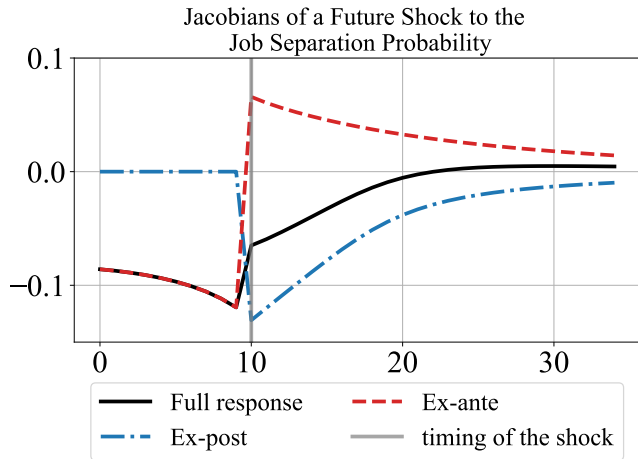
- Sequence-space Jacobian method Auclert et al. (2021)
- Jacobian decomposed into (a) **ex-ante risk response** (b) **ex-post shock response**

Aggregate consumption response: **ex-ante response**



- Sequence-space Jacobian method Auclert et al. (2021)
- Jacobian decomposed into (a) **ex-ante risk response** (b) **ex-post shock response**

Aggregate consumption response: **ex-ante** + **ex-post**



- Sequence-space Jacobian method Auclert et al. (2021)
- Jacobian decomposed into (a) **ex-ante risk response** (b) **ex-post shock response**

Mapping data to the model

Realizations

$$p(n_{i,t} = e | n_{i,t-1} = u) = JF_t$$

$$p(n_{i,t} = u | n_{i,t-1} = e) = JS_t$$

$$JF_t = \rho_{JF} JF_{t-1} + \varepsilon_{JF,t}$$

$$JS_t = \rho_{JS} JS_{t-1} + \varepsilon_{JS,t}$$

Perceptions

$$\tilde{p}(n_{i,t+1} = e | n_{i,t} = u) = \widetilde{JF}_t$$

$$\tilde{p}(n_{i,t+1} = u | n_{i,t} = e) = \widetilde{JS}_t$$

$$\widetilde{JF}_t = \rho_{\widetilde{JF}} \widetilde{JF}_{t-1} + \varepsilon_{\widetilde{JF},t}$$

$$\widetilde{JS}_t = \rho_{\widetilde{JS}} \widetilde{JS}_{t-1} + \varepsilon_{\widetilde{JS},t}$$

Objective/True risks

$$\hat{p}(n_{i,t+1} = e | n_{i,t} = u) = \widehat{JF}_t^*$$

$$\hat{p}(n_{i,t+1} = u | n_{i,t} = e) = \widehat{JS}_t^*$$

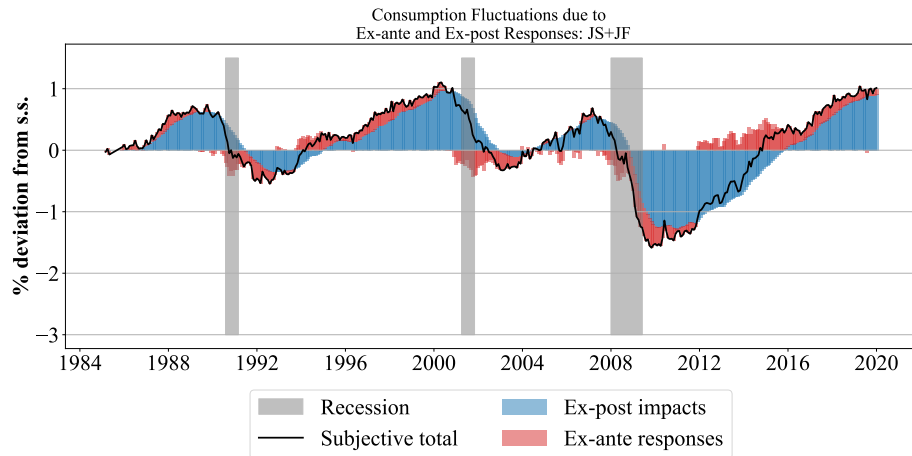
$$\widehat{JF}_t^* = \rho_{\widehat{JF}^*} \widehat{JF}_{t-1}^* + \varepsilon_{\widehat{JF}^*,t}$$

$$\widehat{JS}_t^* = \rho_{\widehat{JS}^*} \widehat{JS}_{t-1}^* + \varepsilon_{\widehat{JS}^*,t}$$

$$\Rightarrow \{ \hat{\varepsilon}_{JF,t}, \hat{\varepsilon}_{JS,t}, \hat{\varepsilon}_{\widetilde{JF},t}, \hat{\varepsilon}_{\widetilde{JS},t}, \hat{\varepsilon}_{\widehat{JF}^*,t}, \hat{\varepsilon}_{\widehat{JS}^*,t} \} \text{ for } t = 1, \dots, T.$$

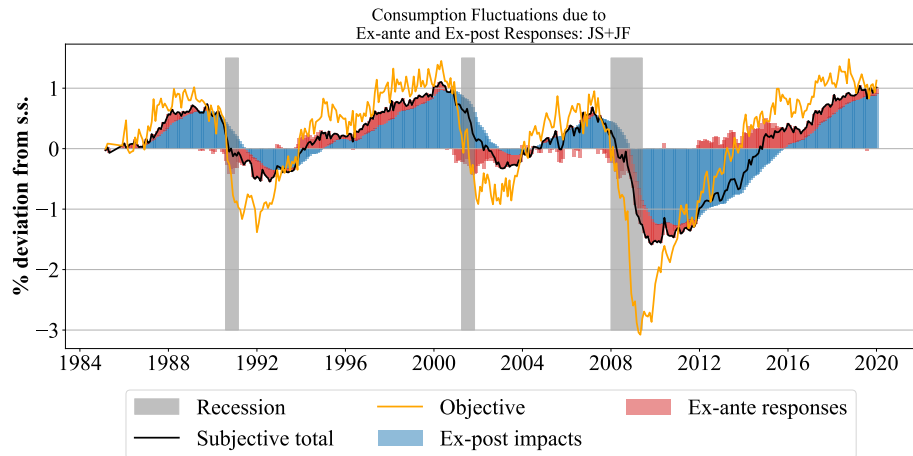
- Feeding these shocks into the model, we obtain the partial equilibrium deviations of aggregate consumption relative to the model's steady state level

Consumption fluctuations under subjective **perceptions**



- **Ex-ante** \leftarrow (a) **perceived risks** \times **ex-ante** Jacobians
 - **Ex-post** \leftarrow (c) **realized transitions** \times **ex-post** Jacobians
- } Subjective total

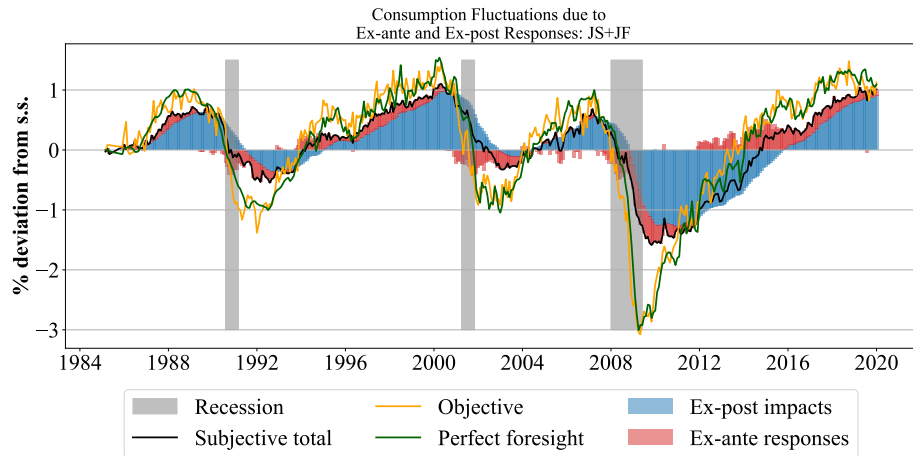
Counterfactual I: (a) perceptions = (b) objective risks



- **Ex-ante** \leftarrow (b) objective risks \times ex-ante Jacobians
- **Ex-post** \leftarrow (c) realized transitions \times ex-post Jacobians

} Objective

Counterfactual II: (b) objective risks = (c) realized transitions

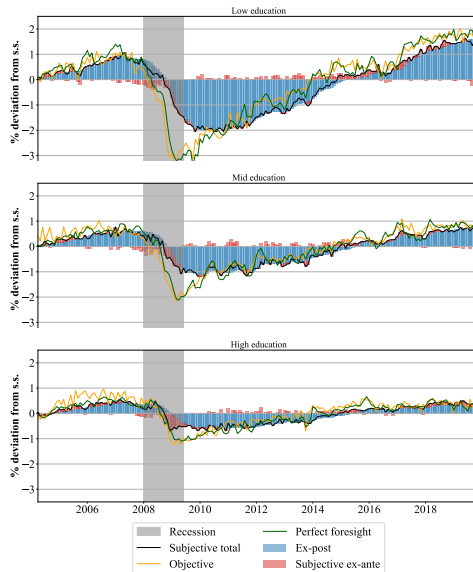


- **Ex-ante** \leftarrow (c) realized transitions \times ex-ante Jacobians
- **Ex-post** \leftarrow (c) realized transitions \times ex-post Jacobians

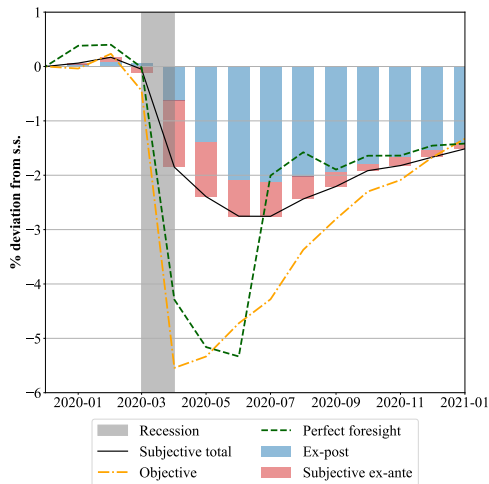
} “Perfect foresight”

Allowing for **heterogeneity** in risks and perceptions by education

- Calibrated to match education-specific MPCs (Fuster et al., 2021)
- Group with the larger risk exposure has stickier belief, hence more underinsured



A case study of the COVID recession



- Job-finding impacts were primarily due to **precautionary** responses
- Job-separation impacts were mostly **income losses**

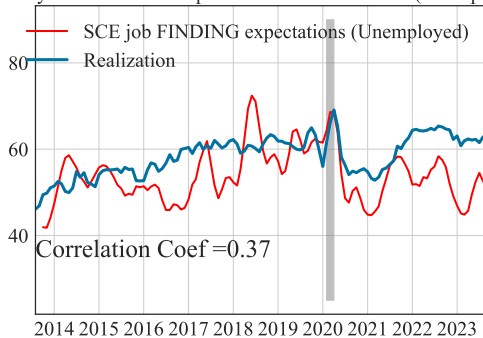
Conclusion

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

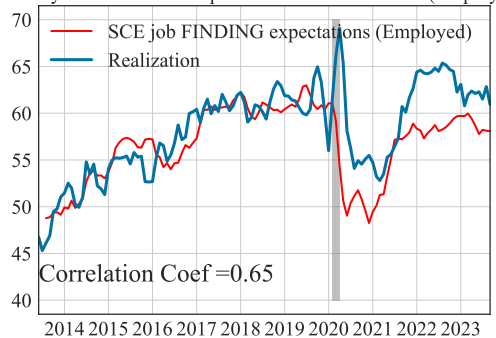
Appendix

JF perceptions by the unemployed and employed

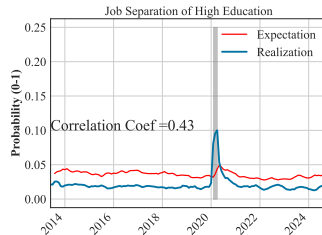
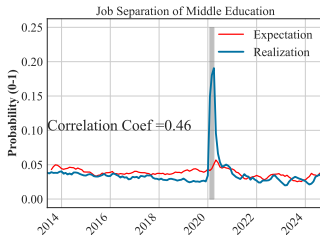
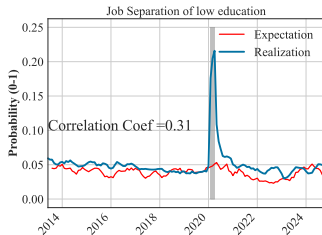
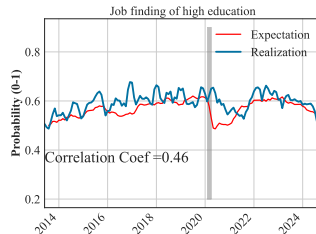
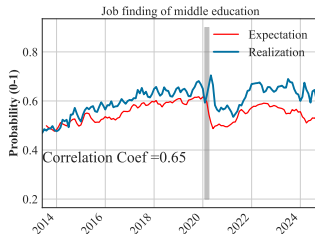
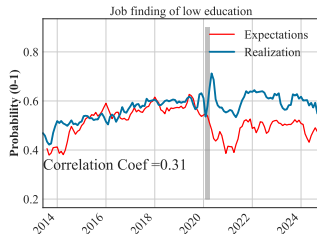
Survey Job FINDING Expectations and Realization (Unemployed)



Survey Job FINDING Expectations and Realization (Employed)

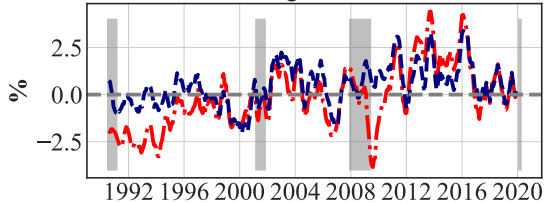


Perceived and realized transition rates remain correlated within education



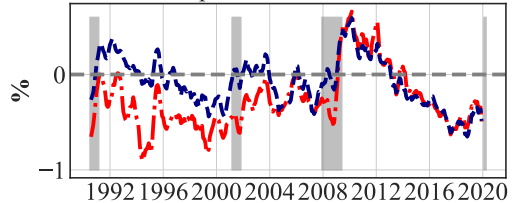
Why is real-time important?

Job Finding Forecast Error



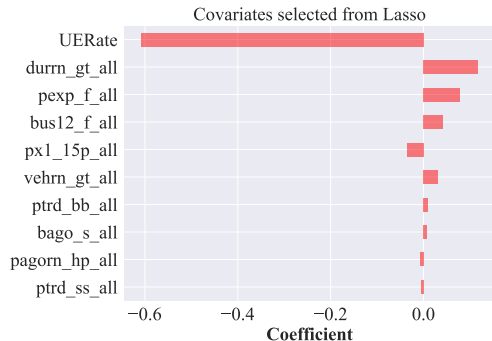
— · · $\hat{JF}^* - JF$: real-time
— · · $\hat{JF}^* - JF$: retrospective

Job Separation Forecast Errors

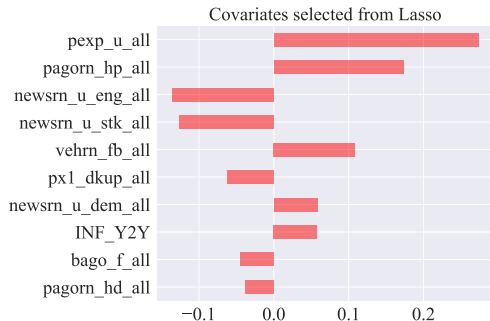


— · · $\hat{JS}^* - JS$: real-time
— · · $\hat{JS}^* - JS$: retrospective

The most important covariates of perceived unemployment risks



- UERate: real-time unemployment rate.
- Durnn_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.
- Vehrnt_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.
- Vehrnt_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.

Heterogeneity in risks and perceptions (2013-2023)

$$\log(\widetilde{JF}_{t+3|t}) = 0.71 + \mathbf{0.81} \log(\widehat{JF}_{t+3|t}^*) + \epsilon_t$$

$$\log(\widetilde{JF}_{t+3|t}^{0.25}) = -5.73 + \mathbf{2.26} \log(\widehat{JF}_{t+3|t}^*) + \epsilon_t$$

$$\log(\widetilde{JF}_{t+3|t}^{0.5}) = -0.84 + \mathbf{1.22} \log(\widehat{JF}_{t+3|t}^*) + \epsilon_t$$

$$\log(\widetilde{JF}_{t+3|t}^{0.75}) = 2.66 + \mathbf{0.44} \log(\widehat{JF}_{t+3|t}^*) + \epsilon_t$$

$$\log(\widetilde{JS}_{t+3|t}) = 1.11 + \mathbf{0.14} \log(\widehat{JS}_{t+3|t}^*) + \epsilon_t$$

$$\log(\widetilde{JS}_{t+3|t}^{0.25}) = -0.91 + \mathbf{0.61} \log(\widehat{JS}_{t+3|t}^*) + \epsilon_t$$

$$\log(\widetilde{JS}_{t+3|t}^{0.5}) = 0.12 + \mathbf{0.34} \log(\widehat{JS}_{t+3|t}^*) + \epsilon_t$$

$$\log(\widetilde{JS}_{t+3|t}^{0.75}) = 1.40 + \mathbf{0.06} \log(\widehat{JS}_{t+3|t}^*) + \epsilon_t$$

Observable heterogeneity: education

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

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

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

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

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

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

- Low-education group's perceptions, especially regarding job separations, are the most underreactive to “true” risks.

Observable heterogeneity: education (2013-2023)

$$\log(\widetilde{JF}_{t+3|t}^{LEdu}) = 0.05 + \mathbf{0.82} \log(\widehat{JF}_{t+3|t}^{*LEdu}) + \epsilon_t$$

$$\log(\widetilde{JF}_{t+3|t}^{MEdu}) = 0.12 + \mathbf{0.73} \log(\widehat{JF}_{t+3|t}^{*MEdu}) + \epsilon_t$$

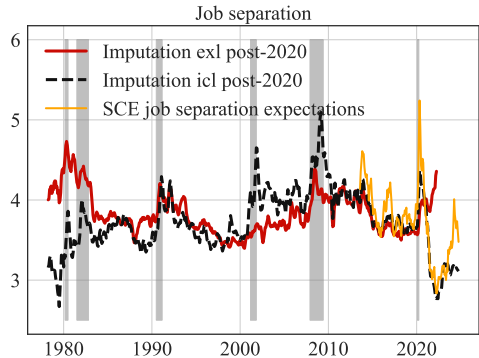
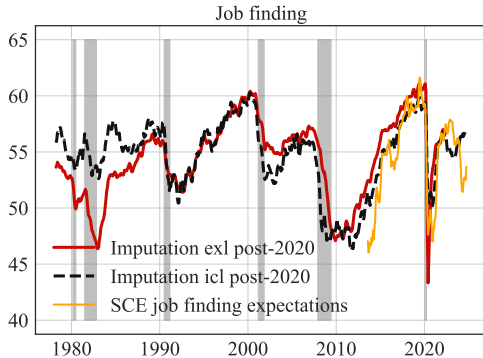
$$\log(\widetilde{JF}_{t+3|t}^{HEdu}) = 0.19 + \mathbf{0.62} \log(\widehat{JF}_{t+3|t}^{*HEdu}) + \epsilon_t$$

$$\log(\widetilde{JS}_{t+3|t}^{LEdu}) = 0.88 + \mathbf{0.25} \log(\widehat{JS}_{t+3|t}^{*LEdu}) + \epsilon_t$$

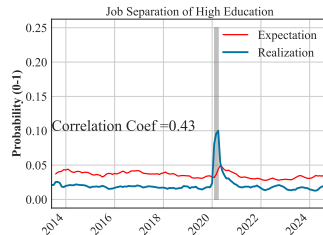
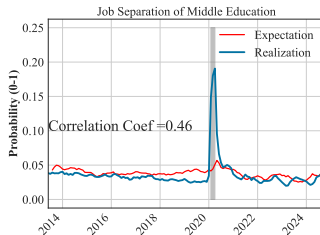
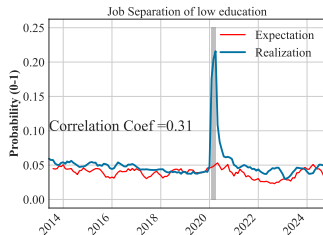
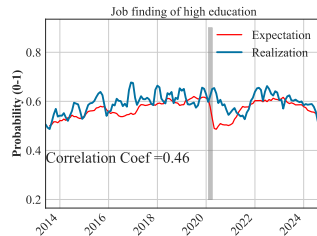
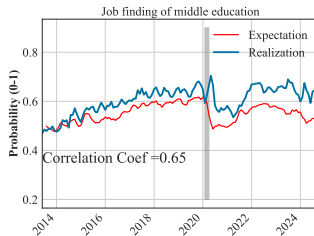
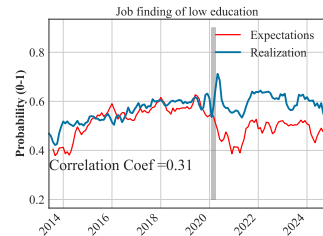
$$\log(\widetilde{JS}_{t+3|t}^{MEdu}) = 0.99 + \mathbf{0.24} \log(\widehat{JS}_{t+3|t}^{*MEdu}) + \epsilon_t$$

$$\log(\widetilde{JS}_{t+3|t}^{HEdu}) = 1.06 + \mathbf{0.22} \log(\widehat{JS}_{t+3|t}^{*HEdu}) + \epsilon_t$$

Imputing beliefs including or excluding the Covid era

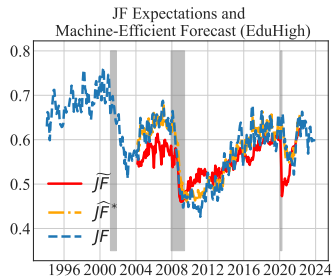
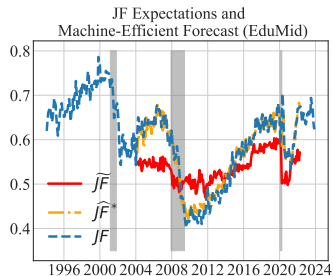
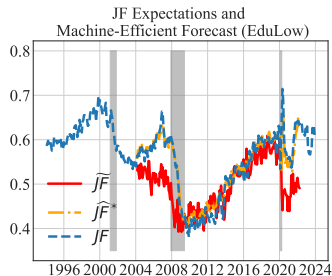


Observable heterogeneity: education

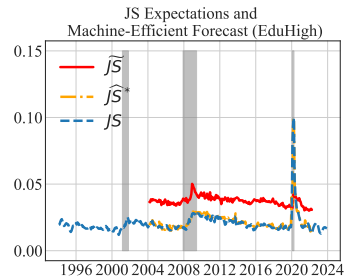
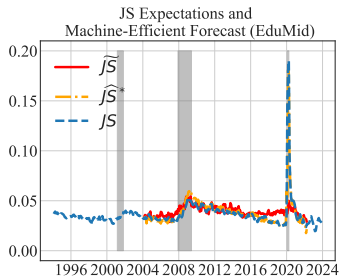
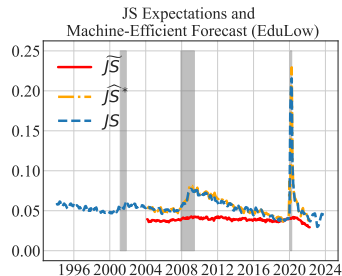


- low education group faces higher separation rate, but perceived separation risks did not go up as much

Belief distortions by education: job finding



Belief distortions by education: job separation



Household block of the model

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

$$s.t. \quad \mathbf{a}_{it} = \mathbf{m}_{it} - \mathbf{c}_{it}$$

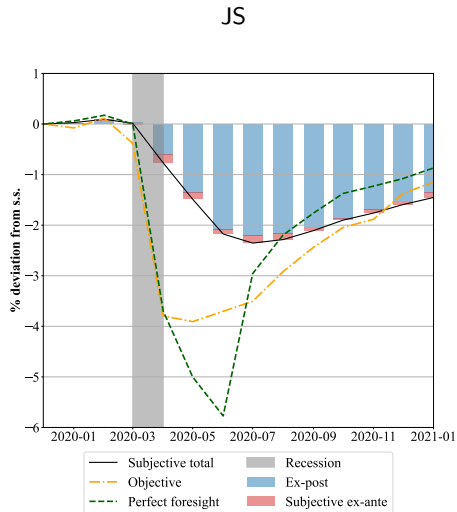
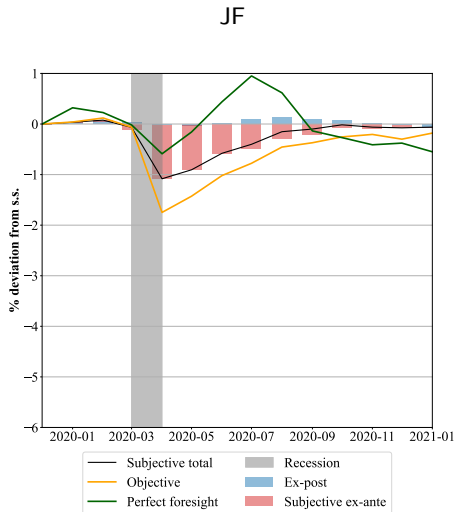
$$\mathbf{a}_{it} + \mathbf{c}_{it} = \mathbf{z}_{it} + (1 + r_t^a)\mathbf{a}_{it-1}$$

$$\mathbf{a}_{it} \geq 0$$

Calibration

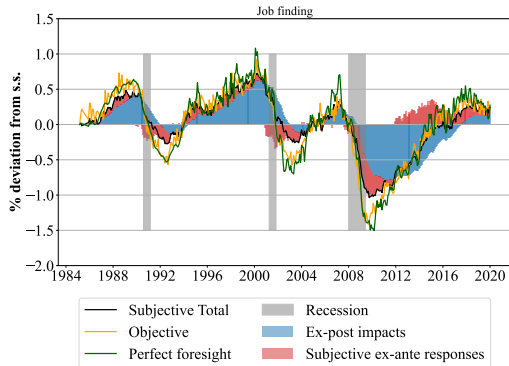
Description	Parameter	Value	Source/Target
CRRA	CRRA	2	Standard
Real Interest Rate	r	$1.05^{\frac{1}{12}} - 1$	5% annualized real rate
UI replacement rate	γ	0.5	50% replacement rate
Persistence of idiosyncratic income process	ρ_e	0.997	Kekre (2023)
Std Dev of idiosyncratic income process	σ_e	0.057	Kekre (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

A case study of the COVID recession

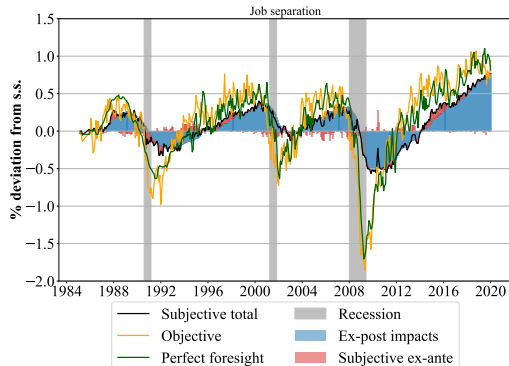


Job-finding versus job-separation

JF

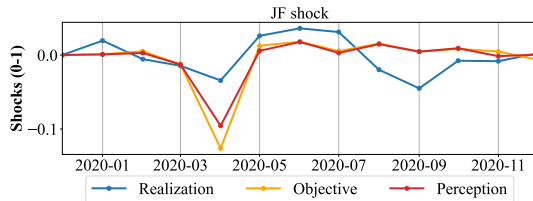


JS

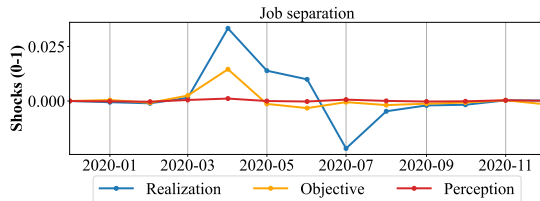


Perception and realization shocks during COVID

JF



JS



» Back

References I

- Andrews, Donald WK**, “Tests for parameter instability and structural change with unknown change point,” *Econometrica: Journal of the Econometric Society*, 1993, pp. 821–856.
- Arni, Patrick**, “What’ s in the Blackbox? The Effect of Labor Market Policy on Search Behavior & Beliefs. A Field Experiment,” Technical Report, IZA Working papers 2013.
- Auclert, Adrien, Bence Bardóczy, Matthew Rognlie, and Ludwig Straub**, “Using the sequence-space Jacobian to solve and estimate heterogeneous-agent models,” *Econometrica*, 2021, 89 (5), 2375–2408.
- Balleer, Almut, Georg Duernecker, Susanne Forstner, and Johannes Goensch**, “The Effects of Biased Labor Market Expectations on Consumption, Wealth Inequality, and Welfare,” 2021.
- Bardóczy, Bence and Joao Guerreiro**, “Unemployment Insurance in Macroeconomic Stabilization with Imperfect Expectations,” Technical Report, mimeo 2023.

References II

- Bayer, Christian, Ralph Lütticke, Lien Pham-Dao, and Volker Tjaden**, “Precautionary savings, illiquid assets, and the aggregate consequences of shocks to household income risk,” *Econometrica*, 2019, 87 (1), 255–290.
- Bianchi, Francesco, Sydney C Ludvigson, and Sai Ma**, “Belief distortions and macroeconomic fluctuations,” *American Economic Review*, 2022, 112 (7), 2269–2315.
- Broer, Tobias, Jeppe Druedahl, Karl Harmenberg, and Erik Öberg**, “The unemployment-risk channel in business-cycle fluctuations,” 2021.
- Caplin, Andrew, Victoria Gregory, Eungik Lee, Søren Leth-Petersen, and Johan Sæverud**, “Subjective earnings risk,” Technical Report, National Bureau of Economic Research 2023.
- Coibion, Olivier and Yuriy Gorodnichenko**, “Information rigidity and the expectations formation process: A simple framework and new facts,” *American Economic Review*, 2015, 105 (8), 2644–78.

References III

- , —, and **Saten Kumar**, “How do firms form their expectations? new survey evidence,” *American Economic Review*, 2018, 108 (9), 2671–2713.
- Conlon, John J, Laura Pilossoph, Matthew Wiswall, and Basit Zafar**, “Labor market search with imperfect information and learning,” Technical Report, National Bureau of Economic Research 2018.
- den Haan, Wouter J., Pontus Rendahl, and Markus Riegler**, “Unemployment (fears) and deflationary spirals,” *Journal of the European Economic Association*, 2018, 16 (5), 1281–1349.
- Fuhrer, Jeffrey C**, “Intrinsic expectations persistence: evidence from professional and household survey expectations,” *Available at SSRN 3296152*, 2018.
- Fuster, Andreas, Greg Kaplan, and Basit Zafar**, “What would you do with \$500? Spending responses to gains, losses, news, and loans,” *The Review of Economic Studies*, 2021, 88 (4), 1760–1795.

References IV

- Graves, Sebastian**, “Does Unemployment Risk Affect Business Cycle Dynamics?,” *International Finance Discussion Paper*, 2020, (1298).
- Jurado, Kyle, Sydney C Ludvigson, and Serena Ng**, “Measuring uncertainty,” *American Economic Review*, 2015, 105 (3), 1177–1216.
- Kekre, Rohan**, “Unemployment insurance in macroeconomic stabilization,” *Review of Economic Studies*, 2023, 90 (5), 2439–2480.
- Koşar, Gizem and Wilbert Van der Klaauw**, “Workers’ perceptions of earnings growth and employment risk,” *Journal of Labor Economics*, 2025, 43 (S1), S83–S121.
- Lee, Do Q**, “Belief Distortions and Unemployment Fluctuations,” *Available at SSRN 5226836*, 2025.
- Menzio, Guido et al.**, “Stubborn Beliefs in Search Equilibrium,” *NBER Chapters*, 2022.
- Mitra, Anushka**, “Imperfect Information and Slow Recoveries in the Labor Market,” 2024.

References V

- Morales-Jiménez, Camilo**, “The Cyclical Behavior of Unemployment and Wages under Information Frictions,” *American Economic Journal: Macroeconomics*, 2022, 14 (1), 301–331.
- Mueller, Andreas I and Johannes Spinnewijn**, “Expectations data, labor market, and job search,” *Handbook of Economic Expectations*, 2023, pp. 677–713.
- , —, and **Giorgio Topa**, “Job seekers’ perceptions and employment prospects: Heterogeneity, duration dependence, and bias,” *American Economic Review*, 2021, 111 (1), 324–63.
- Pappa, Evi, Morten O Ravn, and Vincent Sterk**, “Expectations and incomplete markets,” in “Handbook of Economic Expectations,” Elsevier, 2023, pp. 569–611.
- Rodríguez, Marta Garcia**, “The Role of Wage Expectations in the Labor Market,” 2023.
- Rossi, Barbara and Tatevik Sekhposyan**, “Macroeconomic uncertainty indices based on nowcast and forecast error distributions,” *American Economic Review*, 2015, 105 (5), 650–655.

References VI

- Rozsypal, Filip and Kathrin Schlafmann**, “Overpersistence bias in individual income expectations and its aggregate implications,” *American Economic Journal: Macroeconomics*, 2023, 15 (4), 331–371.
- Spinnewijn, Johannes**, “Unemployed but optimistic: Optimal insurance design with biased beliefs,” *Journal of the European Economic Association*, 2015, 13 (1), 130–167.
- Wang, Tao**, “Perceived versus calibrated income risks in heterogeneous-agent consumption models,” Technical Report, Bank of Canada 2023.